



End Mills for High-hardness Steels

Vol.4-1

# 高硬度鋼用エンドミル

新価格  
体系  
2022年11月

AE-MSS-H・AE-MS-H・AE-ML-H・PXSH  
AE-BM-H・AE-BD-H・AE-LNBD-H・AE-CPR4-H

## 多刃スクエアタイプ Multi-flute Type

ショート形 Short : AE-MS-H  $\phi 16$ 、 $\phi 20$   
ロング形 Long : AE-ML-H  $\phi 16$ 、 $\phi 20$

## ロングネックラジアスタイプ Long Neck Radius Type : AE-CPR4-H

## ヘッド交換式エンドミル Exchangeable Head End Mill : PXSH

計184アイテム追加  
184 new items added



# LINE UP ラインナップ

## 多刃スクエアタイプ・ラジアスタイプ Multi-flute square type and radius type

**AE-MSS-H スタブ形 1.5D刃長(首下長3D)** 1.5 × D cutting length (Neck length 3 × D) ..... **P.7**

**AE-MS-H ショート形 2.5D刃長** 2.5 × D cutting length

AE-MSS-H

スクエアタイプ Square Type ..... **P.10**

AE-MS-H

スクエアタイプ Square Type ..... **P.11**

ラジアスタイプ Radius Type ..... **P.12**



4刃  
4 Flutes



6刃  
6 Flutes



**AE-ML-H ロング形 4D刃長** 4 × D cutting length ..... **P.15**

スクエアタイプ Square Type ..... **P.19**



## ボールタイプ Ball Type

**AE-BM-H 高能率型4刃** 4-flute type for high-efficiency processing ..... **P.21**



**AE-BD-H 高精度仕上げ用2刃** 2-flute type for high-precision finishing ..... **P.27**



## ロングネックタイプ Long neck Type

**AE-CPR4-H 高能率仕上げ用4刃ラジアスタイプ** **NEW** ..... **P.31**

4-flute radius type for high-efficiency and high-precision finishing



**AE-LNBD-H 高精度仕上げ用2刃ボールタイプ** ..... **P.47**

2-flute ball type for high-precision finishing



## ヘッド交換式エンドミル PXM Exchangeable Head End Mill

**PXSH 1D刃長** 1 × D cutting length **NEW** ..... **P.63**

スクエアタイプ Square Type ..... **P.65**

PXMZ ストレートシャंकホルダ Straight Shank Holder for PXM

..... **P.66**

PXMC PXM専用コレット Collet for PXM Exchangeable Head End Mill

..... **P.68**



6刃  
6 Flutes



8刃  
8 Flutes



# 高硬度鋼加工に最適化された超耐熱性・高じん性のコーティング

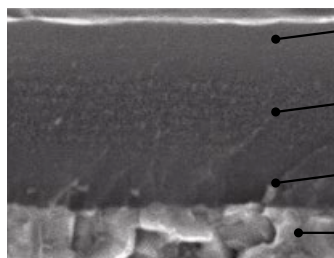
DUROREY coating enables superior heat resistance and high toughness optimized for high-hardness steel milling!

デューロレイ

# DUROREY

PAT.P in Japan

## 被膜断面 Coating Structure

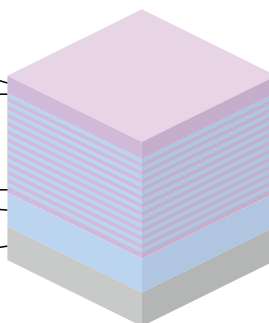


超耐熱層  
Super Heat Resistant Layer

超微細ナノ周期積層構造  
Ultra-Fine Periodic Nano-Layered Structure

付着強度強化層  
Adhesion Strength Reinforcing Layer

母材  
Base Metal



## 超耐熱層 Super Heat Resistant Layer

SiC含有の超耐熱材料と結晶微細化による表面平滑化、高硬度化、高じん性および耐凝着強化  
Smoothering of surface, high toughness and adhesion resistance due to the SiC containing ultra-heat-resistance material and crystal miniaturization

## 超微細ナノ周期積層構造 Ultra-Fine Periodic Nano-Layered Structure

ナノ周期積層と耐摩耗層の積層構造によって、結晶微細化と機械特性の改善  
Crystal miniaturization and improvement of mechanical properties due to the laminated structure of periodic nano-layer and wear-resistant layer

SiC含有の超耐熱層と超微細ナノ周期積層構造によって、  
高い耐熱性と耐摩耗性を有しつつ、優れたじん性を発揮します。  
高硬度加工においてもチッピングを抑制し、工具の長寿命化を実現します。

Super heat resistant layer and ultra-fine periodic nano-layered structure provide superior toughness while maintaining high heat resistance and abrasion resistance.  
Also suppresses chipping even in high hardness milling and achieves long tool life.

| 被膜色<br>Coating Color | 被膜構造<br>Coating Structure                     | 硬さ (GPa)<br>Hardness | 酸化開始<br>温度 (°C)<br>Oxidation<br>Temperature | 耐熱性<br>Heat Resistance | 付着力<br>Adhesion Strength | 面粗さ<br>Surface Roughness | 耐摩耗性<br>Wear Resistance | 耐凝着性<br>Welding Resistance | じん性<br>Toughness |
|----------------------|-----------------------------------------------|----------------------|---------------------------------------------|------------------------|--------------------------|--------------------------|-------------------------|----------------------------|------------------|
| 黒灰色<br>Black Gray    | 超微細ナノ周期積層<br>Ultra-Fine Periodic Nano-Layered | 41                   | 1,300                                       | ☆                      | ◎                        | ○                        | ☆                       | ◎                          | ◎                |

DUROREYはオーエスジー株式会社の登録商標です。  
DUROREY is a registered trademark of OSG Corporation.

(標準) ○ → ◎ → ☆ (高評価)  
Fair Best

## 被膜性能

Coating Performance

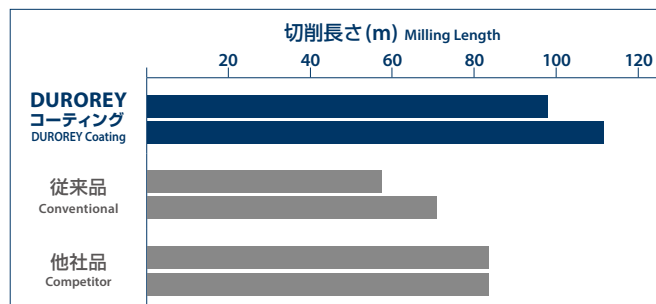
## 硬さ60HRC SKD11加工データ

Cutting data of SKD11 60 HRC

|                        |                                                          |
|------------------------|----------------------------------------------------------|
| 使用工具<br>Tool           | 超硬スクエアエンドミル $\phi 10$ 6枚刃<br>square carbide end mill 6FL |
| 被削材<br>Work Material   | SKD11 (60HRC)                                            |
| 加工方法<br>Milling Method | 側面切削<br>Side Milling                                     |
| 切削速度<br>Cutting Speed  | 150m/min (4,800min <sup>-1</sup> )                       |
| 送り速度<br>Feed           | 2,000mm/min (0.069mm/t)                                  |
| 切込深さ<br>Depth of Cut   | $a_p=10\text{mm}$ $a_e=0.1\text{mm}$                     |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                                        |

## 外周摩耗幅0.1mmでの切削長さ

Cutting length up to 0.1mm outer circumference wear width



## 84m加工後の損傷状況 Wear comparison after milling 84 m

| DUROREYコーティング<br>DUROREY Coating | 従来品<br>Conventional | 他社品<br>Competitor |
|----------------------------------|---------------------|-------------------|
|                                  |                     |                   |

## 従来コーティング品に対して 約60%の性能向上

Approximately 60% improvement in performance compared to conventional coated products



## 加工データ 1 Cutting Data 1

# 最大切込み量22mmによる高硬度鋼 (60HRC) の 高能率荒加工

High efficiency machining of high-hardness steel (60 HRC) with a maximum depth of cut of 22 mm

## 被削材：SKD11 (60HRC)

Work Material

使用機械：立形マシニングセンタ

Machine：Vertical Machining Center

主軸タイプ：HSK-A63 最高回転数：20,000min<sup>-1</sup>

Main Spindle

Maximum RPM

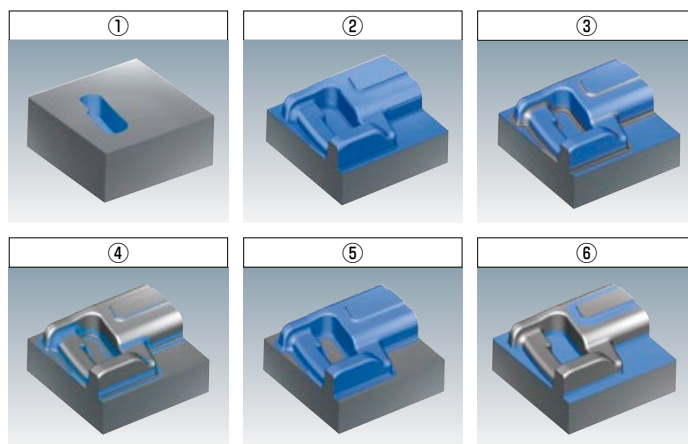
切削油剤：エアブロー ホルダ：焼ばめホルダ

Coolant：Air Blow

Holder：Shrink Fit

製品紹介と  
加工動画は  
こちらから

Scan code for product  
details and video



| 工程番号<br>Process | 加工部<br>Milling Part | 加工方法<br>Milling Method                                 | 加工内容<br>Milling Process          | 使用工具<br>Tool       | 切削速度<br>Cutting Speed<br>(m/min)  | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm)                 | ae<br>(mm)                  |
|-----------------|---------------------|--------------------------------------------------------|----------------------------------|--------------------|-----------------------------------|--------------------------|----------------------------|-----------------------------|
| ①               | ポケット部<br>Pocket     | ヘリカル加工<br>Helical Milling                              | 荒加工<br>Roughing                  | AE-MS-H<br>φ10     | 120<br>(3,800min <sup>-1</sup> )  | 1,200<br>(0.05mm/t)      | ヘリカル角度 1°<br>Helical Angle | ヘリカル半径 R5<br>Helical Radius |
|                 |                     | 繰り広げ加工<br>Enlarging                                    |                                  |                    | 120<br>(3,800min <sup>-1</sup> )  | 6,000<br>(0.26mm/t)      | 22                         | 0.1                         |
| ②               | 全体<br>Overall       | 側面切削 高能率加工<br>Side Milling,<br>High-efficiency Milling | 荒加工<br>Roughing                  | AE-MS-H<br>φ10×R1  | 120<br>(3,800min <sup>-1</sup> )  | 6,000<br>(0.26mm/t)      | 22                         | 0.1                         |
| ③               | 全体<br>Overall       | 等高線加工<br>Contour Milling                               | 中仕上げ加工<br>Semi-finishing         | AE-BM-H<br>R5      | 270<br>(8,600min <sup>-1</sup> )  | 3,100<br>(0.09mm/t)      | 0.5                        | 0.5                         |
| ④               | 隅R部<br>Corner R     | 等高線加工<br>Contour Milling                               | 取り残し加工<br>Leftover Milling       | AE-BM-H<br>R3      | 104<br>(5,500min <sup>-1</sup> )  | 1,800<br>(0.08mm/t)      | 0.5                        | 0.5                         |
| ⑤               | 形状部<br>Shape        | 等高線加工<br>Contour Milling                               | 仕上げ加工<br>Finishing               | AE-BD-H<br>R3×18   | 305<br>(16,200min <sup>-1</sup> ) | 970<br>(0.03mm/t)        | 0.1                        | 0.1                         |
| ⑥               | 底面部<br>Bottom       | 平面加工<br>Flat Surface Milling                           | PL面仕上げ加工<br>PL Surface Finishing | AE-MS-H<br>φ6×R0.5 | 104<br>(5,500min <sup>-1</sup> )  | 990<br>(0.03mm/t)        | 0.04                       | 0.25                        |



## 加工データ 2 Cutting Data 2

# 高硬度鋼 (60HRC) でも、大きな切込み量で 高能率直彫り加工

High efficiency direct engraving with a large depth of cut even in high-hardness steel (60 HRC)

### 被削材：YXR3 (60HRC)

Work Material

#### 使用機械：5軸加工機

Machine : Five-axis Machining Center

主軸タイプ：HSK-A63 最高回転数：25,000min<sup>-1</sup>

Main Spindle

Maximum RPM

切削油剤：MQL

Coolant

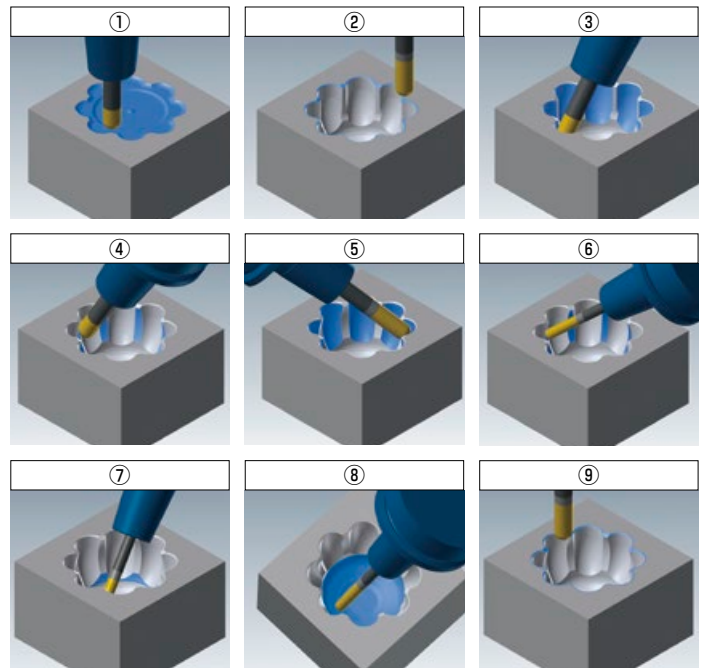
ホルダ：焼ばめホルダ

Holder : Shrink Fit



製品紹介と  
加工動画は  
こちらから

Scan code for product  
details and video



| 工程番号<br>Process | 加工部<br>Milling Part   | 加工方法<br>Milling Method            | 加工内容<br>Milling Process              | 使用工具<br>Tool         | 切削速度<br>Cutting Speed<br>(m/min) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
|-----------------|-----------------------|-----------------------------------|--------------------------------------|----------------------|----------------------------------|--------------------------|------------|------------|
| ①               | 全体<br>Overall         | 3軸 等高線<br>3-axis Contouring Line  | 高能率荒加工<br>High-efficiency Roughing   | AE-BM-H<br>R5        | 150<br>(4,800min <sup>-1</sup> ) | 1,920<br>(0.1mm/t)       | 0.7        | 1.5        |
| ②               | 面取り部<br>Chamfer       | 3軸 等高線<br>3-axis Contouring Line  | 中荒加工<br>Semi-roughing                |                      |                                  |                          |            |            |
| ③               | 溝部<br>Groove          | 5軸 倣い<br>5-axis Profiling         | 中荒加工<br>Semi-roughing                |                      |                                  |                          |            |            |
| ④               | 山部<br>Ridge           | 5軸 ターンミリング<br>5-axis Turn Milling | 荒・中荒加工<br>Roughing・Semi-roughing     |                      |                                  |                          |            |            |
| ⑤               | 溝部<br>Groove          | 5軸 倣い<br>5-axis Profiling         | 高精度仕上げ加工<br>High-precision Finishing | AE-BD-H<br>R5×30     | 150<br>(4,800min <sup>-1</sup> ) | 480<br>(0.05mm/t)        | 0.04       | 1          |
| ⑥               | 山部<br>Ridge           | 5軸 倣い<br>5-axis Profiling         | 高精度仕上げ加工<br>High-precision Finishing | AE-LNBD-H<br>R3×40×6 | 55<br>(2,900min <sup>-1</sup> )  | 174<br>(0.03mm/t)        | 0.03       | 0.2        |
| ⑦               | 中間底部<br>Middle Bottom | 5軸 ターンミリング<br>5-axis Turn Milling | 高精度仕上げ加工<br>High-precision Finishing |                      |                                  |                          | 0.02       | 0.2        |
| ⑧               | 底部<br>Bottom          | 5軸 ターンミリング<br>5-axis Turn Milling | 高精度仕上げ加工<br>High-precision Finishing |                      |                                  |                          |            |            |
| ⑨               | 面取り部<br>Chamfer       | 3軸 等高線<br>3-axis Contouring Line  | 高精度仕上げ加工<br>High-precision Finishing | AE-BD-H<br>R5×30     | 150<br>(4,800min <sup>-1</sup> ) | 480<br>(0.05mm/t)        | 0.04       | 1          |



## 加工データ 3 Cutting Data 3

# 高い工具性能が求められる熱間金型用鋼DH31-Sを 高能率に加工

Highly efficient machining of hot working die steel DH31-S, which requires superior tool performance

## 被削材：DH31-S (50HRC)

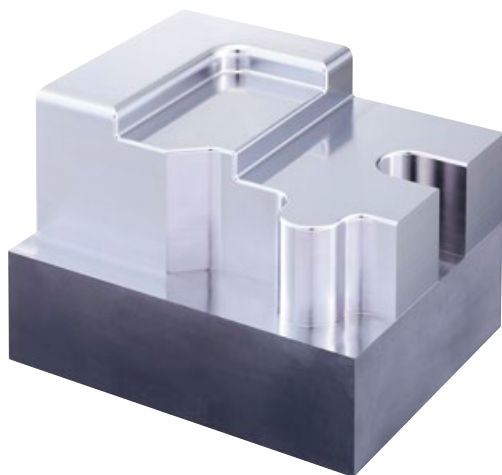
Work Material

使用機械：立形マシニングセンタ

Machine: Vertical Machining Center

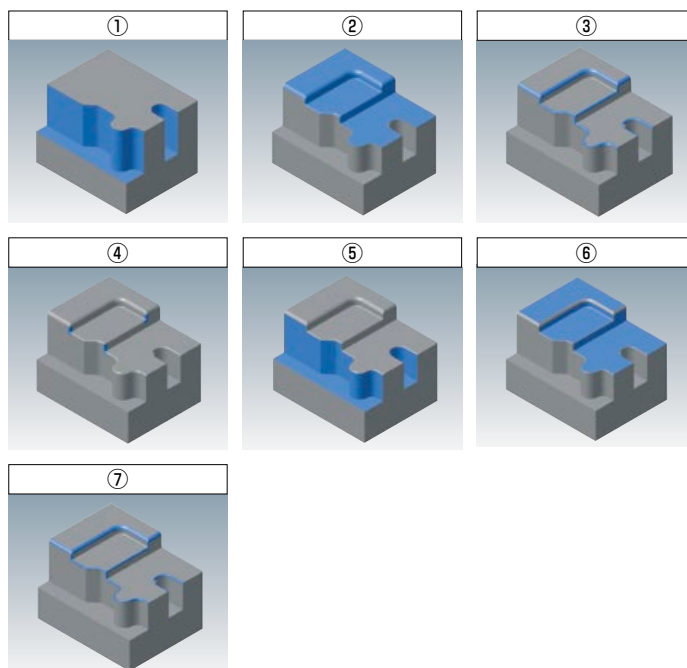
主軸タイプ：HSK-A63 最高回転数：20,000min<sup>-1</sup>  
Main Spindle Maximum RPM

切削油剤：エアブロー ホルダ：焼ばめホルダ  
Coolant: Air Blow Holder: Shrink Fit



製品紹介と  
加工動画は  
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Scan code for product  
details and video



| 工程番号<br>Process | 加工部<br>Milling Part  | 加工方法<br>Milling Method                                 | 加工内容<br>Milling Process       | 使用工具<br>Tool         | 切削速度<br>Cutting Speed<br>(m/min) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
|-----------------|----------------------|--------------------------------------------------------|-------------------------------|----------------------|----------------------------------|--------------------------|------------|------------|
| ①               | 側面<br>Side           | 側面切削 高能率加工<br>Side Milling,<br>High-efficiency Milling | 荒加工<br>Roughing               | AE-ML-H<br>φ10×40    | 80<br>(2,550min <sup>-1</sup> )  | 1,070<br>(0.07mm/t)      | 40         | 0.5        |
| ②               | 上部平面<br>Top          | 側面切削 高能率加工<br>Side Milling,<br>High-efficiency Milling |                               | AE-MS-H<br>φ10×R1    | 120<br>(3,800min <sup>-1</sup> ) | 2,750<br>(0.12mm/t)      | 15         | 0.5        |
| ③               | R 部<br>Corner R      | 等高線加工<br>Contour Milling                               |                               |                      | 200<br>(6,370min <sup>-1</sup> ) | 1,900<br>(0.05mm/t)      | 0.1        | 0.1        |
| ④               | 隅R部<br>Corner R      | 倣い加工<br>Copy Milling                                   | 取り残し加工<br>Leftover Milling    | AE-LNBD-H<br>R1×10×6 | 50<br>(8,000min <sup>-1</sup> )  | 480<br>(0.03mm/t)        | 0.1        | 0.1        |
| ⑤               | 底面・側面<br>Bottom-Side | 平面加工・側面切削<br>Face Milling<br>Side Milling              | 仕上げ加工<br>Finishing            | AE-ML-H<br>φ10×40    | 120<br>(3,800min <sup>-1</sup> ) | 1,150<br>(0.05mm/t)      | 0.2        | 1          |
| ⑥               | 上部平面<br>Top          | 平面加工・側面切削<br>Face Milling<br>Side Milling              |                               | AE-MS-H<br>φ10×R1    | 120<br>(3,800min <sup>-1</sup> ) | 1,150<br>(0.05mm/t)      | 40         | 0.1        |
| ⑦               | R 部<br>Corner R      | 等高線加工<br>Contour Milling                               |                               |                      | 80<br>(12,700min <sup>-1</sup> ) | 760<br>(0.03mm/t)        | 0.2        | 1          |
| ⑦               | R 部<br>Corner R      | 等高線加工<br>Contour Milling                               | R部仕上げ加工<br>Corner R Finishing | AE-LNBD-H<br>R1×10×6 | 80<br>(12,700min <sup>-1</sup> ) | 760<br>(0.03mm/t)        | 15         | 0.1        |



## 加工データ 4 Cutting Data 4

# 溝幅が狭いL/D=14の深掘り形状を高能率に加工

Highly efficient deep milling at L/D = 14 with narrow groove width

## 被削材：SKD61 (50HRC)

Work Material

## 使用機械：立形マシニングセンタ

Machine : Vertical Machining Center

主軸タイプ：HSK-A63 最高回転数：20,000min<sup>-1</sup>

Main Spindle

Maximum RPM

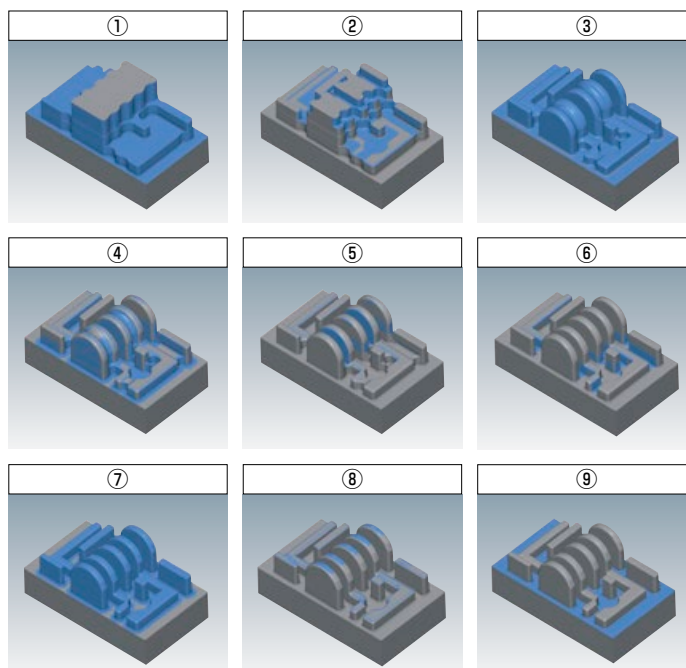
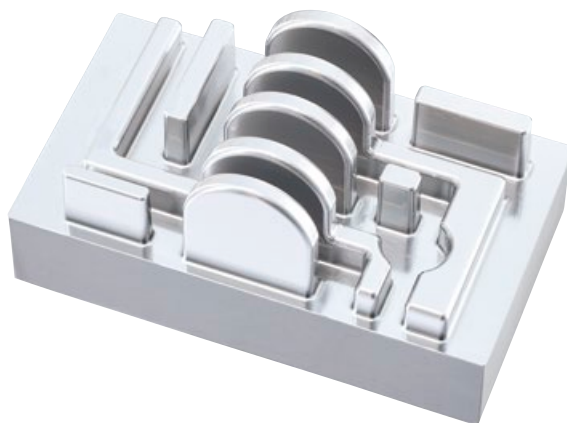
切削油剤：エアブロー ホルダ：焼ばめホルダ

Coolant : Air Blow

Holder : Shrink Fit

製品紹介と  
加工動画は  
こちらから

Scan code for product  
details and video



| 工程番号<br>Process | 加工部<br>Milling Part  | 加工方法<br>Milling Method       | 加工内容<br>Milling Process            | 使用工具<br>Tool            | 突出し長さ<br>Overhang Length<br>(mm) | 切削速度<br>Cutting Speed<br>(m/min) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
|-----------------|----------------------|------------------------------|------------------------------------|-------------------------|----------------------------------|----------------------------------|--------------------------|------------|------------|
| ①               | 全体<br>Overall        | 等高線加工<br>Contour Milling     | 高能率荒取り<br>High-efficiency Roughing | AE-MS-H<br>φ6×R0.3      | 30                               | 90<br>(4,780min <sup>-1</sup> )  | 1,720<br>(0.06mm/t)      | 9          | 0.5        |
| ②               | 全体<br>Overall        | 等高線加工<br>Contour Milling     | 荒取り<br>Roughing                    | AE-MS-H<br>φ4×R1        | 20                               | 90<br>(7,170min <sup>-1</sup> )  | 1,150<br>(0.04mm/t)      | 5          | 0.2        |
| ③               | 全体<br>Overall        | 等高線加工<br>Contour Milling     | 高能率荒取り<br>High-efficiency Roughing | PHX-LN-DFR<br>φ4×R1×20  | 25                               | 75<br>(6,000min <sup>-1</sup> )  | 1,250<br>(0.069mm/t)     | 0.14       | 0.7        |
| ④               | 全体<br>Overall        | 等高線加工<br>Contour Milling     | 高能率荒取り<br>High-efficiency Roughing | AE-CPR4-H<br>φ2×R0.3×20 | 28                               | 58<br>(9,300min <sup>-1</sup> )  | 1,300<br>(0.035mm/t)     | 0.05       | 0.36       |
| ⑤               | 上部R部<br>Upper R      | 等高線加工<br>Contour Milling     | 取り残し加工<br>Leftover Milling         |                         |                                  | 38<br>(6,000min <sup>-1</sup> )  | 1,300<br>(0.054mm/t)     | 0.05       | 0.36       |
| ⑥               | 隅R部<br>Corner R      | 等高線加工<br>Contour Milling     | 取り残し加工<br>Leftover Milling         |                         |                                  |                                  |                          | 0.05       | 0.36       |
| ⑦               | 形状部<br>Shape         | 等高線加工<br>Contour Milling     | 仕上げ加工<br>Finishing                 |                         |                                  |                                  |                          | 0.012      | 0.36       |
| ⑧               | 上部形状部<br>Upper Shape | 走査線加工<br>Linear Milling      | 仕上げ加工<br>Finishing                 | AE-LNBD-H<br>R1×22×4    | 30                               | 68<br>(10,800min <sup>-1</sup> ) | 860<br>(0.04mm/t)        | 0.03       | 0.1        |
| ⑨               | 底面部<br>Bottom        | 平面加工<br>Flat Surface Milling | 仕上げ加工<br>Finishing                 | AE-CPR4-H<br>φ2×R0.3×20 | 28                               | 38<br>(6,000min <sup>-1</sup> )  | 1,300<br>(0.054mm/t)     | 0.012      | 0.1        |



# 高硬度鋼用超硬エンドミル ロングネックラジアスタイプ

## 高能率仕上げ用4刃

4-flute high-efficiency finishing long neck carbide radius end mill for high-hardness steel

### AE-CPR4-H

#### 1 4枚刃仕様で高能率加工を実現

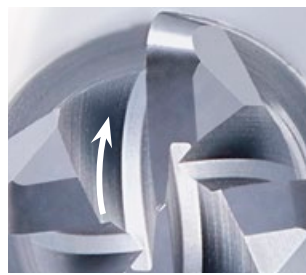
Achieves high efficiency milling with 4-flute specification

- 全サイズ4枚刃設定
- 4-flute configuration for all sizes

#### 2 スパイラル形状の新ギャッシュ仕様

New spiral-shaped gash specification

- 中心部からコーナR部へスパイラル形状にした新ギャッシュ仕様により切りくず排出性の向上と切りくずの噛み込みを防止
- The new gash specification with a spiral shape from the center to the corner R improves chip evacuation and prevents chips from getting caught



AE-CPR4-H



従来品  
Conventional

※外径φ1以上、かつコーナRがR0.1を超えるサイズに適用

\* Applicable to sizes with an outer diameter of φ1 or more and a corner R exceeding R0.1

#### 3 優れたコーナR精度

Superior R precision

- 高精度なコーナR部
- High precision corner R



RE ≤ 0.02



0.02 < RE

#### 4 優れたシャンク精度

Superior shank accuracy

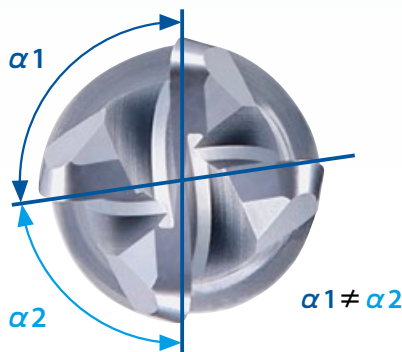
- h4公差 (0/-0.004) に対応
- Supports h4 tolerance (0/-0.004)



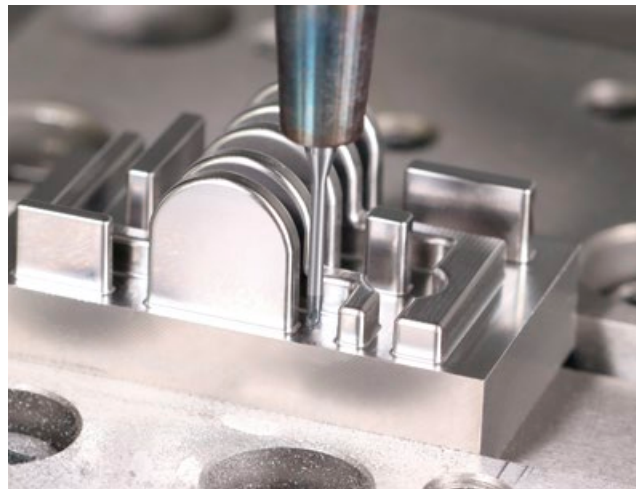
## 5 不等分割刃がびびりを抑制

Unequal spacing teeth suppresses chattering

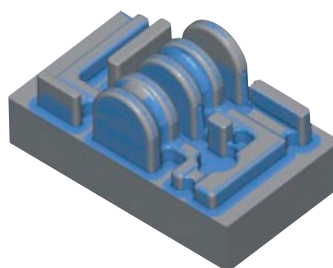
- L/D = 14の深掘り加工でも「びびり振動」を抑制し、高能率な加工を実現
- Achieves highly efficient machining by the suppression of chattering even in deep milling of L/D = 14



加工形状  
Processed shape



|                          |                                                   |
|--------------------------|---------------------------------------------------|
| 使用工具<br>Tool             | AE-CPR4-H $\phi 2 \times R0.3 \times 20$          |
| 被削材<br>Work Material     | SKD61 (50HRC)                                     |
| 加工方法<br>Milling Method   | 等高線加工<br>Contour Milling                          |
| 切削速度<br>Cutting Speed    | 58m/min (9,300min <sup>-1</sup> )                 |
| 送り速度<br>Feed             | 1,300mm/min (0.035mm/t)                           |
| 切込深さ<br>Depth of Cut     | $a_p = 0.05\text{mm}$ $P_f = 0.36\text{mm}$       |
| 突出し長さ<br>Overhang Length | 28mm (L/D=14)                                     |
| 切削油剤<br>Coolant          | エアブロー<br>Air Blow                                 |
| 使用機械<br>Machine          | 立形マシニングセンタ (HSK-A63)<br>Vertical Machining Center |

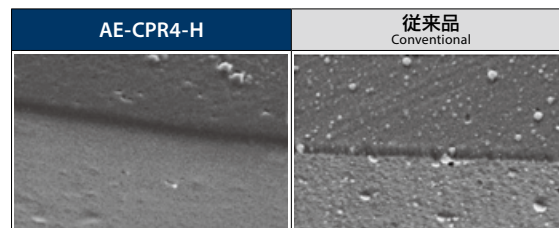


※加工詳細はp.6を参照ください。  
\*Please refer to p.6 for cutting condition details.

## 6 平滑処理

Smooth Surface Treatment

- コーティング表面の平滑化処理により、加工面精度が向上
- Improves surface accuracy by smoothening the coating surface



## 7 豊富なバリエーション

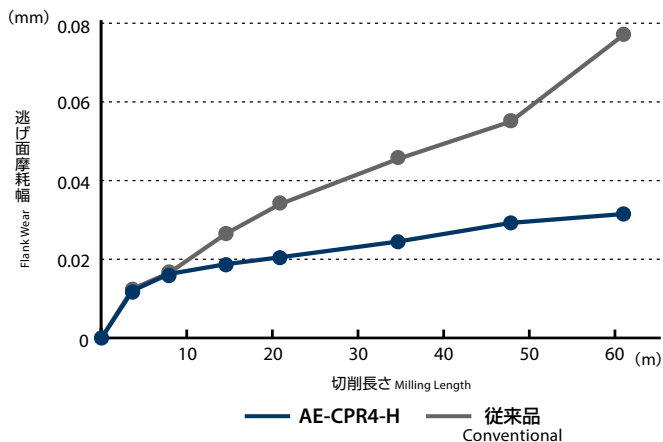
Abundant variations

- 176アイテム (φ0.2 ~ φ4) で幅広い加工に対応可能
- 176 items (φ 0.2 to φ 4) are available to accommodate a wide range of applications

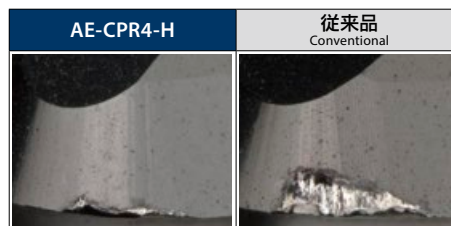
## 安定加工 Stable Performance

高硬度鋼加工において、高能率かつ優れた耐久性を発揮  
Highly efficient and excellent durability in high hardness steel

|                        |                                                |                             |
|------------------------|------------------------------------------------|-----------------------------|
| 使用工具<br>Tool           | AE-CPR4-H<br>$\phi 2 \times R0.3 \times 8$     | 従来品 2枚刃<br>Conventional 2FL |
| 被削材<br>Work Material   | SKD11 (60HRC)                                  |                             |
| 加工方法<br>Milling Method | 正面切削<br>Frontal milling                        |                             |
| 切削速度<br>Cutting Speed  | 72m/min (11,500min <sup>-1</sup> )             |                             |
| 送り速度<br>Feed           | 2,000mm/min<br>(0.043mm/t)                     | 1,000mm/min<br>(0.043mm/t)  |
| 切込深さ<br>Depth of Cut   | $a_p=0.036\text{mm}$ $a_e=0.48\text{mm}$       |                             |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                              |                             |
| 使用機械<br>Machine        | 立形マシニングセンタ (BT40)<br>Vertical Machining Center |                             |



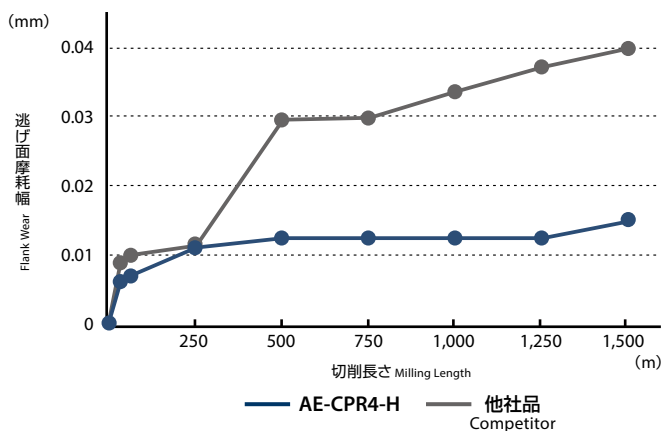
61.2m 加工後の刃先の損傷状態  
Wear comparison of the cutting edge after milling 61.2 m



## 長寿命 Long Tool Life

プリハードン鋼 NAK80(40HRC) において、安定した摩耗推移  
Stable wear transition in pre-hardened steel NAK80 (40 HRC)

|                        |                                                |
|------------------------|------------------------------------------------|
| 使用工具<br>Tool           | AE-CPR4-H $\phi 3 \times R0.5 \times 20$       |
| 被削材<br>Work Material   | NAK80(40HRC)                                   |
| 加工方法<br>Milling Method | 正面切削<br>Frontal milling                        |
| 切削速度<br>Cutting Speed  | 120m/min (12,730min <sup>-1</sup> )            |
| 送り速度<br>Feed           | 1,782mm/min (0.035mm/t)                        |
| 切込深さ<br>Depth of Cut   | $a_p=0.04\text{mm}$ $a_e=0.734\text{mm}$       |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                              |
| 使用機械<br>Machine        | 立形マシニングセンタ (BT40)<br>Vertical Machining Center |



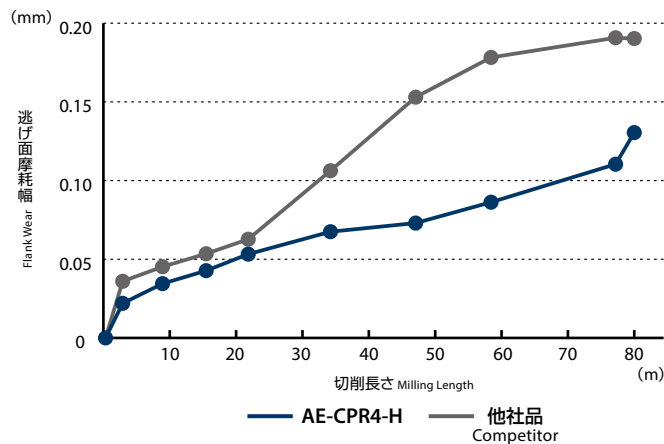
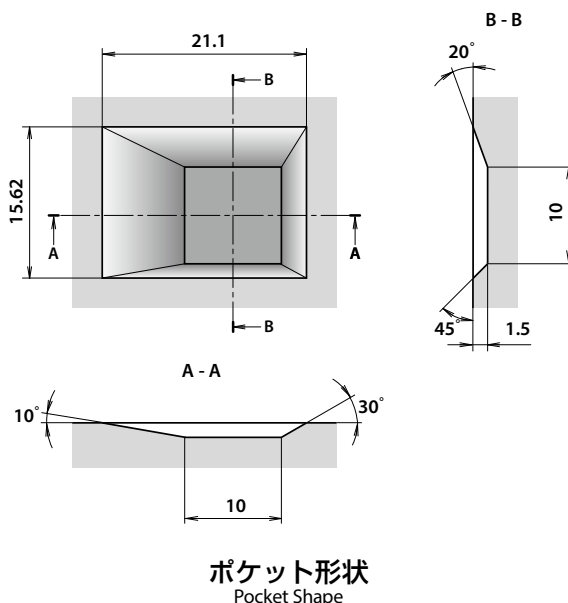
1,512m 加工後の刃先の損傷状態  
Wear comparison of the cutting edge after milling 1,512 m



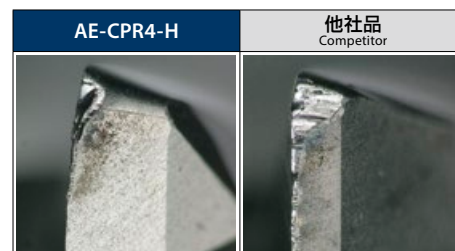
## 安定加工 Stable Performance

高硬度鋼の形状加工において、優れた耐久性と加工面精度を実現  
Achieves excellent durability and machined surface accuracy in profiling of high-hardness steel

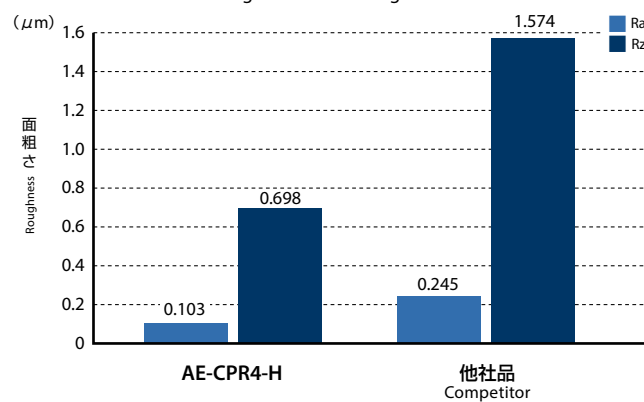
|                        |                                                |
|------------------------|------------------------------------------------|
| 使用工具<br>Tool           | AE-CPR4-H $\phi 3 \times R0.2 \times 8$        |
| 被削材<br>Work Material   | SKD11 (60HRC)                                  |
| 加工方法<br>Milling Method | ポケット加工<br>Pocket Milling                       |
| 切削速度<br>Cutting Speed  | 79m/min (8,400min <sup>-1</sup> )              |
| 送り速度<br>Feed           | 540mm/min (0.016mm/t)                          |
| 切込深さ<br>Depth of Cut   | $a_p=0.04\text{mm}$ $a_e=1\text{mm}$           |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                              |
| 使用機械<br>Machine        | 立形マシニングセンタ (BT40)<br>Vertical Machining Center |



80.2m (ポケット14個) 加工後の刃先の損傷状態  
Wear condition of outer peripheral cutting edge after milling 80.2m

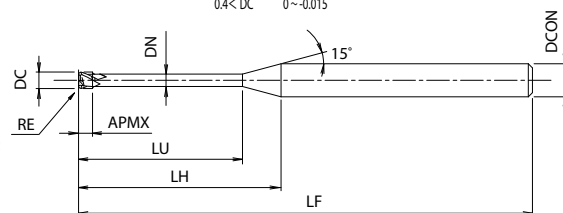


80.2m (ポケット14個) 加工時点の底面粗さ  
Bottom surface roughness after milling 80.2m



切削距離が長くなっても良好な加工面粗さ  
Good machined surface roughness even when milling long distance

## AE-CPR4-H



単位:mm Unit:mm

| ツールNo.<br>EDP No. | 外径×コーナ半径×首下長<br>DC × RE × LU | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | シャンク径<br>DCON | ワーク勾配角αに対する実有効長Le <sup>注1</sup><br>Effective length by inclined angles |      |      |      |      | 在庫<br>Stock | 標準価格<br>(Yen) |
|-------------------|------------------------------|----------|------------|------|----------|------------------------|---------------|------------------------------------------------------------------------|------|------|------|------|-------------|---------------|
|                   |                              |          |            |      |          |                        |               | 0.5°                                                                   | 1°   | 1.5° | 2°   | 3°   |             |               |
| 8557470           | 0.2 × R0.02 × 0.5            | 45       | 0.15       | 7.7  | 0.18     | 13.88°                 | 4             | 0.53                                                                   | 0.57 | 0.61 | 0.65 | 0.73 | A           | ● 9,950       |
| 8557471           | 0.2 × R0.02 × 1              | 45       | 0.15       | 8.2  | 0.18     | 13.07°                 | 4             | 1.06                                                                   | 1.13 | 1.2  | 1.26 | 1.38 |             | ● 9,950       |
| 8557472           | 0.2 × R0.02 × 1.5            | 45       | 0.15       | 8.7  | 0.18     | 12.34°                 | 4             | 1.6                                                                    | 1.69 | 1.77 | 1.85 | 2    |             | ● 11,800      |
| 8557473           | 0.2 × R0.02 × 2              | 45       | 0.15       | 9.2  | 0.18     | 11.69°                 | 4             | 2.12                                                                   | 2.24 | 2.33 | 2.43 | 2.62 |             | ● 12,900      |
| 8557474           | 0.2 × R0.05 × 0.5            | 45       | 0.15       | 7.7  | 0.18     | 13.93°                 | 4             | 0.53                                                                   | 0.56 | 0.6  | 0.64 | 0.72 |             | ● 9,950       |
| 8557475           | 0.2 × R0.05 × 1              | 45       | 0.15       | 8.2  | 0.18     | 13.11°                 | 4             | 1.06                                                                   | 1.13 | 1.19 | 1.25 | 1.37 |             | ● 9,950       |
| 8557476           | 0.2 × R0.05 × 1.5            | 45       | 0.15       | 8.7  | 0.18     | 12.37°                 | 4             | 1.59                                                                   | 1.68 | 1.77 | 1.84 | 1.99 |             | ● 11,800      |
| 8557477           | 0.2 × R0.05 × 2              | 45       | 0.15       | 9.2  | 0.18     | 11.72°                 | 4             | 2.12                                                                   | 2.23 | 2.33 | 2.42 | 2.61 |             | ● 12,900      |
| 8557478           | 0.3 × R0.02 × 1              | 45       | 0.25       | 8    | 0.28     | 13.02°                 | 4             | 1.06                                                                   | 1.13 | 1.2  | 1.26 | 1.38 | A           | ● 9,630       |
| 8557479           | 0.3 × R0.02 × 1.5            | 45       | 0.25       | 8.5  | 0.28     | 12.28°                 | 4             | 1.6                                                                    | 1.69 | 1.77 | 1.85 | 2    |             | ● 9,630       |
| 8557480           | 0.3 × R0.02 × 2              | 45       | 0.25       | 9    | 0.28     | 11.62°                 | 4             | 2.12                                                                   | 2.24 | 2.33 | 2.43 | 2.62 |             | ● 9,630       |
| 8557481           | 0.3 × R0.02 × 2.5            | 45       | 0.25       | 9.5  | 0.28     | 11.02°                 | 4             | 2.65                                                                   | 2.78 | 2.89 | 3    | 3.24 |             | ● 12,100      |
| 8557482           | 0.3 × R0.02 × 3              | 45       | 0.25       | 10   | 0.28     | 10.48°                 | 4             | 3.18                                                                   | 3.32 | 3.45 | 3.58 | 3.87 |             | ● 12,100      |
| 8557483           | 0.3 × R0.05 × 1              | 45       | 0.25       | 8    | 0.28     | 13.06°                 | 4             | 1.06                                                                   | 1.13 | 1.19 | 1.25 | 1.37 |             | ● 9,630       |
| 8557484           | 0.3 × R0.05 × 1.5            | 45       | 0.25       | 8.5  | 0.28     | 12.32°                 | 4             | 1.59                                                                   | 1.68 | 1.77 | 1.84 | 1.99 |             | ● 9,630       |
| 8557485           | 0.3 × R0.05 × 2              | 45       | 0.25       | 9    | 0.28     | 11.65°                 | 4             | 2.12                                                                   | 2.23 | 2.33 | 2.42 | 2.61 |             | ● 9,630       |
| 8557486           | 0.3 × R0.05 × 2.5            | 45       | 0.25       | 9.5  | 0.28     | 11.05°                 | 4             | 2.65                                                                   | 2.78 | 2.89 | 3    | 3.24 | D           | ○ 12,100      |
| 8557487           | 0.3 × R0.05 × 3              | 45       | 0.25       | 10   | 0.28     | 10.51°                 | 4             | 3.18                                                                   | 3.32 | 3.44 | 3.57 | 3.86 | A           | ● 12,100      |
| 8557488           | 0.4 × R0.02 × 1              | 45       | 0.3        | 8.2  | 0.37     | 12.41°                 | 4             | 1.08                                                                   | 1.17 | 1.28 | 1.38 | 1.62 | A           | ● 6,450       |
| 8557489           | 0.4 × R0.02 × 1.5            | 45       | 0.3        | 8.7  | 0.37     | 11.71°                 | 4             | 1.62                                                                   | 1.76 | 1.89 | 2.03 | 2.32 |             | ● 6,450       |
| 8557490           | 0.4 × R0.02 × 2              | 45       | 0.3        | 9.2  | 0.37     | 11.09°                 | 4             | 2.16                                                                   | 2.33 | 2.5  | 2.67 | 3    |             | ● 6,450       |
| 8557491           | 0.4 × R0.02 × 2.5            | 45       | 0.3        | 9.7  | 0.37     | 10.53°                 | 4             | 2.7                                                                    | 2.9  | 3.1  | 3.29 | 3.66 |             | ● 6,450       |
| 8557492           | 0.4 × R0.02 × 3              | 45       | 0.3        | 10.2 | 0.37     | 10.03°                 | 4             | 3.24                                                                   | 3.47 | 3.69 | 3.9  | 4.31 |             | ● 6,450       |
| 8557493           | 0.4 × R0.02 × 4              | 45       | 0.3        | 11.2 | 0.37     | 9.15°                  | 4             | 4.31                                                                   | 4.59 | 4.85 | 5.1  | 5.57 |             | ● 6,450       |
| 8557494           | 0.4 × R0.05 × 1              | 45       | 0.3        | 8.2  | 0.37     | 12.45°                 | 4             | 1.08                                                                   | 1.17 | 1.27 | 1.37 | 1.6  |             | ● 6,450       |
| 8557495           | 0.4 × R0.05 × 1.5            | 45       | 0.3        | 8.7  | 0.37     | 11.75°                 | 4             | 1.62                                                                   | 1.75 | 1.89 | 2.03 | 2.31 | D           | ○ 6,450       |
| 8557496           | 0.4 × R0.05 × 2              | 45       | 0.3        | 9.2  | 0.37     | 11.12°                 | 4             | 2.16                                                                   | 2.33 | 2.49 | 2.66 | 2.99 | A           | ● 6,450       |
| 8557497           | 0.4 × R0.05 × 2.5            | 45       | 0.3        | 9.7  | 0.37     | 10.56°                 | 4             | 2.7                                                                    | 2.9  | 3.09 | 3.28 | 3.65 | D           | ○ 6,450       |
| 8557498           | 0.4 × R0.05 × 3              | 45       | 0.3        | 10.2 | 0.37     | 10.05°                 | 4             | 3.24                                                                   | 3.46 | 3.68 | 3.89 | 4.3  |             | ○ 6,450       |
| 8557499           | 0.4 × R0.05 × 4              | 45       | 0.3        | 11.2 | 0.37     | 9.17°                  | 4             | 4.31                                                                   | 4.59 | 4.85 | 5.1  | 5.56 | A           | ● 6,450       |
| 8557500           | 0.4 × R0.1 × 1               | 45       | 0.3        | 8.2  | 0.37     | 12.51°                 | 4             | 1.07                                                                   | 1.16 | 1.26 | 1.36 | 1.58 |             | ● 6,450       |
| 8557501           | 0.4 × R0.1 × 2               | 45       | 0.3        | 9.2  | 0.37     | 11.18°                 | 4             | 2.16                                                                   | 2.32 | 2.48 | 2.65 | 2.98 | D           | ● 6,450       |
| 8557502           | 0.4 × R0.1 × 3               | 45       | 0.3        | 10.2 | 0.37     | 10.1°                  | 4             | 3.23                                                                   | 3.46 | 3.67 | 3.88 | 4.29 |             | ○ 6,450       |
| 8557503           | 0.4 × R0.1 × 4               | 45       | 0.3        | 11.2 | 0.37     | 9.21°                  | 4             | 4.3                                                                    | 4.58 | 4.84 | 5.09 | 5.55 |             | ○ 6,450       |

● = 標準在庫品

○ = 準標準在庫品(在庫をご確認下さい。)

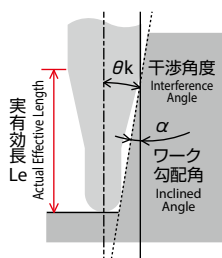
Standard stock item

Limited standard stock item

・アイコンの説明はp.10をご覧ください。 See p.10 for explanation of icons.

注1: ワーク勾配角αに対する実有効長 Le 欄に数値がないものは干渉無しを表します。

Note: If there is no value in the actual effective length (Le column) for the work gradient angle α, it indicates no interference.

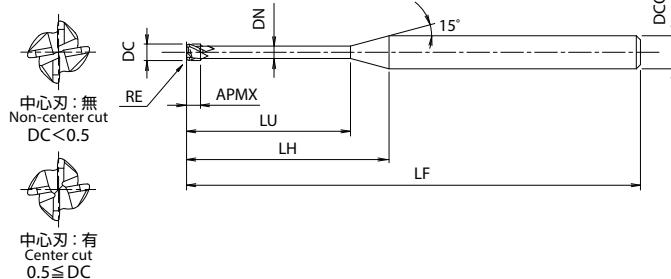


| ツールNo.<br>EDP No. | 外径×コーナ半径×首下長<br>DC×RE×LU | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | シャンク径<br>DCON | ワーク勾配角αに対する実有効長 Le 注1<br>Effective length by inclined angles |       |       |       |       | 在庫<br>Stock | 標準価格<br>(Yen) |
|-------------------|--------------------------|----------|------------|------|----------|------------------------|---------------|--------------------------------------------------------------|-------|-------|-------|-------|-------------|---------------|
|                   |                          |          |            |      |          |                        |               | 0.5°                                                         | 1°    | 1.5°  | 2°    | 3°    |             |               |
| 8557504           | 0.5×R0.02×1              | 45       | 0.4        | 8    | 0.46     | 12.39°                 | 4             | 1.08                                                         | 1.17  | 1.26  | 1.37  | 1.59  | A           | ● 5,290       |
| 8557505           | 0.5×R0.02×2              | 45       | 0.4        | 9    | 0.46     | 11.04°                 | 4             | 2.16                                                         | 2.32  | 2.48  | 2.64  | 2.97  |             | ● 5,290       |
| 8557506           | 0.5×R0.02×3              | 45       | 0.4        | 10   | 0.46     | 9.96°                  | 4             | 3.23                                                         | 3.45  | 3.67  | 3.87  | 4.27  |             | ● 5,290       |
| 8557507           | 0.5×R0.02×4              | 45       | 0.4        | 11   | 0.46     | 9.07°                  | 4             | 4.3                                                          | 4.57  | 4.83  | 5.07  | 5.53  |             | ● 5,290       |
| 8557508           | 0.5×R0.02×5              | 45       | 0.4        | 12   | 0.46     | 8.32°                  | 4             | 5.36                                                         | 5.68  | 5.98  | 6.25  | 6.77  |             | ● 5,290       |
| 8557509           | 0.5×R0.02×6              | 45       | 0.4        | 13   | 0.46     | 7.69°                  | 4             | 6.42                                                         | 6.79  | 7.11  | 7.41  | 8.02  | D           | ○ 5,290       |
| 8557510           | 0.5×R0.05×1              | 45       | 0.4        | 8    | 0.46     | 12.43°                 | 4             | 1.08                                                         | 1.16  | 1.26  | 1.36  | 1.58  | A           | ● 5,290       |
| 8557511           | 0.5×R0.05×2              | 45       | 0.4        | 9    | 0.46     | 11.08°                 | 4             | 2.15                                                         | 2.31  | 2.47  | 2.64  | 2.96  |             | ● 5,290       |
| 8557512           | 0.5×R0.05×3              | 45       | 0.4        | 10   | 0.46     | 9.99°                  | 4             | 3.23                                                         | 3.45  | 3.66  | 3.87  | 4.27  |             | ● 5,290       |
| 8557513           | 0.5×R0.05×4              | 45       | 0.4        | 11   | 0.46     | 9.09°                  | 4             | 4.3                                                          | 4.57  | 4.82  | 5.07  | 5.52  |             | ● 5,290       |
| 8557514           | 0.5×R0.05×5              | 45       | 0.4        | 12   | 0.46     | 8.34°                  | 4             | 5.36                                                         | 5.68  | 5.97  | 6.25  | 6.77  | D           | ○ 5,290       |
| 8557515           | 0.5×R0.05×6              | 45       | 0.4        | 13   | 0.46     | 7.71°                  | 4             | 6.42                                                         | 6.79  | 7.11  | 7.41  | 8.01  | A           | ● 5,290       |
| 8557516           | 0.5×R0.1×1               | 45       | 0.4        | 8    | 0.46     | 12.5°                  | 4             | 1.07                                                         | 1.15  | 1.24  | 1.34  | 1.55  |             | ● 5,290       |
| 8557517           | 0.5×R0.1×2               | 45       | 0.4        | 9    | 0.46     | 11.13°                 | 4             | 2.15                                                         | 2.31  | 2.46  | 2.62  | 2.95  |             | ● 5,290       |
| 8557518           | 0.5×R0.1×3               | 45       | 0.4        | 10   | 0.46     | 10.03°                 | 4             | 3.22                                                         | 3.44  | 3.65  | 3.86  | 4.25  |             | ● 5,290       |
| 8557519           | 0.5×R0.1×4               | 45       | 0.4        | 11   | 0.46     | 9.13°                  | 4             | 4.29                                                         | 4.56  | 4.82  | 5.06  | 5.51  |             | ● 5,290       |
| 8557520           | 0.5×R0.1×5               | 45       | 0.4        | 12   | 0.46     | 8.37°                  | 4             | 5.36                                                         | 5.68  | 5.97  | 6.24  | 6.76  | D           | ○ 5,290       |
| 8557521           | 0.5×R0.1×6               | 45       | 0.4        | 13   | 0.46     | 7.73°                  | 4             | 6.42                                                         | 6.78  | 7.1   | 7.4   | 8     | A           | ● 5,290       |
| 8557522           | 0.6×R0.1×2               | 45       | 0.48       | 8.8  | 0.55     | 11.08°                 | 4             | 2.14                                                         | 2.29  | 2.45  | 2.6   | 2.92  |             | ● 5,290       |
| 8557523           | 0.6×R0.1×4               | 45       | 0.48       | 10.8 | 0.55     | 9.05°                  | 4             | 4.28                                                         | 4.55  | 4.79  | 5.03  | 5.48  |             | ● 5,290       |
| 8557524           | 0.6×R0.1×6               | 45       | 0.48       | 12.8 | 0.55     | 7.64°                  | 4             | 6.41                                                         | 6.76  | 7.08  | 7.37  | 7.97  |             | ● 5,290       |
| 8557525           | 0.7×R0.02×2              | 45       | 0.55       | 8.6  | 0.65     | 10.9°                  | 4             | 2.15                                                         | 2.31  | 2.46  | 2.62  | 2.94  | A           | ● 5,930       |
| 8557526           | 0.7×R0.02×4              | 45       | 0.55       | 10.6 | 0.65     | 8.88°                  | 4             | 4.29                                                         | 4.55  | 4.81  | 5.05  | 5.5   |             | ● 5,930       |
| 8557527           | 0.7×R0.02×6              | 45       | 0.55       | 12.6 | 0.65     | 7.48°                  | 4             | 6.41                                                         | 6.77  | 7.09  | 7.38  | 7.98  | D           | ○ 5,930       |
| 8557528           | 0.7×R0.05×2              | 45       | 0.55       | 8.6  | 0.65     | 10.94°                 | 4             | 2.15                                                         | 2.3   | 2.46  | 2.62  | 2.93  | A           | ● 5,930       |
| 8557529           | 0.7×R0.05×4              | 45       | 0.55       | 10.6 | 0.65     | 8.9°                   | 4             | 4.28                                                         | 4.55  | 4.8   | 5.04  | 5.49  |             | ● 5,930       |
| 8557530           | 0.7×R0.05×6              | 45       | 0.55       | 12.6 | 0.65     | 7.5°                   | 4             | 6.41                                                         | 6.76  | 7.08  | 7.38  | 7.98  | D           | ○ 5,930       |
| 8557531           | 0.7×R0.1×2               | 45       | 0.55       | 8.6  | 0.65     | 10.99°                 | 4             | 2.14                                                         | 2.29  | 2.45  | 2.6   | 2.92  | A           | ● 5,930       |
| 8557532           | 0.7×R0.1×4               | 45       | 0.55       | 10.6 | 0.65     | 8.94°                  | 4             | 4.28                                                         | 4.55  | 4.79  | 5.03  | 5.48  |             | ● 5,930       |
| 8557533           | 0.7×R0.1×6               | 45       | 0.55       | 12.6 | 0.65     | 7.53°                  | 4             | 6.41                                                         | 6.76  | 7.08  | 7.37  | 7.97  | D           | ○ 5,930       |
| 8557534           | 0.8×R0.1×4               | 45       | 0.65       | 10.4 | 0.75     | 8.83°                  | 4             | 4.28                                                         | 4.55  | 4.79  | 5.03  | 5.48  | A           | ● 5,930       |
| 8557535           | 0.8×R0.1×6               | 45       | 0.65       | 12.4 | 0.75     | 7.41°                  | 4             | 6.41                                                         | 6.76  | 7.08  | 7.37  | 7.97  |             | ● 5,930       |
| 8557536           | 0.8×R0.2×4               | 45       | 0.65       | 10.4 | 0.75     | 8.9°                   | 4             | 4.28                                                         | 4.53  | 4.78  | 5.01  | 5.46  | A           | ● 5,930       |
| 8557537           | 0.8×R0.2×6               | 45       | 0.65       | 12.4 | 0.75     | 7.47°                  | 4             | 6.4                                                          | 6.75  | 7.06  | 7.36  | 7.94  |             | ● 5,930       |
| 8557538           | 0.8×R0.2×8               | 45       | 0.65       | 14.4 | 0.75     | 6.43°                  | 4             | 8.52                                                         | 8.94  | 9.31  | 9.66  | 10.43 |             | ● 6,150       |
| 8557539           | 0.9×R0.1×4               | 45       | 0.7        | 10.2 | 0.85     | 8.71°                  | 4             | 4.28                                                         | 4.55  | 4.79  | 5.03  | 5.48  | A           | ● 6,740       |
| 8557540           | 0.9×R0.1×8               | 45       | 0.7        | 14.2 | 0.85     | 6.27°                  | 4             | 8.52                                                         | 8.95  | 9.32  | 9.67  | 10.45 |             | ● 6,740       |
| 8557541           | 1×R0.05×4                | 45       | 0.8        | 10   | 0.94     | 8.57°                  | 4             | 4.28                                                         | 4.54  | 4.78  | 5.02  | 5.46  | A           | ● 4,540       |
| 8557542           | 1×R0.05×6                | 45       | 0.8        | 12   | 0.94     | 7.16°                  | 4             | 6.4                                                          | 6.75  | 7.06  | 7.35  | 7.95  |             | ● 4,970       |
| 8557543           | 1×R0.05×8                | 45       | 0.8        | 14   | 0.94     | 6.14°                  | 4             | 8.51                                                         | 8.93  | 9.3   | 9.65  | 10.43 |             | ● 4,970       |
| 8557544           | 1×R0.05×10               | 45       | 0.8        | 16   | 0.94     | 5.38°                  | 4             | 10.61                                                        | 11.1  | 11.52 | 11.95 | 12.92 | D           | ● 4,970       |
| 8557545           | 1×R0.05×12               | 45       | 0.8        | 18   | 0.94     | 4.78°                  | 4             | 12.71                                                        | 13.26 | 13.74 | 14.25 | 15.41 |             | ○ 4,970       |
| 8557546           | 1×R0.1×4                 | 45       | 0.8        | 10   | 0.94     | 8.61°                  | 4             | 4.27                                                         | 4.53  | 4.77  | 5.01  | 5.45  | A           | ● 4,540       |
| 8557547           | 1×R0.1×6                 | 45       | 0.8        | 12   | 0.94     | 7.18°                  | 4             | 6.39                                                         | 6.74  | 7.05  | 7.34  | 7.93  |             | ● 4,970       |
| 8557548           | 1×R0.1×8                 | 45       | 0.8        | 14   | 0.94     | 6.16°                  | 4             | 8.51                                                         | 8.93  | 9.3   | 9.65  | 10.42 |             | ● 4,970       |
| 8557549           | 1×R0.1×10                | 45       | 0.8        | 16   | 0.94     | 5.39°                  | 4             | 10.61                                                        | 11.1  | 11.52 | 11.95 | 12.91 | A           | ● 4,970       |
| 8557550           | 1×R0.1×12                | 45       | 0.8        | 18   | 0.94     | 4.79°                  | 4             | 12.71                                                        | 13.25 | 13.73 | 14.25 | 15.39 |             | ● 4,970       |
| 8557551           | 1×R0.2×4                 | 45       | 0.8        | 10   | 0.94     | 8.69°                  | 4             | 4.27                                                         | 4.52  | 4.76  | 4.99  | 5.42  | A           | ● 4,540       |
| 8557552           | 1×R0.2×6                 | 45       | 0.8        | 12   | 0.94     | 7.24°                  | 4             | 6.39                                                         | 6.73  | 7.04  | 7.33  | 7.91  |             | ● 4,970       |
| 8557553           | 1×R0.2×8                 | 45       | 0.8        | 14   | 0.94     | 6.2°                   | 4             | 8.5                                                          | 8.92  | 9.29  | 9.63  | 10.4  |             | ● 4,970       |
| 8557554           | 1×R0.2×10                | 45       | 0.8        | 16   | 0.94     | 5.42°                  | 4             | 10.61                                                        | 11.09 | 11.51 | 11.93 | 12.88 | A           | ● 4,970       |
| 8557555           | 1×R0.2×12                | 45       | 0.8        | 18   | 0.94     | 4.82°                  | 4             | 12.7                                                         | 13.24 | 13.72 | 14.23 | 15.37 |             | ● 4,970       |
| 8557556           | 1×R0.2×16                | 55       | 0.8        | 22   | 0.94     | 3.94°                  | 4             | 16.89                                                        | 17.53 | 18.16 | 18.83 | 20.34 |             | ● 4,970       |
| 8557557           | 1×R0.2×20                | 55       | 0.8        | 26   | 0.94     | 3.33°                  | 4             | 21.05                                                        | 21.81 | 22.59 | 23.43 | 25.32 | A           | ● 4,540       |
| 8557558           | 1×R0.3×4                 | 45       | 0.8        | 10   | 0.94     | 8.77°                  | 4             | 4.26                                                         | 4.51  | 4.74  | 4.97  | 5.4   |             | ● 4,970       |
| 8557559           | 1×R0.3×6                 | 45       | 0.8        | 12   | 0.94     | 7.3°                   | 4             | 6.38                                                         | 6.72  | 7.03  | 7.31  | 7.89  |             | ● 4,970       |
| 8557560           | 1×R0.3×8                 | 45       | 0.8        | 14   | 0.94     | 6.24°                  | 4             | 8.5                                                          | 8.91  | 9.27  | 9.62  | 10.37 | A           | ● 4,970       |
| 8557561           | 1×R0.3×10                | 45       | 0.8        | 16   | 0.94     | 5.46°                  | 4             | 10.6                                                         | 11.08 | 11.5  | 11.92 | 12.86 |             | ● 4,970       |
| 8557562           | 1×R0.3×12                | 45       | 0.8        | 18   | 0.94     | 4.84°                  | 4             | 12.7                                                         | 13.24 | 13.71 | 14.22 | 15.35 |             | ● 5,110       |

● = 標準在庫品 Standard stock item  
○ = 準標準在庫品 (在庫をご確認下さい。) Limited standard stock item



## AE-CPR4-H



単位:mm Unit:mm

| ツールNo.<br>EDP No. | 外径×コーナ半径×首下長<br>DC × RE × LU | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | シャンク径<br>DCON | ワーク勾配角αに対する実有効長Le <sup>注1</sup><br>Effective length by inclined angles |       |       |       |       | 在庫<br>Stock | 標準価格<br>(Yen) |
|-------------------|------------------------------|----------|------------|------|----------|------------------------|---------------|------------------------------------------------------------------------|-------|-------|-------|-------|-------------|---------------|
|                   |                              |          |            |      |          |                        |               | 0.5°                                                                   | 1°    | 1.5°  | 2°    | 3°    |             |               |
| 8557563           | 1.2 × R0.2 × 6               | 45       | 1          | 11.6 | 1.14     | 6.98°                  | 4             | 6.39                                                                   | 6.73  | 7.04  | 7.33  | 7.91  | A           | ● 4,970       |
| 8557564           | 1.2 × R0.2 × 8               | 45       | 1          | 13.6 | 1.14     | 5.95°                  | 4             | 8.5                                                                    | 8.92  | 9.29  | 9.63  | 10.4  |             | ● 4,970       |
| 8557565           | 1.2 × R0.2 × 10              | 45       | 1          | 15.6 | 1.14     | 5.19°                  | 4             | 10.61                                                                  | 11.09 | 11.51 | 11.93 | 12.88 | D           | ● 5,110       |
| 8557566           | 1.2 × R0.3 × 6               | 45       | 1          | 11.6 | 1.14     | 7.04°                  | 4             | 6.38                                                                   | 6.72  | 7.03  | 7.31  | 7.89  |             | ● 5,110       |
| 8557567           | 1.2 × R0.3 × 8               | 45       | 1          | 13.6 | 1.14     | 5.99°                  | 4             | 8.5                                                                    | 8.91  | 9.27  | 9.62  | 10.37 | D           | ○ 5,110       |
| 8557568           | 1.2 × R0.3 × 10              | 45       | 1          | 15.6 | 1.14     | 5.22°                  | 4             | 10.6                                                                   | 11.08 | 11.5  | 11.92 | 12.86 |             | ○ 5,110       |
| 8557569           | 1.5 × R0.2 × 6               | 45       | 1.2        | 11   | 1.43     | 6.57°                  | 4             | 6.38                                                                   | 6.71  | 7.02  | 7.3   | 7.88  | A           | ● 4,840       |
| 8557570           | 1.5 × R0.2 × 8               | 45       | 1.2        | 13   | 1.43     | 5.56°                  | 4             | 8.49                                                                   | 8.9   | 9.26  | 9.6   | 10.37 |             | ● 5,110       |
| 8557571           | 1.5 × R0.2 × 10              | 45       | 1.2        | 15   | 1.43     | 4.81°                  | 4             | 10.59                                                                  | 11.07 | 11.48 | 11.9  | 12.85 |             | ● 5,110       |
| 8557572           | 1.5 × R0.2 × 12              | 45       | 1.2        | 17   | 1.43     | 4.25°                  | 4             | 12.69                                                                  | 13.22 | 13.7  | 14.2  | 15.34 |             | ● 5,110       |
| 8557573           | 1.5 × R0.2 × 16              | 50       | 1.2        | 21   | 1.43     | 3.44°                  | 4             | 16.87                                                                  | 17.51 | 18.13 | 18.8  | 20.31 |             | ● 5,110       |
| 8557574           | 1.5 × R0.3 × 6               | 45       | 1.2        | 11   | 1.43     | 6.63°                  | 4             | 6.37                                                                   | 6.7   | 7.01  | 7.29  | 7.86  |             | ● 4,840       |
| 8557575           | 1.5 × R0.3 × 8               | 45       | 1.2        | 13   | 1.43     | 5.6°                   | 4             | 8.48                                                                   | 8.89  | 9.25  | 9.59  | 10.34 |             | ● 5,110       |
| 8557576           | 1.5 × R0.3 × 10              | 45       | 1.2        | 15   | 1.43     | 4.85°                  | 4             | 10.59                                                                  | 11.06 | 11.47 | 11.89 | 12.83 |             | ● 5,110       |
| 8557577           | 1.5 × R0.3 × 12              | 45       | 1.2        | 17   | 1.43     | 4.27°                  | 4             | 12.68                                                                  | 13.21 | 13.69 | 14.19 | 15.32 |             | ● 5,110       |
| 8557578           | 1.5 × R0.3 × 16              | 50       | 1.2        | 21   | 1.43     | 3.45°                  | 4             | 16.86                                                                  | 17.5  | 18.12 | 18.79 | 20.29 |             | ● 5,110       |
| 8557579           | 2 × R0.1 × 8                 | 50       | 1.6        | 12.1 | 1.92     | 4.77°                  | 4             | 8.48                                                                   | 8.89  | 9.25  | 9.59  | 10.37 | A           | ● 5,110       |
| 8557580           | 2 × R0.1 × 10                | 50       | 1.6        | 14.1 | 1.92     | 4.09°                  | 4             | 10.58                                                                  | 11.05 | 11.47 | 11.89 | 12.85 |             | ● 5,110       |
| 8557581           | 2 × R0.1 × 12                | 50       | 1.6        | 16.1 | 1.92     | 3.58°                  | 4             | 12.68                                                                  | 13.21 | 13.68 | 14.19 | 15.34 |             | ● 5,110       |
| 8557582           | 2 × R0.1 × 16                | 50       | 1.6        | 20.1 | 1.92     | 2.87°                  | 4             | 16.85                                                                  | 17.49 | 18.12 | 18.79 | —     |             | ● 5,110       |
| 8557583           | 2 × R0.1 × 20                | 60       | 1.6        | 24.1 | 1.92     | 2.39°                  | 4             | 21.02                                                                  | 21.77 | 22.55 | 23.39 | —     |             | ● 5,110       |
| 8557584           | 2 × R0.1 × 25                | 60       | 1.6        | 29.1 | 1.92     | 1.98°                  | 4             | 26.2                                                                   | 27.12 | 28.09 | —     | —     |             | ● 5,110       |
| 8557585           | 2 × R0.2 × 8                 | 50       | 1.6        | 12.1 | 1.92     | 4.81°                  | 4             | 8.48                                                                   | 8.88  | 9.24  | 9.58  | 10.34 |             | ● 5,110       |
| 8557586           | 2 × R0.2 × 10                | 50       | 1.6        | 14.1 | 1.92     | 4.12°                  | 4             | 10.58                                                                  | 11.05 | 11.46 | 11.88 | 12.83 |             | ● 5,110       |
| 8557587           | 2 × R0.2 × 12                | 50       | 1.6        | 16.1 | 1.92     | 3.6°                   | 4             | 12.67                                                                  | 13.2  | 13.67 | 14.18 | 15.31 |             | ● 5,110       |
| 8557588           | 2 × R0.2 × 16                | 50       | 1.6        | 20.1 | 1.92     | 2.88°                  | 4             | 16.85                                                                  | 17.48 | 18.11 | 18.78 | —     |             | ● 5,110       |
| 8557589           | 2 × R0.2 × 20                | 60       | 1.6        | 24.1 | 1.92     | 2.4°                   | 4             | 21.01                                                                  | 21.76 | 22.54 | 23.38 | —     |             | ● 5,110       |
| 8557590           | 2 × R0.2 × 25                | 60       | 1.6        | 29.1 | 1.92     | 1.99°                  | 4             | 26.2                                                                   | 27.11 | 28.08 | —     | —     |             | ● 5,110       |
| 8557591           | 2 × R0.3 × 8                 | 50       | 1.6        | 12.1 | 1.92     | 4.85°                  | 4             | 8.47                                                                   | 8.87  | 9.23  | 9.56  | 10.32 |             | ● 5,110       |
| 8557592           | 2 × R0.3 × 10                | 50       | 1.6        | 14.1 | 1.92     | 4.15°                  | 4             | 10.57                                                                  | 11.04 | 11.45 | 11.86 | 12.8  |             | ● 5,110       |
| 8557593           | 2 × R0.3 × 12                | 50       | 1.6        | 16.1 | 1.92     | 3.63°                  | 4             | 12.67                                                                  | 13.19 | 13.66 | 14.16 | 15.29 |             | ● 5,110       |
| 8557594           | 2 × R0.3 × 16                | 50       | 1.6        | 20.1 | 1.92     | 2.9°                   | 4             | 16.85                                                                  | 17.48 | 18.1  | 18.76 | —     |             | ● 5,110       |
| 8557595           | 2 × R0.3 × 20                | 60       | 1.6        | 24.1 | 1.92     | 2.41°                  | 4             | 21.01                                                                  | 21.75 | 22.53 | 23.36 | —     |             | ● 5,110       |
| 8557596           | 2 × R0.5 × 8                 | 50       | 1.6        | 12.1 | 1.92     | 4.93°                  | 4             | 8.46                                                                   | 8.85  | 9.2   | 9.54  | 10.27 |             | ● 5,110       |
| 8557597           | 2 × R0.5 × 10                | 50       | 1.6        | 14.1 | 1.92     | 4.21°                  | 4             | 10.56                                                                  | 11.02 | 11.42 | 11.83 | 12.76 |             | ● 5,110       |
| 8557598           | 2 × R0.5 × 12                | 50       | 1.6        | 16.1 | 1.92     | 3.67°                  | 4             | 12.66                                                                  | 13.18 | 13.64 | 14.13 | 15.24 |             | ● 5,110       |
| 8557599           | 2 × R0.5 × 16                | 50       | 1.6        | 20.1 | 1.92     | 2.92°                  | 4             | 16.84                                                                  | 17.46 | 18.07 | 18.73 | —     |             | ● 5,110       |
| 8557600           | 2 × R0.5 × 20                | 60       | 1.6        | 24.1 | 1.92     | 2.43°                  | 4             | 21                                                                     | 21.74 | 22.51 | 23.33 | —     |             | ● 5,110       |
| 8557601           | 2 × R0.5 × 25                | 60       | 1.6        | 29.1 | 1.92     | 2.01°                  | 4             | 26.19                                                                  | 27.09 | 28.05 | 29.08 | —     |             | ● 5,110       |

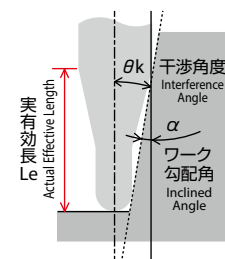
・アイコンの説明はp.10をご覧ください。See p.10 for explanation of icons.

● = 標準在庫品

Standard stock item

○ = 準標準在庫品(在庫をご確認下さい。)

Limited standard stock item



注1: ワーク勾配角αに対する実有効長 Le 欄に数値がないものは干渉無しを表します。

Note: If there is no value in the actual effective length (Le column) for the work gradient angle  $\alpha$ , it indicates no interference.

FROM

単位:mm Unit:mm

| ツールNo.<br>EDP No. | 外径×コーナ半径×首下長<br>DC × RE × LU | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>$\theta_k$ | シャンク径<br>DCON | ワーク勾配角αに対する実有効長 Le 注1<br>Effective length by inclined angles |       |       |       |       | 在庫<br>Stock | 標準価格<br>(Yen) |
|-------------------|------------------------------|----------|------------|------|----------|--------------------|---------------|--------------------------------------------------------------|-------|-------|-------|-------|-------------|---------------|
|                   |                              |          |            |      |          |                    |               | 0.5°                                                         | 1°    | 1.5°  | 2°    | 3°    |             |               |
| 8557602           | 2.5 × R0.2 × 10              | 55       | 2          | 13.1 | 2.4      | 3.33°              | 4             | 10.55                                                        | 11.01 | 11.41 | 11.83 | 12.78 | A           | ● 5,290       |
| 8557603           | 2.5 × R0.2 × 20              | 55       | 2          | 23.1 | 2.4      | 1.88°              | 4             | 20.98                                                        | 21.72 | 22.5  | —     | —     |             | ● 5,480       |
| 8557604           | 2.5 × R0.5 × 10              | 55       | 2          | 13.1 | 2.4      | 3.4°               | 4             | 10.54                                                        | 10.98 | 11.38 | 11.79 | 12.71 |             | ● 5,290       |
| 8557605           | 2.5 × R0.5 × 20              | 55       | 2          | 23.1 | 2.4      | 1.9°               | 4             | 20.97                                                        | 21.7  | 22.46 | —     | —     |             | ● 5,480       |
| 8557606           | 3 × R0.2 × 8                 | 55       | 2.5        | 13.8 | 2.85     | 6.28°              | 6             | 8.41                                                         | 8.77  | 9.11  | 9.44  | 10.19 | A           | ● 4,390       |
| 8557607           | 3 × R0.2 × 12                | 55       | 2.5        | 17.8 | 2.85     | 4.86°              | 6             | 12.59                                                        | 13.07 | 13.54 | 14.04 | 15.16 |             | ● 5,290       |
| 8557608           | 3 × R0.2 × 16                | 55       | 2.5        | 21.8 | 2.85     | 3.97°              | 6             | 16.75                                                        | 17.35 | 17.97 | 18.64 | 20.14 |             | ● 6,590       |
| 8557609           | 3 × R0.2 × 20                | 55       | 2.5        | 25.8 | 2.85     | 3.35°              | 6             | 20.9                                                         | 21.63 | 22.4  | 23.24 | 25.11 |             | ● 6,590       |
| 8557610           | 3 × R0.2 × 25                | 70       | 2.5        | 30.8 | 2.85     | 2.81°              | 6             | 26.08                                                        | 26.98 | 27.95 | 28.99 | —     | D           | ● 6,590       |
| 8557611           | 3 × R0.2 × 30                | 70       | 2.5        | 35.8 | 2.85     | 2.41°              | 6             | 31.25                                                        | 32.33 | 33.49 | 34.74 | —     |             | ● 7,390       |
| 8557612           | 3 × R0.2 × 35                | 70       | 2.5        | 40.8 | 2.85     | 2.12°              | 6             | 36.41                                                        | 37.68 | 39.03 | 40.49 | —     |             | ○ 8,300       |
| 8557613           | 3 × R0.3 × 12                | 55       | 2.5        | 17.8 | 2.85     | 4.89°              | 6             | 12.58                                                        | 13.07 | 13.53 | 14.02 | 15.14 |             | ● 5,290       |
| 8557614           | 3 × R0.3 × 16                | 55       | 2.5        | 21.8 | 2.85     | 3.99°              | 6             | 16.75                                                        | 17.34 | 17.96 | 18.62 | 20.11 | A           | ● 6,590       |
| 8557615           | 3 × R0.3 × 20                | 55       | 2.5        | 25.8 | 2.85     | 3.37°              | 6             | 20.9                                                         | 21.62 | 22.39 | 23.22 | 25.08 |             | ● 6,590       |
| 8557616           | 3 × R0.3 × 25                | 70       | 2.5        | 30.8 | 2.85     | 2.82°              | 6             | 26.07                                                        | 26.97 | 27.94 | 28.97 | —     |             | ● 6,590       |
| 8557617           | 3 × R0.3 × 30                | 70       | 2.5        | 35.8 | 2.85     | 2.42°              | 6             | 31.24                                                        | 32.32 | 33.48 | 34.72 | —     |             | ● 7,390       |
| 8557618           | 3 × R0.3 × 35                | 70       | 2.5        | 40.8 | 2.85     | 2.12°              | 6             | 36.41                                                        | 37.67 | 39.02 | 40.47 | —     | D           | ○ 8,300       |
| 8557619           | 3 × R0.5 × 12                | 55       | 2.5        | 17.8 | 2.85     | 4.94°              | 6             | 12.57                                                        | 13.05 | 13.51 | 13.99 | 15.09 |             | ● 5,290       |
| 8557620           | 3 × R0.5 × 16                | 55       | 2.5        | 21.8 | 2.85     | 4.02°              | 6             | 16.74                                                        | 17.33 | 17.94 | 18.59 | 20.06 |             | ● 6,590       |
| 8557621           | 3 × R0.5 × 20                | 55       | 2.5        | 25.8 | 2.85     | 3.39°              | 6             | 20.89                                                        | 21.61 | 22.37 | 23.19 | 25.04 |             | ● 6,590       |
| 8557622           | 3 × R0.5 × 25                | 70       | 2.5        | 30.8 | 2.85     | 2.83°              | 6             | 26.07                                                        | 26.96 | 27.91 | 28.94 | —     | D           | ● 6,590       |
| 8557623           | 3 × R0.5 × 30                | 70       | 2.5        | 35.8 | 2.85     | 2.43°              | 6             | 31.24                                                        | 32.31 | 33.46 | 34.69 | —     |             | ● 7,390       |
| 8557624           | 3 × R0.5 × 35                | 70       | 2.5        | 40.8 | 2.85     | 2.13°              | 6             | 36.4                                                         | 37.66 | 39    | 40.44 | —     |             | ○ 8,300       |
| 8557625           | 4 × R0.2 × 16                | 60       | 3.2        | 20   | 3.84     | 2.9°               | 6             | 16.74                                                        | 17.34 | 17.96 | 18.62 | —     | A           | ● 6,590       |
| 8557626           | 4 × R0.2 × 20                | 60       | 3.2        | 24   | 3.84     | 2.41°              | 6             | 20.89                                                        | 21.62 | 22.39 | 23.22 | —     |             | ● 6,590       |
| 8557627           | 4 × R0.2 × 25                | 60       | 3.2        | 29   | 3.84     | 2°                 | 6             | 26.06                                                        | 26.96 | 27.93 | —     | —     |             | ● 6,590       |
| 8557628           | 4 × R0.2 × 30                | 75       | 3.2        | 34   | 3.84     | 1.7°               | 6             | 31.23                                                        | 32.31 | 33.47 | —     | —     |             | ● 7,390       |
| 8557629           | 4 × R0.2 × 40                | 75       | 3.2        | 44   | 3.84     | 1.31°              | 6             | 41.57                                                        | 43.01 | —     | —     | —     | A           | ● 8,300       |
| 8557630           | 4 × R0.3 × 16                | 60       | 3.2        | 20   | 3.84     | 2.92°              | 6             | 16.74                                                        | 17.33 | 17.95 | 18.61 | —     |             | ● 6,590       |
| 8557631           | 4 × R0.3 × 20                | 60       | 3.2        | 24   | 3.84     | 2.42°              | 6             | 20.89                                                        | 21.61 | 22.38 | 23.21 | —     |             | ● 6,590       |
| 8557632           | 4 × R0.3 × 25                | 60       | 3.2        | 29   | 3.84     | 2°                 | 6             | 26.06                                                        | 26.96 | 27.92 | —     | —     |             | ● 6,590       |
| 8557633           | 4 × R0.3 × 30                | 75       | 3.2        | 34   | 3.84     | 1.71°              | 6             | 31.23                                                        | 32.31 | 33.46 | —     | —     | D           | ● 7,390       |
| 8557634           | 4 × R0.3 × 40                | 75       | 3.2        | 44   | 3.84     | 1.32°              | 6             | 41.56                                                        | 43    | —     | —     | —     |             | ○ 8,300       |
| 8557635           | 4 × R0.5 × 16                | 60       | 3.2        | 20   | 3.84     | 2.95°              | 6             | 16.73                                                        | 17.32 | 17.92 | 18.58 | —     |             | ● 6,590       |
| 8557636           | 4 × R0.5 × 20                | 60       | 3.2        | 24   | 3.84     | 2.44°              | 6             | 20.88                                                        | 21.59 | 22.36 | 23.18 | —     |             | ● 6,590       |
| 8557637           | 4 × R0.5 × 25                | 60       | 3.2        | 29   | 3.84     | 2.02°              | 6             | 26.05                                                        | 26.94 | 27.9  | 28.93 | —     | A           | ● 6,590       |
| 8557638           | 4 × R0.5 × 30                | 75       | 3.2        | 34   | 3.84     | 1.72°              | 6             | 31.22                                                        | 32.29 | 33.44 | —     | —     |             | ● 7,390       |
| 8557639           | 4 × R0.5 × 40                | 75       | 3.2        | 44   | 3.84     | 1.32°              | 6             | 41.56                                                        | 42.99 | —     | —     | —     |             | ○ 8,300       |
| 8557640           | 4 × R0.5 × 50                | 90       | 3.2        | 54   | 3.84     | 1.08°              | 6             | 51.89                                                        | 53.69 | —     | —     | —     | A           | ● 9,300       |
| 8557641           | 4 × R1 × 16                  | 60       | 3.2        | 20   | 3.84     | 3.02°              | 6             | 16.71                                                        | 17.28 | 17.87 | 18.5  | 19.93 |             | ● 6,590       |
| 8557642           | 4 × R1 × 20                  | 60       | 3.2        | 24   | 3.84     | 2.5°               | 6             | 20.86                                                        | 21.56 | 22.3  | 23.1  | —     |             | ● 6,590       |
| 8557643           | 4 × R1 × 25                  | 60       | 3.2        | 29   | 3.84     | 2.05°              | 6             | 26.04                                                        | 26.91 | 27.85 | 28.85 | —     |             | ● 6,590       |
| 8557644           | 4 × R1 × 30                  | 75       | 3.2        | 34   | 3.84     | 1.74°              | 6             | 31.2                                                         | 32.26 | 33.39 | —     | —     |             | ● 7,390       |
| 8557645           | 4 × R1 × 40                  | 75       | 3.2        | 44   | 3.84     | 1.34°              | 6             | 41.54                                                        | 42.95 | —     | —     | —     |             | ● 8,300       |

● = 標準在庫品

Standard stock item

○ = 準標準在庫品 (在庫をご確認下さい。)

Limited standard stock item

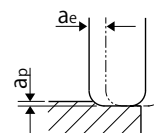


# AE-CPR4-H 切削条件基準表 Cutting Condition

## 標準切削 Regular Milling

| 被削材<br>Work Material |        |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(～45HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(～55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(～66HRC) |                          |            |            |
|----------------------|--------|-----------|--------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|
| 外径<br>DC             | RE     | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                          | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
| 0.2                  | R0.02  | 0.5       | 40,000                                                                         | 560                      | 0.006      | 0.072      | 36,000                                            | 470                      | 0.005      | 0.06       | 31,500                                                | 380                      | 0.003      | 0.048      |
|                      |        | 1         | 38,000                                                                         | 530                      | 0.005      | 0.072      | 34,000                                            | 440                      | 0.004      | 0.06       | 30,000                                                | 360                      | 0.002      | 0.048      |
|                      |        | 1.5       | 36,000                                                                         | 430                      | 0.004      | 0.054      | 32,000                                            | 350                      | 0.003      | 0.045      | 28,500                                                | 290                      | 0.002      | 0.036      |
|                      |        | 2         | 34,000                                                                         | 250                      | 0.002      | 0.054      | 30,000                                            | 200                      | 0.002      | 0.045      | 27,000                                                | 160                      | 0.001      | 0.036      |
|                      | R0.05  | 0.5       | 40,000                                                                         | 560                      | 0.006      | 0.072      | 36,000                                            | 470                      | 0.005      | 0.06       | 31,500                                                | 380                      | 0.003      | 0.048      |
|                      |        | 1         | 38,000                                                                         | 530                      | 0.005      | 0.072      | 34,000                                            | 440                      | 0.004      | 0.06       | 30,000                                                | 360                      | 0.002      | 0.048      |
|                      |        | 1.5       | 36,000                                                                         | 430                      | 0.004      | 0.054      | 32,000                                            | 350                      | 0.003      | 0.045      | 28,500                                                | 290                      | 0.002      | 0.036      |
|                      |        | 2         | 34,000                                                                         | 250                      | 0.002      | 0.054      | 30,000                                            | 200                      | 0.002      | 0.045      | 27,000                                                | 160                      | 0.001      | 0.036      |
| 0.3                  | R0.02  | 1         | 36,500                                                                         | 730                      | 0.006      | 0.108      | 32,500                                            | 560                      | 0.005      | 0.09       | 30,500                                                | 480                      | 0.003      | 0.072      |
|                      |        | 1.5       | 33,000                                                                         | 600                      | 0.004      | 0.09       | 30,000                                            | 470                      | 0.003      | 0.075      | 28,000                                                | 410                      | 0.002      | 0.06       |
|                      |        | 2         | 30,000                                                                         | 510                      | 0.002      | 0.073      | 27,000                                            | 390                      | 0.002      | 0.061      | 25,500                                                | 340                      | 0.001      | 0.049      |
|                      |        | 2.5       | 26,500                                                                         | 400                      | 0.002      | 0.073      | 24,000                                            | 320                      | 0.002      | 0.061      | 22,500                                                | 280                      | 0.001      | 0.049      |
|                      | R0.05  | 3         | 23,000                                                                         | 190                      | 0.001      | 0.066      | 21,000                                            | 150                      | 0.001      | 0.055      | 19,500                                                | 130                      | 0.001      | 0.044      |
|                      |        | 1         | 36,500                                                                         | 730                      | 0.006      | 0.108      | 32,500                                            | 560                      | 0.005      | 0.09       | 30,500                                                | 480                      | 0.003      | 0.072      |
|                      |        | 1.5       | 33,000                                                                         | 600                      | 0.004      | 0.09       | 30,000                                            | 470                      | 0.003      | 0.075      | 28,000                                                | 410                      | 0.002      | 0.06       |
|                      |        | 2         | 30,000                                                                         | 510                      | 0.002      | 0.073      | 27,000                                            | 390                      | 0.002      | 0.061      | 25,500                                                | 340                      | 0.001      | 0.049      |
| 0.4                  | R0.02  | 2.5       | 26,500                                                                         | 400                      | 0.002      | 0.073      | 24,000                                            | 320                      | 0.002      | 0.061      | 22,500                                                | 280                      | 0.001      | 0.049      |
|                      |        | 3         | 23,000                                                                         | 190                      | 0.001      | 0.066      | 21,000                                            | 150                      | 0.001      | 0.055      | 19,500                                                | 130                      | 0.001      | 0.044      |
|                      |        | 1         | 36,500                                                                         | 730                      | 0.006      | 0.108      | 32,500                                            | 560                      | 0.005      | 0.09       | 30,500                                                | 480                      | 0.003      | 0.072      |
|                      |        | 1.5       | 33,000                                                                         | 600                      | 0.004      | 0.09       | 30,000                                            | 470                      | 0.003      | 0.075      | 28,000                                                | 410                      | 0.002      | 0.06       |
|                      | R0.05  | 2         | 30,000                                                                         | 510                      | 0.002      | 0.073      | 27,000                                            | 390                      | 0.002      | 0.061      | 25,500                                                | 340                      | 0.001      | 0.049      |
|                      |        | 2.5       | 26,500                                                                         | 400                      | 0.002      | 0.073      | 24,000                                            | 320                      | 0.002      | 0.061      | 22,500                                                | 280                      | 0.001      | 0.049      |
|                      |        | 3         | 23,000                                                                         | 190                      | 0.001      | 0.066      | 21,000                                            | 150                      | 0.001      | 0.055      | 19,500                                                | 130                      | 0.001      | 0.044      |
|                      |        | R0.1      | 1                                                                              | 29,500                   | 1,130      | 0.008      | 0.144                                             | 26,000                   | 870        | 0.007      | 0.12                                                  | 24,500                   | 710        | 0.004      |
| 1.5                  | 29,500 |           | 1,130                                                                          | 0.008                    | 0.144      | 26,000     | 870                                               | 0.007                    | 0.12       | 24,500     | 710                                                   | 0.004                    | 0.096      |            |
| 2                    | 27,500 |           | 1,020                                                                          | 0.006                    | 0.122      | 24,500     | 780                                               | 0.005                    | 0.102      | 23,000     | 630                                                   | 0.003                    | 0.082      |            |
| 2.5                  | 25,000 |           | 860                                                                            | 0.004                    | 0.106      | 22,500     | 660                                               | 0.003                    | 0.088      | 21,000     | 530                                                   | 0.002                    | 0.07       |            |
| 0.5                  | R0.02  | 3         | 23,000                                                                         | 710                      | 0.002      | 0.09       | 20,000                                            | 540                      | 0.002      | 0.075      | 19,000                                                | 440                      | 0.001      | 0.06       |
|                      |        | 4         | 21,000                                                                         | 570                      | 0.001      | 0.043      | 18,500                                            | 440                      | 0.001      | 0.036      | 17,500                                                | 360                      | 0.001      | 0.029      |
|                      |        | 1         | 29,500                                                                         | 1,130                    | 0.008      | 0.144      | 26,000                                            | 870                      | 0.007      | 0.12       | 24,500                                                | 710                      | 0.004      | 0.096      |
|                      |        | 1.5       | 29,500                                                                         | 1,130                    | 0.008      | 0.144      | 26,000                                            | 870                      | 0.007      | 0.12       | 24,500                                                | 710                      | 0.004      | 0.096      |
|                      | R0.05  | 2         | 27,500                                                                         | 1,020                    | 0.006      | 0.122      | 24,500                                            | 780                      | 0.005      | 0.102      | 23,000                                                | 630                      | 0.003      | 0.082      |
|                      |        | 2.5       | 25,000                                                                         | 860                      | 0.004      | 0.106      | 22,500                                            | 660                      | 0.003      | 0.088      | 21,000                                                | 530                      | 0.002      | 0.07       |
|                      |        | 3         | 23,000                                                                         | 710                      | 0.002      | 0.09       | 20,000                                            | 540                      | 0.002      | 0.075      | 19,000                                                | 440                      | 0.001      | 0.06       |
|                      |        | 4         | 21,000                                                                         | 570                      | 0.001      | 0.043      | 18,500                                            | 440                      | 0.002      | 0.036      | 17,500                                                | 360                      | 0.001      | 0.029      |
| 0.6                  | R0.02  | 1         | 29,000                                                                         | 1,230                    | 0.008      | 0.18       | 26,000                                            | 1,010                    | 0.007      | 0.15       | 26,000                                                | 930                      | 0.004      | 0.12       |
|                      |        | 2         | 29,000                                                                         | 1,230                    | 0.008      | 0.18       | 26,000                                            | 1,010                    | 0.007      | 0.15       | 26,000                                                | 930                      | 0.004      | 0.12       |
|                      |        | 3         | 27,500                                                                         | 1,050                    | 0.004      | 0.126      | 24,500                                            | 860                      | 0.003      | 0.105      | 24,500                                                | 800                      | 0.002      | 0.084      |
|                      |        | 4         | 22,500                                                                         | 770                      | 0.002      | 0.108      | 20,000                                            | 630                      | 0.002      | 0.09       | 20,000                                                | 590                      | 0.001      | 0.072      |
|                      | R0.05  | 5         | 21,000                                                                         | 630                      | 0.001      | 0.054      | 18,500                                            | 510                      | 0.001      | 0.045      | 18,500                                                | 480                      | 0.001      | 0.036      |
|                      |        | 6         | 19,500                                                                         | 540                      | 0.001      | 0.036      | 17,000                                            | 450                      | 0.001      | 0.03       | 17,000                                                | 410                      | 0.001      | 0.024      |
|                      |        | 1         | 29,000                                                                         | 1,230                    | 0.008      | 0.18       | 26,000                                            | 1,010                    | 0.007      | 0.15       | 26,000                                                | 930                      | 0.004      | 0.12       |
|                      |        | 2         | 29,000                                                                         | 1,230                    | 0.008      | 0.18       | 26,000                                            | 1,010                    | 0.007      | 0.15       | 26,000                                                | 930                      | 0.004      | 0.12       |
| R0.1                 | 3      | 27,500    | 1,050                                                                          | 0.004                    | 0.126      | 24,500     | 860                                               | 0.003                    | 0.105      | 24,500     | 800                                                   | 0.002                    | 0.084      |            |
|                      | 4      | 22,500    | 770                                                                            | 0.002                    | 0.108      | 20,000     | 630                                               | 0.002                    | 0.09       | 20,000     | 590                                                   | 0.001                    | 0.072      |            |
|                      | 5      | 21,000    | 630                                                                            | 0.001                    | 0.054      | 18,500     | 510                                               | 0.001                    | 0.045      | 18,500     | 480                                                   | 0.001                    | 0.036      |            |
|                      | 6      | 19,500    | 540                                                                            | 0.001                    | 0.036      | 17,000     | 450                                               | 0.001                    | 0.03       | 17,000     | 410                                                   | 0.001                    | 0.024      |            |
|                      | 1      | 29,000    | 1,230                                                                          | 0.012                    | 0.18       | 26,000     | 1,010                                             | 0.01                     | 0.15       | 26,000     | 930                                                   | 0.006                    | 0.12       |            |
|                      | 2      | 29,000    | 1,230                                                                          | 0.012                    | 0.18       | 26,000     | 1,010                                             | 0.01                     | 0.15       | 26,000     | 930                                                   | 0.006                    | 0.12       |            |

- 機械、ホルダは剛性のある精度の高いものをご使用下さい。
- 切削油剤は被削材に応じてエアフローまたは発煙性の少ない切削油剤をご使用下さい。  
調質鋼の切削では、MQL（オイルミストクーラント）を推奨いたします。
- 上表は、等高線加工の負荷の少ない加工形状での目安です。加工形状、機械剛性、ワーク保持等の状況により、回転速度、送り速度、切込深さを調整下さい。
- びびり、振動、異常な切削音が発生する場合、回転速度、送り速度、切込深さを調整下さい。
- Z切込時のアプローチ方法として、円弧（ヘリカル）、傾斜（ランプ）での加工をお勧めします。
- φ0.5未満あるいはL/D（アスペクト比）が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
- 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。



FROM

| 被削材<br>Work Material |       |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(~45HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(~55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(~66HRC) |                          |            |            |
|----------------------|-------|-----------|--------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|
| 外径<br>DC             | RE    | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                          | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
| 0.6                  | R0.1  | 2         | 29,000                                                                         | 1,470                    | 0.014      | 0.216      | 26,000                                            | 1,220                    | 0.012      | 0.18       | 21,500                                                | 930                      | 0.007      | 0.144      |
|                      |       | 4         | 24,500                                                                         | 1,050                    | 0.006      | 0.146      | 21,500                                            | 860                      | 0.005      | 0.122      | 18,000                                                | 660                      | 0.003      | 0.098      |
|                      |       | 6         | 21,000                                                                         | 750                      | 0.002      | 0.065      | 18,500                                            | 620                      | 0.002      | 0.054      | 15,500                                                | 480                      | 0.001      | 0.043      |
| 0.7                  | R0.02 | 2         | 27,000                                                                         | 1,580                    | 0.008      | 0.264      | 23,500                                            | 1,280                    | 0.007      | 0.22       | 19,500                                                | 970                      | 0.004      | 0.176      |
|                      |       | 4         | 24,000                                                                         | 1,300                    | 0.004      | 0.192      | 21,000                                            | 1,040                    | 0.003      | 0.16       | 17,500                                                | 790                      | 0.002      | 0.128      |
|                      |       | 6         | 20,000                                                                         | 900                      | 0.002      | 0.096      | 17,500                                            | 740                      | 0.002      | 0.08       | 14,500                                                | 550                      | 0.001      | 0.064      |
|                      | R0.05 | 2         | 27,000                                                                         | 1,580                    | 0.012      | 0.264      | 23,500                                            | 1,280                    | 0.01       | 0.22       | 19,500                                                | 970                      | 0.006      | 0.176      |
|                      |       | 4         | 24,000                                                                         | 1,300                    | 0.006      | 0.192      | 21,000                                            | 1,040                    | 0.005      | 0.16       | 17,500                                                | 790                      | 0.003      | 0.128      |
|                      |       | 6         | 20,000                                                                         | 900                      | 0.004      | 0.096      | 17,500                                            | 740                      | 0.003      | 0.08       | 14,500                                                | 550                      | 0.002      | 0.064      |
|                      | R0.1  | 2         | 27,000                                                                         | 1,580                    | 0.022      | 0.264      | 23,500                                            | 1,280                    | 0.018      | 0.22       | 19,500                                                | 970                      | 0.011      | 0.176      |
|                      |       | 4         | 24,000                                                                         | 1,300                    | 0.012      | 0.192      | 21,000                                            | 1,040                    | 0.01       | 0.16       | 17,500                                                | 790                      | 0.006      | 0.128      |
|                      |       | 6         | 20,000                                                                         | 900                      | 0.006      | 0.096      | 17,500                                            | 740                      | 0.005      | 0.08       | 14,500                                                | 550                      | 0.003      | 0.064      |
| 0.8                  | R0.1  | 4         | 23,500                                                                         | 1,500                    | 0.019      | 0.288      | 20,500                                            | 1,200                    | 0.016      | 0.24       | 17,000                                                | 860                      | 0.01       | 0.192      |
|                      |       | 6         | 19,500                                                                         | 1,050                    | 0.008      | 0.288      | 16,500                                            | 840                      | 0.007      | 0.24       | 14,000                                                | 590                      | 0.004      | 0.192      |
|                      | R0.2  | 4         | 23,500                                                                         | 1,500                    | 0.038      | 0.288      | 20,500                                            | 1,200                    | 0.032      | 0.24       | 17,000                                                | 860                      | 0.019      | 0.192      |
|                      |       | 6         | 19,500                                                                         | 1,050                    | 0.017      | 0.288      | 16,500                                            | 840                      | 0.014      | 0.24       | 14,000                                                | 590                      | 0.008      | 0.192      |
|                      |       | 8         | 18,000                                                                         | 860                      | 0.01       | 0.259      | 15,500                                            | 680                      | 0.008      | 0.216      | 13,000                                                | 480                      | 0.005      | 0.173      |
| 0.9                  | R0.1  | 4         | 23,000                                                                         | 1,730                    | 0.022      | 0.324      | 20,000                                            | 1,380                    | 0.018      | 0.27       | 17,000                                                | 1,000                    | 0.011      | 0.216      |
|                      |       | 8         | 18,000                                                                         | 1,190                    | 0.006      | 0.276      | 15,500                                            | 930                      | 0.005      | 0.23       | 13,000                                                | 660                      | 0.003      | 0.184      |
| 1                    | R0.05 | 4         | 23,000                                                                         | 1,950                    | 0.012      | 0.36       | 20,000                                            | 1,580                    | 0.01       | 0.3        | 17,000                                                | 1,140                    | 0.006      | 0.24       |
|                      |       | 6         | 20,500                                                                         | 1,580                    | 0.006      | 0.252      | 18,000                                            | 1,260                    | 0.005      | 0.21       | 15,500                                                | 920                      | 0.003      | 0.168      |
|                      |       | 8         | 18,000                                                                         | 1,200                    | 0.004      | 0.216      | 15,500                                            | 980                      | 0.003      | 0.18       | 13,500                                                | 710                      | 0.002      | 0.144      |
|                      |       | 10        | 16,500                                                                         | 980                      | 0.002      | 0.108      | 14,500                                            | 800                      | 0.002      | 0.09       | 12,500                                                | 570                      | 0.001      | 0.072      |
|                      |       | 12        | 15,500                                                                         | 860                      | 0.001      | 0.072      | 13,500                                            | 690                      | 0.001      | 0.06       | 11,500                                                | 510                      | 0.001      | 0.048      |
|                      | R0.1  | 4         | 23,000                                                                         | 1,950                    | 0.024      | 0.36       | 20,000                                            | 1,580                    | 0.02       | 0.3        | 17,000                                                | 1,140                    | 0.012      | 0.24       |
|                      |       | 6         | 20,500                                                                         | 1,580                    | 0.012      | 0.252      | 18,000                                            | 1,260                    | 0.01       | 0.21       | 15,500                                                | 920                      | 0.006      | 0.168      |
|                      |       | 8         | 18,000                                                                         | 1,200                    | 0.007      | 0.216      | 15,500                                            | 980                      | 0.006      | 0.18       | 13,500                                                | 710                      | 0.004      | 0.144      |
|                      |       | 10        | 16,500                                                                         | 980                      | 0.005      | 0.108      | 14,500                                            | 800                      | 0.004      | 0.09       | 12,500                                                | 570                      | 0.002      | 0.072      |
|                      |       | 12        | 15,500                                                                         | 860                      | 0.004      | 0.072      | 13,500                                            | 690                      | 0.003      | 0.06       | 11,500                                                | 510                      | 0.002      | 0.048      |
|                      | R0.2  | 4         | 23,000                                                                         | 1,950                    | 0.048      | 0.36       | 20,000                                            | 1,580                    | 0.04       | 0.3        | 17,000                                                | 1,140                    | 0.024      | 0.24       |
|                      |       | 6         | 20,500                                                                         | 1,580                    | 0.024      | 0.252      | 18,000                                            | 1,260                    | 0.02       | 0.21       | 15,500                                                | 920                      | 0.012      | 0.168      |
|                      |       | 8         | 18,000                                                                         | 1,200                    | 0.014      | 0.216      | 15,500                                            | 980                      | 0.012      | 0.18       | 13,500                                                | 710                      | 0.007      | 0.144      |
|                      |       | 10        | 16,500                                                                         | 980                      | 0.01       | 0.108      | 14,500                                            | 800                      | 0.008      | 0.09       | 12,500                                                | 570                      | 0.005      | 0.072      |
|                      |       | 12        | 15,500                                                                         | 860                      | 0.007      | 0.072      | 13,500                                            | 690                      | 0.006      | 0.06       | 11,500                                                | 510                      | 0.004      | 0.048      |
|                      | R0.3  | 16        | 12,000                                                                         | 600                      | 0.005      | 0.036      | 10,500                                            | 500                      | 0.004      | 0.03       | 9,150                                                 | 360                      | 0.002      | 0.024      |
|                      |       | 20        | 10,000                                                                         | 440                      | 0.004      | 0.029      | 8,900                                             | 350                      | 0.003      | 0.024      | 7,650                                                 | 260                      | 0.002      | 0.019      |
|                      |       | 4         | 23,000                                                                         | 1,950                    | 0.06       | 0.36       | 20,000                                            | 1,580                    | 0.05       | 0.3        | 17,000                                                | 1,140                    | 0.03       | 0.24       |
|                      |       | 6         | 20,500                                                                         | 1,580                    | 0.03       | 0.252      | 18,000                                            | 1,260                    | 0.025      | 0.21       | 15,500                                                | 920                      | 0.015      | 0.168      |
|                      |       | 8         | 18,000                                                                         | 1,200                    | 0.018      | 0.216      | 15,500                                            | 980                      | 0.015      | 0.18       | 13,500                                                | 710                      | 0.009      | 0.144      |
| 1.2                  | R0.2  | 10        | 16,500                                                                         | 980                      | 0.012      | 0.108      | 14,500                                            | 800                      | 0.01       | 0.09       | 12,500                                                | 570                      | 0.006      | 0.072      |
|                      |       | 12        | 15,500                                                                         | 860                      | 0.008      | 0.072      | 13,500                                            | 690                      | 0.007      | 0.06       | 11,500                                                | 510                      | 0.004      | 0.048      |
|                      |       | 6         | 19,000                                                                         | 1,800                    | 0.038      | 0.432      | 18,000                                            | 1,580                    | 0.032      | 0.36       | 14,500                                                | 1,110                    | 0.019      | 0.288      |
|                      |       | 8         | 17,000                                                                         | 1,460                    | 0.022      | 0.302      | 16,000                                            | 1,280                    | 0.018      | 0.252      | 13,000                                                | 870                      | 0.011      | 0.202      |
|                      | R0.3  | 10        | 16,000                                                                         | 1,280                    | 0.013      | 0.259      | 15,000                                            | 1,110                    | 0.011      | 0.216      | 12,000                                                | 770                      | 0.007      | 0.173      |
|                      |       | 6         | 19,000                                                                         | 1,800                    | 0.048      | 0.432      | 18,000                                            | 1,580                    | 0.04       | 0.36       | 14,500                                                | 1,110                    | 0.024      | 0.288      |
|                      |       | 8         | 17,000                                                                         | 1,460                    | 0.026      | 0.302      | 16,000                                            | 1,280                    | 0.022      | 0.252      | 13,000                                                | 870                      | 0.013      | 0.202      |
|                      |       | 10        | 16,000                                                                         | 1,280                    | 0.017      | 0.259      | 15,000                                            | 1,110                    | 0.014      | 0.216      | 12,000                                                | 770                      | 0.008      | 0.173      |

多スウェータイフ・ラジスタタイプ Multi-flute square type and radius type

ボールタイプ Ball Type

ロングネックタイプ Long Neck Type

ヘッド交換式 Exchangeable Head

AE-MSS-H

AE-MS-H

AE-ML-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-LNBD-H

PXSH

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. The above condition shows an approximate standard for contouring operation (side milling) with a low machining load.  
If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of  $\phi$  0.5 or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage.  
Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

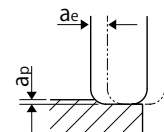
40

# AE-CPR4-H 切削条件基準表 Cutting Condition

FROM

標準切削 Regular Milling

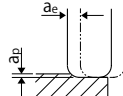
| 被削材<br>Work Material |      |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(～45HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(～55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(～66HRC) |                          |            |            |
|----------------------|------|-----------|--------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|
| 外径<br>DC             | RE   | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                          | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
| 1.5                  | R0.2 | 6         | 17,000                                                                         | 2,180                    | 0.048      | 0.54       | 16,000                                            | 1,880                    | 0.04       | 0.45       | 13,500                                                | 1,320                    | 0.024      | 0.36       |
|                      |      | 8         | 16,000                                                                         | 1,880                    | 0.031      | 0.458      | 15,500                                            | 1,650                    | 0.026      | 0.382      | 12,500                                                | 1,130                    | 0.016      | 0.306      |
|                      |      | 10        | 14,500                                                                         | 1,500                    | 0.022      | 0.35       | 13,500                                            | 1,350                    | 0.018      | 0.292      | 11,000                                                | 950                      | 0.011      | 0.234      |
|                      |      | 12        | 13,500                                                                         | 1,350                    | 0.014      | 0.324      | 12,500                                            | 1,190                    | 0.012      | 0.27       | 10,500                                                | 830                      | 0.007      | 0.216      |
|                      |      | 16        | 9,150                                                                          | 800                      | 0.008      | 0.134      | 8,650                                             | 690                      | 0.007      | 0.112      | 7,150                                                 | 480                      | 0.004      | 0.09       |
|                      | R0.3 | 6         | 17,000                                                                         | 2,180                    | 0.072      | 0.54       | 16,000                                            | 1,880                    | 0.06       | 0.45       | 13,500                                                | 1,320                    | 0.036      | 0.36       |
|                      |      | 8         | 16,000                                                                         | 1,880                    | 0.047      | 0.458      | 15,500                                            | 1,650                    | 0.039      | 0.382      | 12,500                                                | 1,130                    | 0.023      | 0.306      |
|                      |      | 10        | 14,500                                                                         | 1,500                    | 0.032      | 0.35       | 13,500                                            | 1,350                    | 0.027      | 0.292      | 11,000                                                | 950                      | 0.016      | 0.234      |
|                      |      | 12        | 13,500                                                                         | 1,350                    | 0.022      | 0.324      | 12,500                                            | 1,190                    | 0.018      | 0.27       | 10,500                                                | 830                      | 0.011      | 0.216      |
|                      |      | 16        | 9,150                                                                          | 800                      | 0.012      | 0.134      | 8,650                                             | 690                      | 0.01       | 0.112      | 7,150                                                 | 480                      | 0.006      | 0.09       |
| 2                    | R0.1 | 8         | 13,000                                                                         | 2,180                    | 0.024      | 0.72       | 13,000                                            | 1,950                    | 0.02       | 0.6        | 11,500                                                | 1,500                    | 0.012      | 0.48       |
|                      |      | 10        | 12,000                                                                         | 1,950                    | 0.019      | 0.612      | 12,000                                            | 1,730                    | 0.016      | 0.51       | 11,000                                                | 1,370                    | 0.01       | 0.408      |
|                      |      | 12        | 11,500                                                                         | 1,730                    | 0.012      | 0.504      | 11,500                                            | 1,580                    | 0.01       | 0.42       | 10,000                                                | 1,220                    | 0.006      | 0.336      |
|                      |      | 16        | 10,000                                                                         | 1,350                    | 0.007      | 0.432      | 10,000                                            | 1,200                    | 0.006      | 0.36       | 8,900                                                 | 950                      | 0.004      | 0.288      |
|                      |      | 20        | 9,300                                                                          | 1,100                    | 0.005      | 0.216      | 9,300                                             | 980                      | 0.004      | 0.18       | 8,250                                                 | 770                      | 0.002      | 0.144      |
|                      |      | 25        | 8,600                                                                          | 950                      | 0.002      | 0.144      | 8,600                                             | 840                      | 0.002      | 0.12       | 7,650                                                 | 660                      | 0.001      | 0.096      |
|                      | R0.2 | 8         | 13,000                                                                         | 2,180                    | 0.048      | 0.72       | 13,000                                            | 1,950                    | 0.04       | 0.6        | 11,500                                                | 1,500                    | 0.024      | 0.48       |
|                      |      | 10        | 12,000                                                                         | 1,950                    | 0.038      | 0.612      | 12,000                                            | 1,730                    | 0.032      | 0.51       | 11,000                                                | 1,370                    | 0.019      | 0.408      |
|                      |      | 12        | 11,500                                                                         | 1,730                    | 0.024      | 0.504      | 11,500                                            | 1,580                    | 0.02       | 0.42       | 10,000                                                | 1,220                    | 0.012      | 0.336      |
|                      |      | 16        | 10,000                                                                         | 1,350                    | 0.014      | 0.432      | 10,000                                            | 1,200                    | 0.012      | 0.36       | 8,900                                                 | 950                      | 0.007      | 0.288      |
|                      |      | 20        | 9,300                                                                          | 1,100                    | 0.01       | 0.216      | 9,300                                             | 980                      | 0.008      | 0.18       | 8,250                                                 | 770                      | 0.005      | 0.144      |
|                      |      | 25        | 8,600                                                                          | 950                      | 0.005      | 0.144      | 8,600                                             | 840                      | 0.004      | 0.12       | 7,650                                                 | 660                      | 0.002      | 0.096      |
|                      | R0.3 | 8         | 13,000                                                                         | 2,180                    | 0.072      | 0.72       | 13,000                                            | 1,950                    | 0.06       | 0.6        | 11,500                                                | 1,500                    | 0.036      | 0.48       |
|                      |      | 10        | 12,000                                                                         | 1,950                    | 0.058      | 0.612      | 12,000                                            | 1,730                    | 0.048      | 0.51       | 11,000                                                | 1,370                    | 0.029      | 0.408      |
|                      |      | 12        | 11,500                                                                         | 1,730                    | 0.036      | 0.504      | 11,500                                            | 1,580                    | 0.03       | 0.42       | 10,000                                                | 1,220                    | 0.018      | 0.336      |
|                      |      | 16        | 10,000                                                                         | 1,350                    | 0.022      | 0.432      | 10,000                                            | 1,200                    | 0.018      | 0.36       | 8,900                                                 | 950                      | 0.011      | 0.288      |
|                      |      | 20        | 9,300                                                                          | 1,100                    | 0.014      | 0.216      | 9,300                                             | 980                      | 0.012      | 0.18       | 8,250                                                 | 770                      | 0.007      | 0.144      |
|                      |      |           |                                                                                |                          |            |            |                                                   |                          |            |            |                                                       |                          |            |            |
|                      | R0.5 | 8         | 13,000                                                                         | 2,180                    | 0.09       | 0.72       | 13,000                                            | 1,950                    | 0.075      | 0.6        | 11,500                                                | 1,500                    | 0.045      | 0.48       |
|                      |      | 10        | 12,000                                                                         | 1,950                    | 0.072      | 0.612      | 12,000                                            | 1,730                    | 0.06       | 0.51       | 11,000                                                | 1,370                    | 0.036      | 0.408      |
|                      |      | 12        | 11,500                                                                         | 1,730                    | 0.044      | 0.504      | 11,500                                            | 1,580                    | 0.037      | 0.42       | 10,000                                                | 1,220                    | 0.022      | 0.336      |
|                      |      | 16        | 10,000                                                                         | 1,350                    | 0.026      | 0.432      | 10,000                                            | 1,200                    | 0.022      | 0.36       | 8,900                                                 | 950                      | 0.013      | 0.288      |
|                      |      | 20        | 9,300                                                                          | 1,100                    | 0.018      | 0.216      | 9,300                                             | 980                      | 0.015      | 0.18       | 8,250                                                 | 770                      | 0.009      | 0.144      |
| 25                   |      | 8,600     | 950                                                                            | 0.011                    | 0.144      | 8,600      | 840                                               | 0.009                    | 0.12       | 7,650      | 660                                                   | 0.005                    | 0.096      |            |
| 2.5                  | R0.2 | 10        | 11,500                                                                         | 2,400                    | 0.048      | 0.9        | 10,500                                            | 1,800                    | 0.04       | 0.75       | 9,150                                                 | 1,500                    | 0.024      | 0.6        |
|                      |      | 20        | 8,900                                                                          | 1,500                    | 0.024      | 0.54       | 8,000                                             | 1,110                    | 0.02       | 0.45       | 7,150                                                 | 950                      | 0.012      | 0.36       |
|                      | R0.5 | 10        | 11,500                                                                         | 2,400                    | 0.09       | 0.9        | 10,500                                            | 1,800                    | 0.075      | 0.75       | 9,150                                                 | 1,500                    | 0.045      | 0.6        |
|                      |      | 20        | 8,900                                                                          | 1,500                    | 0.044      | 0.54       | 8,000                                             | 1,110                    | 0.037      | 0.45       | 7,150                                                 | 950                      | 0.022      | 0.36       |



1. 機械、ホルダは剛性のある精度の高いものをご使用下さい。
2. 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。調質鋼の切削では、MQL（オイルミストクーラント）を推奨いたします。
3. 上表は、等高線加工の負荷の少ない加工形状での目安です。加工形状、機械剛性、ワーク保持等の状況により、回転速度、送り速度、切込深さを調整下さい。
4. びびり、振動、異常な切削音が発生する場合、回転速度、送り速度、切込深さを調整下さい。
5. Z切込時のアプローチ方法として、円弧（ヘリカル）、傾斜（ランプ）での加工をお勧めします。
6.  $\phi 0.5$  未満あるいはL/D（アスペクト比）が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
7. 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。



FROM

| 被削材<br>Work Material |      |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(～45HRC)      |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(～55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(～66HRC) |                          |            |            |       |
|----------------------|------|-----------|-------------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|-------|
| 外径<br>DC             | RE   | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                               | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |       |
| 3                    | R0.2 | 8         | 9,550                                                                               | 2,250                    | 0.048      | 1.08       | 8,600                                             | 1,730                    | 0.04       | 0.9        | 7,650                                                 | 1,250                    | 0.024      | 0.72       |       |
|                      |      | 12        | 9,550                                                                               | 2,250                    | 0.048      | 1.08       | 8,600                                             | 1,730                    | 0.04       | 0.9        | 7,650                                                 | 1,250                    | 0.024      | 0.72       |       |
|                      |      | 16        | 8,500                                                                               | 1,800                    | 0.034      | 0.864      | 7,650                                             | 1,370                    | 0.028      | 0.72       | 6,800                                                 | 990                      | 0.017      | 0.576      |       |
|                      |      | 20        | 7,400                                                                               | 1,490                    | 0.022      | 0.734      | 6,700                                             | 1,130                    | 0.018      | 0.612      | 5,950                                                 | 830                      | 0.011      | 0.49       |       |
|                      |      | 25        | 7,100                                                                               | 1,250                    | 0.014      | 0.648      | 6,400                                             | 960                      | 0.012      | 0.54       | 5,700                                                 | 690                      | 0.007      | 0.432      |       |
|                      |      | 30        | 6,900                                                                               | 1,140                    | 0.01       | 0.324      | 6,200                                             | 870                      | 0.008      | 0.27       | 5,500                                                 | 630                      | 0.005      | 0.216      |       |
|                      |      | 35        | 6,350                                                                               | 990                      | 0.007      | 0.216      | 5,700                                             | 750                      | 0.006      | 0.18       | 5,100                                                 | 560                      | 0.004      | 0.144      |       |
|                      | R0.3 | 12        | 9,550                                                                               | 2,250                    | 0.072      | 1.08       | 8,600                                             | 1,730                    | 0.06       | 0.9        | 7,650                                                 | 1,250                    | 0.036      | 0.72       |       |
|                      |      | 16        | 8,500                                                                               | 1,800                    | 0.05       | 0.864      | 7,650                                             | 1,370                    | 0.042      | 0.72       | 6,800                                                 | 990                      | 0.025      | 0.576      |       |
|                      |      | 20        | 7,400                                                                               | 1,490                    | 0.032      | 0.734      | 6,700                                             | 1,130                    | 0.027      | 0.612      | 5,950                                                 | 830                      | 0.016      | 0.49       |       |
|                      |      | 25        | 7,100                                                                               | 1,250                    | 0.022      | 0.648      | 6,400                                             | 960                      | 0.018      | 0.54       | 5,700                                                 | 690                      | 0.011      | 0.432      |       |
|                      |      | 30        | 6,900                                                                               | 1,140                    | 0.014      | 0.324      | 6,200                                             | 870                      | 0.012      | 0.27       | 5,500                                                 | 630                      | 0.007      | 0.216      |       |
|                      | R0.5 | 35        | 6,350                                                                               | 990                      | 0.011      | 0.216      | 5,700                                             | 750                      | 0.009      | 0.18       | 5,100                                                 | 560                      | 0.005      | 0.144      |       |
|                      |      | 12        | 9,550                                                                               | 2,250                    | 0.09       | 1.08       | 8,600                                             | 1,730                    | 0.075      | 0.9        | 7,650                                                 | 1,250                    | 0.045      | 0.72       |       |
|                      |      | 16        | 8,500                                                                               | 1,800                    | 0.062      | 0.864      | 7,650                                             | 1,370                    | 0.052      | 0.72       | 6,800                                                 | 990                      | 0.031      | 0.576      |       |
|                      |      | 20        | 7,400                                                                               | 1,490                    | 0.04       | 0.734      | 6,700                                             | 1,130                    | 0.033      | 0.612      | 5,950                                                 | 830                      | 0.02       | 0.49       |       |
|                      |      | 25        | 7,100                                                                               | 1,250                    | 0.026      | 0.648      | 6,400                                             | 960                      | 0.022      | 0.54       | 5,700                                                 | 690                      | 0.013      | 0.432      |       |
| 4                    | R0.2 | 30        | 6,900                                                                               | 1,140                    | 0.018      | 0.324      | 6,200                                             | 870                      | 0.015      | 0.27       | 5,500                                                 | 630                      | 0.009      | 0.216      |       |
|                      |      | 35        | 6,350                                                                               | 990                      | 0.013      | 0.216      | 5,700                                             | 750                      | 0.011      | 0.18       | 5,100                                                 | 560                      | 0.007      | 0.144      |       |
|                      |      | 16        | 7,150                                                                               | 2,050                    | 0.048      | 1.44       | 6,450                                             | 1,550                    | 0.04       | 1.2        | 5,000                                                 | 970                      | 0.024      | 0.96       |       |
|                      |      | 20        | 6,750                                                                               | 1,950                    | 0.038      | 1.224      | 6,100                                             | 1,450                    | 0.032      | 1.02       | 4,750                                                 | 910                      | 0.019      | 0.816      |       |
|                      |      | 25        | 5,950                                                                               | 1,700                    | 0.024      | 0.979      | 5,350                                             | 1,300                    | 0.02       | 0.816      | 4,150                                                 | 800                      | 0.012      | 0.653      |       |
|                      | R0.3 | 30        | 5,550                                                                               | 1,600                    | 0.017      | 0.893      | 5,000                                             | 1,200                    | 0.014      | 0.744      | 3,900                                                 | 750                      | 0.008      | 0.595      |       |
|                      |      | 40        | 5,150                                                                               | 1,500                    | 0.01       | 0.432      | 4,650                                             | 1,100                    | 0.008      | 0.36       | 3,600                                                 | 700                      | 0.005      | 0.288      |       |
|                      |      | 16        | 7,150                                                                               | 2,050                    | 0.072      | 1.44       | 6,450                                             | 1,550                    | 0.06       | 1.2        | 5,000                                                 | 970                      | 0.036      | 0.96       |       |
|                      |      | 20        | 6,750                                                                               | 1,950                    | 0.058      | 1.224      | 6,100                                             | 1,450                    | 0.048      | 1.02       | 4,750                                                 | 910                      | 0.029      | 0.816      |       |
|                      |      | 25        | 5,950                                                                               | 1,700                    | 0.036      | 0.979      | 5,350                                             | 1,300                    | 0.03       | 0.816      | 4,150                                                 | 800                      | 0.018      | 0.653      |       |
|                      | R0.5 | 30        | 5,550                                                                               | 1,600                    | 0.025      | 0.893      | 5,000                                             | 1,200                    | 0.021      | 0.744      | 3,900                                                 | 750                      | 0.013      | 0.595      |       |
|                      |      | 40        | 5,150                                                                               | 1,500                    | 0.014      | 0.432      | 4,650                                             | 1,100                    | 0.012      | 0.36       | 3,600                                                 | 700                      | 0.007      | 0.288      |       |
|                      |      | 16        | 7,150                                                                               | 2,050                    | 0.09       | 1.44       | 6,450                                             | 1,550                    | 0.075      | 1.2        | 5,000                                                 | 970                      | 0.045      | 0.96       |       |
|                      |      | 20        | 6,750                                                                               | 1,950                    | 0.072      | 1.224      | 6,100                                             | 1,450                    | 0.06       | 1.02       | 4,750                                                 | 910                      | 0.036      | 0.816      |       |
|                      |      | 25        | 5,950                                                                               | 1,700                    | 0.044      | 0.979      | 5,350                                             | 1,300                    | 0.037      | 0.816      | 4,150                                                 | 800                      | 0.022      | 0.653      |       |
|                      | R1   | 30        | 5,550                                                                               | 1,600                    | 0.031      | 0.893      | 5,000                                             | 1,200                    | 0.026      | 0.744      | 3,900                                                 | 750                      | 0.016      | 0.595      |       |
|                      |      | 40        | 5,150                                                                               | 1,500                    | 0.018      | 0.432      | 4,650                                             | 1,100                    | 0.015      | 0.36       | 3,600                                                 | 700                      | 0.009      | 0.288      |       |
| 50                   |      | 4,550     | 1,300                                                                               | 0.011                    | 0.259      | 4,100      | 980                                               | 0.009                    | 0.216      | 3,150      | 610                                                   | 0.005                    | 0.173      |            |       |
| 16                   |      | 7,150     | 2,050                                                                               | 0.144                    | 1.44       | 6,450      | 1,550                                             | 0.12                     | 1.2        | 5,000      | 970                                                   | 0.072                    | 0.96       |            |       |
| 20                   |      | 6,750     | 1,950                                                                               | 0.12                     | 1.224      | 6,100      | 1,450                                             | 0.1                      | 1.02       | 4,750      | 910                                                   | 0.06                     | 0.816      |            |       |
| 切込深さ<br>Depth of Cut |      |           | 25                                                                                  | 5,950                    | 1,700      | 0.072      | 0.979                                             | 5,350                    | 1,300      | 0.06       | 0.816                                                 | 4,150                    | 800        | 0.036      | 0.653 |
|                      |      |           | 30                                                                                  | 5,550                    | 1,600      | 0.048      | 0.893                                             | 5,000                    | 1,200      | 0.04       | 0.744                                                 | 3,900                    | 750        | 0.024      | 0.595 |
|                      |      |           | 40                                                                                  | 5,150                    | 1,500      | 0.029      | 0.432                                             | 4,650                    | 1,100      | 0.024      | 0.36                                                  | 3,600                    | 700        | 0.014      | 0.288 |
|                      |      |           |  |                          |            |            |                                                   |                          |            |            |                                                       |                          |            |            |       |

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. The above condition shows an approximate standard for contouring operation (side milling) with a low machining load.  
If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of  $\phi$  0.5 or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage.  
Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.

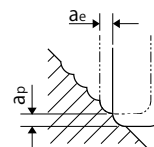


# AE-CPR4-H 切削条件基準表 Cutting Condition

## 側面切削(等高線仕上げ加工) Side Milling (Contour Line Finish Milling)

| 被削材<br>Work Material |        |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(～45HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(～55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(～66HRC) |                          |            |            |       |      |
|----------------------|--------|-----------|--------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|-------|------|
| 外径<br>DC             | RE     | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                          | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |       |      |
| 0.2                  | R0.02  | 0.5       | 50,000                                                                         | 700                      | 0.006      | 0.007      | 43,000                                            | 550                      | 0.005      | 0.006      | 43,000                                                | 520                      | 0.003      | 0.005      |       |      |
|                      |        | 1         | 47,500                                                                         | 680                      | 0.006      | 0.007      | 40,500                                            | 520                      | 0.005      | 0.006      | 40,500                                                | 490                      | 0.003      | 0.005      |       |      |
|                      |        | 1.5       | 45,000                                                                         | 540                      | 0.005      | 0.006      | 38,000                                            | 420                      | 0.004      | 0.005      | 38,000                                                | 400                      | 0.002      | 0.004      |       |      |
|                      |        | 2         | 42,000                                                                         | 300                      | 0.004      | 0.006      | 35,500                                            | 230                      | 0.003      | 0.005      | 35,500                                                | 220                      | 0.002      | 0.004      |       |      |
|                      | R0.05  | 0.5       | 50,000                                                                         | 700                      | 0.006      | 0.007      | 43,000                                            | 550                      | 0.005      | 0.006      | 43,000                                                | 520                      | 0.003      | 0.005      |       |      |
|                      |        | 1         | 47,500                                                                         | 680                      | 0.006      | 0.007      | 40,500                                            | 520                      | 0.005      | 0.006      | 40,500                                                | 490                      | 0.003      | 0.005      |       |      |
|                      |        | 1.5       | 45,000                                                                         | 540                      | 0.005      | 0.006      | 38,000                                            | 420                      | 0.004      | 0.005      | 38,000                                                | 400                      | 0.002      | 0.004      |       |      |
|                      |        | 2         | 42,000                                                                         | 300                      | 0.004      | 0.006      | 35,500                                            | 230                      | 0.003      | 0.005      | 35,500                                                | 220                      | 0.002      | 0.004      |       |      |
| 0.3                  | R0.02  | 1         | 43,000                                                                         | 850                      | 0.006      | 0.011      | 38,000                                            | 690                      | 0.005      | 0.009      | 33,500                                                | 530                      | 0.003      | 0.007      |       |      |
|                      |        | 1.5       | 40,000                                                                         | 740                      | 0.006      | 0.011      | 35,000                                            | 590                      | 0.005      | 0.009      | 30,500                                                | 440                      | 0.003      | 0.007      |       |      |
|                      |        | 2         | 36,000                                                                         | 610                      | 0.005      | 0.01       | 32,000                                            | 500                      | 0.004      | 0.008      | 28,000                                                | 370                      | 0.002      | 0.006      |       |      |
|                      |        | 2.5       | 32,000                                                                         | 480                      | 0.004      | 0.01       | 28,000                                            | 380                      | 0.003      | 0.008      | 24,500                                                | 290                      | 0.002      | 0.006      |       |      |
|                      |        | 3         | 28,000                                                                         | 220                      | 0.002      | 0.008      | 24,500                                            | 180                      | 0.002      | 0.007      | 21,500                                                | 130                      | 0.001      | 0.006      |       |      |
|                      | R0.05  | 1         | 43,000                                                                         | 850                      | 0.006      | 0.011      | 38,000                                            | 690                      | 0.005      | 0.009      | 33,500                                                | 530                      | 0.003      | 0.007      |       |      |
|                      |        | 1.5       | 40,000                                                                         | 740                      | 0.006      | 0.011      | 35,000                                            | 590                      | 0.005      | 0.009      | 30,500                                                | 440                      | 0.003      | 0.007      |       |      |
|                      |        | 2         | 36,000                                                                         | 610                      | 0.005      | 0.01       | 32,000                                            | 500                      | 0.004      | 0.008      | 28,000                                                | 370                      | 0.002      | 0.006      |       |      |
|                      |        | 2.5       | 32,000                                                                         | 480                      | 0.004      | 0.01       | 28,000                                            | 380                      | 0.003      | 0.008      | 24,500                                                | 290                      | 0.002      | 0.006      |       |      |
|                      |        | 3         | 28,000                                                                         | 220                      | 0.002      | 0.008      | 24,500                                            | 180                      | 0.002      | 0.007      | 21,500                                                | 130                      | 0.001      | 0.006      |       |      |
|                      |        | 0.4       | R0.02                                                                          | 1                        | 39,500     | 1,510      | 0.007                                             | 0.014                    | 32,000     | 1,170      | 0.006                                                 | 0.012                    | 28,500     | 820        | 0.004 | 0.01 |
|                      |        |           |                                                                                | 1.5                      | 39,500     | 1,510      | 0.007                                             | 0.014                    | 32,000     | 1,170      | 0.006                                                 | 0.012                    | 28,500     | 820        | 0.004 | 0.01 |
| 2                    | 37,000 |           |                                                                                | 1,370                    | 0.007      | 0.014      | 30,500                                            | 1,050                    | 0.006      | 0.012      | 27,000                                                | 750                      | 0.004      | 0.01       |       |      |
| 2.5                  | 33,500 |           |                                                                                | 1,130                    | 0.006      | 0.012      | 27,500                                            | 870                      | 0.005      | 0.01       | 24,500                                                | 620                      | 0.003      | 0.008      |       |      |
| 3                    | 30,500 |           |                                                                                | 950                      | 0.005      | 0.01       | 25,000                                            | 720                      | 0.004      | 0.008      | 22,500                                                | 510                      | 0.002      | 0.006      |       |      |
| 4                    | 28,500 |           |                                                                                | 760                      | 0.002      | 0.007      | 23,500                                            | 590                      | 0.002      | 0.006      | 20,500                                                | 420                      | 0.001      | 0.005      |       |      |
| R0.05                | 1      |           | 39,500                                                                         | 1,510                    | 0.007      | 0.014      | 32,000                                            | 1,170                    | 0.006      | 0.012      | 28,500                                                | 820                      | 0.004      | 0.01       |       |      |
|                      | 1.5    |           | 39,500                                                                         | 1,510                    | 0.007      | 0.014      | 32,000                                            | 1,170                    | 0.006      | 0.012      | 28,500                                                | 820                      | 0.004      | 0.01       |       |      |
|                      | 2      |           | 37,000                                                                         | 1,370                    | 0.007      | 0.014      | 30,500                                            | 1,050                    | 0.006      | 0.012      | 27,000                                                | 750                      | 0.004      | 0.01       |       |      |
|                      | 2.5    |           | 33,500                                                                         | 1,130                    | 0.006      | 0.012      | 27,500                                            | 870                      | 0.005      | 0.01       | 24,500                                                | 620                      | 0.003      | 0.008      |       |      |
|                      | 3      |           | 30,500                                                                         | 950                      | 0.005      | 0.01       | 25,000                                            | 720                      | 0.004      | 0.008      | 22,500                                                | 510                      | 0.002      | 0.006      |       |      |
|                      | 4      |           | 28,500                                                                         | 760                      | 0.002      | 0.007      | 23,500                                            | 590                      | 0.002      | 0.006      | 20,500                                                | 420                      | 0.001      | 0.005      |       |      |
| R0.1                 | 1      | 39,500    | 1,510                                                                          | 0.012                    | 0.014      | 32,000     | 1,170                                             | 0.01                     | 0.012      | 28,500     | 820                                                   | 0.006                    | 0.01       |            |       |      |
|                      | 2      | 37,000    | 1,370                                                                          | 0.012                    | 0.014      | 30,500     | 1,050                                             | 0.01                     | 0.012      | 27,000     | 750                                                   | 0.006                    | 0.01       |            |       |      |
|                      | 3      | 30,500    | 950                                                                            | 0.008                    | 0.01       | 25,000     | 720                                               | 0.007                    | 0.008      | 22,500     | 510                                                   | 0.004                    | 0.006      |            |       |      |
|                      | 4      | 28,500    | 760                                                                            | 0.005                    | 0.007      | 23,500     | 590                                               | 0.004                    | 0.006      | 20,500     | 420                                                   | 0.002                    | 0.005      |            |       |      |
| 0.5                  | R0.02  | 1         | 34,500                                                                         | 1,460                    | 0.007      | 0.018      | 28,500                                            | 1,170                    | 0.006      | 0.015      | 24,000                                                | 870                      | 0.004      | 0.012      |       |      |
|                      |        | 2         | 34,500                                                                         | 1,460                    | 0.007      | 0.018      | 28,500                                            | 1,170                    | 0.006      | 0.015      | 24,000                                                | 870                      | 0.004      | 0.012      |       |      |
|                      |        | 3         | 32,500                                                                         | 1,230                    | 0.007      | 0.016      | 27,000                                            | 990                      | 0.006      | 0.013      | 22,500                                                | 740                      | 0.004      | 0.01       |       |      |
|                      |        | 4         | 26,500                                                                         | 900                      | 0.004      | 0.012      | 22,500                                            | 720                      | 0.003      | 0.01       | 18,500                                                | 540                      | 0.002      | 0.008      |       |      |
|                      |        | 5         | 25,000                                                                         | 740                      | 0.002      | 0.008      | 20,500                                            | 590                      | 0.002      | 0.007      | 17,500                                                | 440                      | 0.001      | 0.006      |       |      |
|                      |        | 6         | 23,000                                                                         | 650                      | 0.001      | 0.007      | 19,000                                            | 510                      | 0.001      | 0.006      | 16,000                                                | 390                      | 0.001      | 0.005      |       |      |
|                      | R0.05  | 1         | 34,500                                                                         | 1,460                    | 0.007      | 0.018      | 28,500                                            | 1,170                    | 0.006      | 0.015      | 24,000                                                | 870                      | 0.004      | 0.012      |       |      |
|                      |        | 2         | 34,500                                                                         | 1,460                    | 0.007      | 0.018      | 28,500                                            | 1,170                    | 0.006      | 0.015      | 24,000                                                | 870                      | 0.004      | 0.012      |       |      |
|                      |        | 3         | 32,500                                                                         | 1,230                    | 0.007      | 0.016      | 27,000                                            | 990                      | 0.006      | 0.013      | 22,500                                                | 740                      | 0.004      | 0.01       |       |      |
|                      |        | 4         | 26,500                                                                         | 900                      | 0.004      | 0.012      | 22,500                                            | 720                      | 0.003      | 0.01       | 18,500                                                | 540                      | 0.002      | 0.008      |       |      |
|                      |        | 5         | 25,000                                                                         | 740                      | 0.002      | 0.008      | 20,500                                            | 590                      | 0.002      | 0.007      | 17,500                                                | 440                      | 0.001      | 0.006      |       |      |
|                      |        | 6         | 23,000                                                                         | 650                      | 0.001      | 0.007      | 19,000                                            | 510                      | 0.001      | 0.006      | 16,000                                                | 390                      | 0.001      | 0.005      |       |      |
|                      | R0.1   | 1         | 34,500                                                                         | 1,460                    | 0.012      | 0.018      | 28,500                                            | 1,170                    | 0.01       | 0.015      | 24,000                                                | 870                      | 0.006      | 0.012      |       |      |
|                      |        | 2         | 34,500                                                                         | 1,460                    | 0.012      | 0.018      | 28,500                                            | 1,170                    | 0.01       | 0.015      | 24,000                                                | 870                      | 0.006      | 0.012      |       |      |
|                      |        | 3         | 32,500                                                                         | 1,230                    | 0.012      | 0.016      | 27,000                                            | 990                      | 0.01       | 0.013      | 22,500                                                | 740                      | 0.006      | 0.01       |       |      |
|                      |        | 4         | 26,500                                                                         | 900                      | 0.007      | 0.012      | 22,500                                            | 720                      | 0.006      | 0.01       | 18,500                                                | 540                      | 0.004      | 0.008      |       |      |
|                      |        | 5         | 25,000                                                                         | 740                      | 0.005      | 0.008      | 20,500                                            | 590                      | 0.004      | 0.007      | 17,500                                                | 440                      | 0.002      | 0.006      |       |      |
|                      |        | 6         | 23,000                                                                         | 650                      | 0.004      | 0.007      | 19,000                                            | 510                      | 0.003      | 0.006      | 16,000                                                | 390                      | 0.002      | 0.005      |       |      |

- 機械、ホルダは剛性のある精度の高いものをご使用下さい。
- 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。調質鋼の切削では、MQL（オイルミストクーラント）を推奨いたします。
- 上表は、等高線加工（側面）の負荷の少ない加工形状での目安です。加工形状、機械剛性、ワーク保持等の状況により、回転速度、送り速度、切込深さを調整下さい。
- びびり、振動、異常な切削音が発生する場合、回転速度、送り速度、切込深さを調整下さい。
- Z切込時のアプローチ方法として、円弧（ヘリカル）、傾斜（ランプ）での加工をお勧めします。
- φ0.5未満あるいはL/D（アスペクト比）が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
- 加工精度を要求される場合は、回転速度、送り速度、切込量を抑えて使用下さい。
- 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。



FROM

| 被削材<br>Work Material |       |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(~45HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(~55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(~66HRC) |                          |            |            |
|----------------------|-------|-----------|--------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|
| 外径<br>DC             | RE    | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                          | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
| 0.6                  | R0.1  | 2         | 31,000                                                                         | 1,580                    | 0.014      | 0.022      | 26,500                                            | 1,280                    | 0.012      | 0.018      | 24,000                                                | 1,040                    | 0.007      | 0.014      |
|                      |       | 4         | 26,000                                                                         | 1,110                    | 0.011      | 0.014      | 22,000                                            | 900                      | 0.009      | 0.012      | 20,000                                                | 740                      | 0.005      | 0.01       |
|                      |       | 6         | 22,500                                                                         | 800                      | 0.005      | 0.011      | 19,000                                            | 650                      | 0.004      | 0.009      | 17,000                                                | 530                      | 0.002      | 0.007      |
| 0.7                  | R0.02 | 2         | 30,000                                                                         | 1,800                    | 0.007      | 0.026      | 26,000                                            | 1,560                    | 0.006      | 0.022      | 24,000                                                | 1,220                    | 0.004      | 0.018      |
|                      |       | 4         | 27,000                                                                         | 1,420                    | 0.005      | 0.019      | 23,500                                            | 1,210                    | 0.004      | 0.016      | 21,500                                                | 940                      | 0.002      | 0.013      |
|                      |       | 6         | 22,500                                                                         | 980                      | 0.002      | 0.012      | 19,500                                            | 830                      | 0.002      | 0.01       | 18,000                                                | 650                      | 0.001      | 0.008      |
|                      | R0.05 | 2         | 30,000                                                                         | 1,800                    | 0.007      | 0.026      | 26,000                                            | 1,560                    | 0.006      | 0.022      | 24,000                                                | 1,220                    | 0.004      | 0.018      |
|                      |       | 4         | 27,000                                                                         | 1,420                    | 0.005      | 0.019      | 23,500                                            | 1,210                    | 0.004      | 0.016      | 21,500                                                | 940                      | 0.002      | 0.013      |
|                      |       | 6         | 22,500                                                                         | 980                      | 0.002      | 0.012      | 19,500                                            | 830                      | 0.002      | 0.01       | 18,000                                                | 650                      | 0.001      | 0.008      |
|                      | R0.1  | 2         | 30,000                                                                         | 1,800                    | 0.018      | 0.026      | 26,000                                            | 1,560                    | 0.015      | 0.022      | 24,000                                                | 1,220                    | 0.009      | 0.018      |
|                      |       | 4         | 27,000                                                                         | 1,420                    | 0.014      | 0.019      | 23,500                                            | 1,210                    | 0.012      | 0.016      | 21,500                                                | 940                      | 0.007      | 0.013      |
|                      |       | 6         | 22,500                                                                         | 980                      | 0.011      | 0.012      | 19,500                                            | 830                      | 0.009      | 0.01       | 18,000                                                | 650                      | 0.005      | 0.008      |
| 0.8                  | R0.1  | 4         | 29,000                                                                         | 1,800                    | 0.018      | 0.024      | 25,500                                            | 1,580                    | 0.015      | 0.02       | 23,500                                                | 1,190                    | 0.009      | 0.016      |
|                      |       | 6         | 23,500                                                                         | 1,280                    | 0.014      | 0.017      | 21,000                                            | 1,080                    | 0.012      | 0.014      | 19,500                                                | 830                      | 0.007      | 0.011      |
|                      | R0.2  | 4         | 29,000                                                                         | 1,800                    | 0.024      | 0.024      | 25,500                                            | 1,580                    | 0.02       | 0.02       | 23,500                                                | 1,190                    | 0.012      | 0.016      |
|                      |       | 6         | 23,500                                                                         | 1,280                    | 0.019      | 0.017      | 21,000                                            | 1,080                    | 0.016      | 0.014      | 19,500                                                | 830                      | 0.01       | 0.011      |
| 0.9                  | R0.1  | 8         | 22,000                                                                         | 1,040                    | 0.01       | 0.012      | 19,500                                            | 890                      | 0.008      | 0.01       | 18,000                                                | 680                      | 0.005      | 0.008      |
|                      |       | 4         | 28,000                                                                         | 2,020                    | 0.018      | 0.03       | 25,000                                            | 1,690                    | 0.015      | 0.025      | 23,000                                                | 1,330                    | 0.009      | 0.02       |
| 1                    | R0.05 | 8         | 21,500                                                                         | 1,360                    | 0.011      | 0.024      | 19,000                                            | 1,140                    | 0.009      | 0.02       | 17,500                                                | 890                      | 0.005      | 0.016      |
|                      |       | 4         | 27,000                                                                         | 2,250                    | 0.007      | 0.036      | 24,500                                            | 1,880                    | 0.006      | 0.03       | 22,500                                                | 1,500                    | 0.004      | 0.024      |
|                      |       | 6         | 24,000                                                                         | 1,800                    | 0.007      | 0.032      | 21,500                                            | 1,500                    | 0.006      | 0.027      | 20,000                                                | 1,200                    | 0.004      | 0.022      |
|                      |       | 8         | 21,000                                                                         | 1,430                    | 0.004      | 0.025      | 19,000                                            | 1,190                    | 0.003      | 0.021      | 17,500                                                | 930                      | 0.002      | 0.017      |
|                      | R0.1  | 10        | 19,500                                                                         | 1,160                    | 0.004      | 0.018      | 17,500                                            | 960                      | 0.003      | 0.015      | 16,500                                                | 770                      | 0.002      | 0.012      |
|                      |       | 12        | 18,000                                                                         | 1,010                    | 0.004      | 0.016      | 16,000                                            | 840                      | 0.003      | 0.013      | 15,000                                                | 660                      | 0.002      | 0.01       |
|                      |       | 4         | 27,000                                                                         | 2,250                    | 0.018      | 0.036      | 24,500                                            | 1,880                    | 0.015      | 0.03       | 22,500                                                | 1,500                    | 0.009      | 0.024      |
|                      |       | 6         | 24,000                                                                         | 1,800                    | 0.018      | 0.032      | 21,500                                            | 1,500                    | 0.015      | 0.027      | 20,000                                                | 1,200                    | 0.009      | 0.022      |
|                      |       | 8         | 21,000                                                                         | 1,430                    | 0.011      | 0.025      | 19,000                                            | 1,190                    | 0.009      | 0.021      | 17,500                                                | 930                      | 0.005      | 0.017      |
|                      | R0.2  | 10        | 19,500                                                                         | 1,160                    | 0.007      | 0.018      | 17,500                                            | 960                      | 0.006      | 0.015      | 16,500                                                | 770                      | 0.004      | 0.012      |
|                      |       | 12        | 18,000                                                                         | 1,010                    | 0.005      | 0.016      | 16,000                                            | 840                      | 0.004      | 0.013      | 15,000                                                | 660                      | 0.002      | 0.01       |
|                      |       | 4         | 27,000                                                                         | 2,250                    | 0.024      | 0.036      | 24,500                                            | 1,880                    | 0.02       | 0.03       | 22,500                                                | 1,500                    | 0.012      | 0.024      |
|                      |       | 6         | 24,000                                                                         | 1,800                    | 0.024      | 0.032      | 21,500                                            | 1,500                    | 0.02       | 0.027      | 20,000                                                | 1,200                    | 0.012      | 0.022      |
|                      | R0.3  | 8         | 21,000                                                                         | 1,430                    | 0.014      | 0.025      | 19,000                                            | 1,190                    | 0.012      | 0.021      | 17,500                                                | 930                      | 0.007      | 0.017      |
|                      |       | 10        | 19,500                                                                         | 1,160                    | 0.01       | 0.018      | 17,500                                            | 960                      | 0.008      | 0.015      | 16,500                                                | 770                      | 0.005      | 0.012      |
|                      |       | 12        | 18,000                                                                         | 1,010                    | 0.007      | 0.016      | 16,000                                            | 840                      | 0.006      | 0.013      | 15,000                                                | 660                      | 0.004      | 0.01       |
|                      |       | 16        | 14,500                                                                         | 710                      | 0.005      | 0.012      | 13,000                                            | 590                      | 0.004      | 0.01       | 12,000                                                | 470                      | 0.002      | 0.008      |
|                      | R0.2  | 20        | 12,000                                                                         | 510                      | 0.004      | 0.011      | 11,000                                            | 420                      | 0.003      | 0.009      | 10,000                                                | 330                      | 0.002      | 0.007      |
|                      |       | 4         | 27,000                                                                         | 2,250                    | 0.036      | 0.036      | 24,500                                            | 1,880                    | 0.03       | 0.03       | 22,500                                                | 1,500                    | 0.018      | 0.024      |
|                      |       | 6         | 24,000                                                                         | 1,800                    | 0.036      | 0.032      | 21,500                                            | 1,500                    | 0.03       | 0.027      | 20,000                                                | 1,200                    | 0.018      | 0.022      |
|                      |       | 8         | 21,000                                                                         | 1,430                    | 0.022      | 0.025      | 19,000                                            | 1,190                    | 0.018      | 0.021      | 17,500                                                | 930                      | 0.011      | 0.017      |
| 1.2                  | R0.2  | 10        | 19,500                                                                         | 1,160                    | 0.014      | 0.018      | 17,500                                            | 960                      | 0.012      | 0.015      | 16,500                                                | 770                      | 0.007      | 0.012      |
|                      |       | 12        | 18,000                                                                         | 1,010                    | 0.011      | 0.016      | 16,000                                            | 840                      | 0.009      | 0.013      | 15,000                                                | 660                      | 0.005      | 0.01       |
|                      |       | 6         | 22,500                                                                         | 2,180                    | 0.019      | 0.043      | 21,000                                            | 1,880                    | 0.016      | 0.036      | 19,000                                                | 1,440                    | 0.01       | 0.029      |
|                      |       | 8         | 20,000                                                                         | 1,730                    | 0.011      | 0.034      | 18,500                                            | 1,470                    | 0.009      | 0.028      | 17,000                                                | 1,140                    | 0.005      | 0.022      |
|                      | R0.3  | 10        | 18,500                                                                         | 1,500                    | 0.006      | 0.025      | 17,500                                            | 1,290                    | 0.005      | 0.021      | 16,000                                                | 1,010                    | 0.003      | 0.017      |
|                      |       | 6         | 22,500                                                                         | 2,180                    | 0.029      | 0.043      | 21,000                                            | 1,880                    | 0.024      | 0.036      | 19,000                                                | 1,440                    | 0.014      | 0.029      |
|                      |       | 8         | 20,000                                                                         | 1,730                    | 0.016      | 0.034      | 18,500                                            | 1,470                    | 0.013      | 0.028      | 17,000                                                | 1,140                    | 0.008      | 0.022      |
|                      |       | 10        | 18,500                                                                         | 1,500                    | 0.01       | 0.025      | 17,500                                            | 1,290                    | 0.008      | 0.021      | 16,000                                                | 1,010                    | 0.005      | 0.017      |

多刃スクエアタイプ・ラジアスタイプ Multi-flute square type and radius type

ボールタイプ Ball Type

AE-MS-H

AE-ML-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-LNBD-H

PXSH

AE-MSS-H

AE-MS-H

AE-ML-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-LNBD-H

PXSH

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. The above condition shows an approximate standard for contouring operation (side milling) with a low machining load.  
If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of  $\phi$  0.5 or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage.  
Therefore, adjust the cutting conditions based on the machining situation.
7. Adjust the speed, feed rate, and the depth of the cut according to the shape of the work, rigidity of the machine, and how the work is held.
8. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

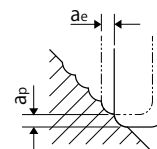
44

# AE-CPR4-H 切削条件基準表 Cutting Condition

FROM

側面切削(等高線仕上げ加工) Side Milling (Contour Line Finish Milling)

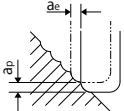
| 被削材<br>Work Material |      |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(～45HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(～55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(～66HRC) |                          |            |            |
|----------------------|------|-----------|--------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|
| 外径<br>DC             | RE   | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                          | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
| 1.5                  | R0.2 | 6         | 21,000                                                                         | 2,630                    | 0.024      | 0.054      | 18,500                                            | 2,180                    | 0.02       | 0.045      | 16,000                                                | 1,580                    | 0.012      | 0.036      |
|                      |      | 8         | 20,000                                                                         | 2,250                    | 0.024      | 0.054      | 17,500                                            | 1,880                    | 0.02       | 0.045      | 15,500                                                | 1,370                    | 0.012      | 0.036      |
|                      |      | 10        | 17,500                                                                         | 1,880                    | 0.022      | 0.043      | 15,500                                            | 1,580                    | 0.018      | 0.036      | 13,500                                                | 1,140                    | 0.011      | 0.029      |
|                      |      | 12        | 16,500                                                                         | 1,650                    | 0.014      | 0.037      | 14,500                                            | 1,370                    | 0.012      | 0.031      | 12,500                                                | 1,010                    | 0.007      | 0.025      |
|                      |      | 16        | 11,000                                                                         | 960                      | 0.01       | 0.026      | 10,000                                            | 800                      | 0.008      | 0.022      | 8,650                                                 | 590                      | 0.005      | 0.018      |
|                      |      | 20        | 8,650                                                                          | 590                      | 0.005      | 0.018      | 7,700                                             | 590                      | 0.005      | 0.018      | 6,750                                                 | 450                      | 0.003      | 0.014      |
|                      | R0.3 | 6         | 21,000                                                                         | 2,630                    | 0.036      | 0.054      | 18,500                                            | 2,180                    | 0.03       | 0.045      | 16,000                                                | 1,580                    | 0.018      | 0.036      |
|                      |      | 8         | 20,000                                                                         | 2,250                    | 0.036      | 0.054      | 17,500                                            | 1,880                    | 0.03       | 0.045      | 15,500                                                | 1,370                    | 0.018      | 0.036      |
|                      |      | 10        | 17,500                                                                         | 1,880                    | 0.032      | 0.043      | 15,500                                            | 1,580                    | 0.027      | 0.036      | 13,500                                                | 1,140                    | 0.016      | 0.029      |
|                      |      | 12        | 16,500                                                                         | 1,650                    | 0.022      | 0.037      | 14,500                                            | 1,370                    | 0.018      | 0.031      | 12,500                                                | 1,010                    | 0.011      | 0.025      |
|                      |      | 16        | 11,000                                                                         | 960                      | 0.014      | 0.026      | 10,000                                            | 800                      | 0.012      | 0.022      | 8,650                                                 | 590                      | 0.007      | 0.018      |
|                      |      | 20        | 8,650                                                                          | 590                      | 0.007      | 0.018      | 7,700                                             | 590                      | 0.007      | 0.018      | 6,750                                                 | 450                      | 0.004      | 0.014      |
| 2                    | R0.1 | 8         | 16,500                                                                         | 2,780                    | 0.018      | 0.072      | 16,000                                            | 2,400                    | 0.015      | 0.06       | 15,000                                                | 2,030                    | 0.009      | 0.048      |
|                      |      | 10        | 15,500                                                                         | 2,480                    | 0.018      | 0.072      | 15,500                                            | 2,180                    | 0.015      | 0.06       | 14,500                                                | 1,800                    | 0.009      | 0.048      |
|                      |      | 12        | 14,500                                                                         | 2,250                    | 0.018      | 0.065      | 14,500                                            | 1,950                    | 0.015      | 0.054      | 13,500                                                | 1,580                    | 0.009      | 0.043      |
|                      |      | 16        | 13,000                                                                         | 1,730                    | 0.011      | 0.05       | 12,500                                            | 1,500                    | 0.009      | 0.042      | 12,000                                                | 1,250                    | 0.005      | 0.034      |
|                      |      | 20        | 12,000                                                                         | 1,410                    | 0.007      | 0.036      | 11,500                                            | 1,230                    | 0.006      | 0.03       | 11,000                                                | 1,020                    | 0.004      | 0.024      |
|                      |      | 25        | 11,000                                                                         | 1,200                    | 0.005      | 0.032      | 11,000                                            | 1,050                    | 0.004      | 0.027      | 10,000                                                | 870                      | 0.002      | 0.022      |
|                      | R0.2 | 8         | 16,500                                                                         | 2,780                    | 0.024      | 0.072      | 16,000                                            | 2,400                    | 0.02       | 0.06       | 15,000                                                | 2,030                    | 0.012      | 0.048      |
|                      |      | 10        | 15,500                                                                         | 2,480                    | 0.024      | 0.072      | 15,500                                            | 2,180                    | 0.02       | 0.06       | 14,500                                                | 1,800                    | 0.012      | 0.048      |
|                      |      | 12        | 14,500                                                                         | 2,250                    | 0.024      | 0.065      | 14,500                                            | 1,950                    | 0.02       | 0.054      | 13,500                                                | 1,580                    | 0.012      | 0.043      |
|                      |      | 16        | 13,000                                                                         | 1,730                    | 0.014      | 0.05       | 12,500                                            | 1,500                    | 0.012      | 0.042      | 12,000                                                | 1,250                    | 0.007      | 0.034      |
|                      |      | 20        | 12,000                                                                         | 1,410                    | 0.01       | 0.036      | 11,500                                            | 1,230                    | 0.008      | 0.03       | 11,000                                                | 1,020                    | 0.005      | 0.024      |
|                      |      | 25        | 11,000                                                                         | 1,200                    | 0.007      | 0.032      | 11,000                                            | 1,050                    | 0.006      | 0.027      | 10,000                                                | 870                      | 0.004      | 0.022      |
|                      | R0.3 | 8         | 16,500                                                                         | 2,780                    | 0.036      | 0.072      | 16,000                                            | 2,400                    | 0.03       | 0.06       | 15,000                                                | 2,030                    | 0.018      | 0.048      |
|                      |      | 10        | 15,500                                                                         | 2,480                    | 0.036      | 0.072      | 15,500                                            | 2,180                    | 0.03       | 0.06       | 14,500                                                | 1,800                    | 0.018      | 0.048      |
|                      |      | 12        | 14,500                                                                         | 2,250                    | 0.036      | 0.065      | 14,500                                            | 1,950                    | 0.03       | 0.054      | 13,500                                                | 1,580                    | 0.018      | 0.043      |
|                      |      | 16        | 13,000                                                                         | 1,730                    | 0.022      | 0.05       | 12,500                                            | 1,500                    | 0.018      | 0.042      | 12,000                                                | 1,250                    | 0.011      | 0.034      |
|                      |      | 20        | 12,000                                                                         | 1,410                    | 0.014      | 0.036      | 11,500                                            | 1,230                    | 0.012      | 0.03       | 11,000                                                | 1,020                    | 0.007      | 0.024      |
|                      |      | 25        | 11,000                                                                         | 1,200                    | 0.007      | 0.032      | 11,000                                            | 1,050                    | 0.006      | 0.027      | 10,000                                                | 870                      | 0.004      | 0.022      |
|                      | R0.5 | 8         | 16,500                                                                         | 2,780                    | 0.06       | 0.072      | 16,000                                            | 2,400                    | 0.05       | 0.06       | 15,000                                                | 2,030                    | 0.03       | 0.048      |
|                      |      | 10        | 15,500                                                                         | 2,480                    | 0.06       | 0.072      | 15,500                                            | 2,180                    | 0.05       | 0.06       | 14,500                                                | 1,800                    | 0.03       | 0.048      |
|                      |      | 12        | 14,500                                                                         | 2,250                    | 0.06       | 0.065      | 14,500                                            | 1,950                    | 0.05       | 0.054      | 13,500                                                | 1,580                    | 0.03       | 0.043      |
|                      |      | 16        | 13,000                                                                         | 1,730                    | 0.036      | 0.05       | 12,500                                            | 1,500                    | 0.03       | 0.042      | 12,000                                                | 1,250                    | 0.018      | 0.034      |
|                      |      | 20        | 12,000                                                                         | 1,410                    | 0.024      | 0.036      | 11,500                                            | 1,230                    | 0.02       | 0.03       | 11,000                                                | 1,020                    | 0.012      | 0.024      |
|                      |      | 25        | 11,000                                                                         | 1,200                    | 0.018      | 0.032      | 11,000                                            | 1,050                    | 0.015      | 0.027      | 10,000                                                | 870                      | 0.009      | 0.022      |
| 2.5                  | R0.2 | 10        | 13,000                                                                         | 2,780                    | 0.024      | 0.09       | 13,000                                            | 2,100                    | 0.02       | 0.075      | 12,000                                                | 2,030                    | 0.012      | 0.06       |
|                      |      | 20        | 10,000                                                                         | 1,730                    | 0.014      | 0.062      | 10,000                                            | 1,340                    | 0.012      | 0.052      | 9,450                                                 | 1,250                    | 0.007      | 0.042      |
|                      | R0.5 | 10        | 13,000                                                                         | 2,780                    | 0.06       | 0.09       | 13,000                                            | 2,100                    | 0.05       | 0.075      | 12,000                                                | 2,030                    | 0.03       | 0.06       |
|                      |      | 20        | 10,000                                                                         | 1,730                    | 0.036      | 0.062      | 10,000                                            | 1,340                    | 0.03       | 0.052      | 9,450                                                 | 1,250                    | 0.018      | 0.042      |



1. 機械、ホルダは剛性のある精度の高いものをご使用下さい。
2. 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。調質鋼の切削では、MQL (オイルミストクーラント) を推奨いたします。
3. 上表は、等高線加工 (側面) の負荷の少ない加工形状での目安です。加工形状、機械剛性、ワーク保持等の状況により、回転速度、送り速度、切込深さを調整下さい。
4. びびり、振動、異常な切削音が発生する場合、回転速度、送り速度、切込深さを調整下さい。
5. Z 切込時のアプローチ方法として、円弧 (ヘリカル)、傾斜 (ランプ) での加工をお勧めします。
6.  $\phi 0.5$  未満あるいは L/D (アスペクト比) が 10 以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
7. 加工精度を要求される場合は、回転速度、送り速度、切込量を抑えて使用下さい。
8. 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。



FROM

| 被削材<br>Work Material |      |           | 調質鋼・プリハードン鋼<br>Hardened Steel・Prehardened Steel<br>PX5・NAK80・SKD61<br>(～45HRC)       |                          |            |            | 調質鋼<br>Hardened Steel<br>STAVAX・HPM38<br>(～55HRC) |                          |            |            | 調質鋼<br>Hardened Steel<br>SKH51・YXR7・HAP40<br>(～66HRC) |                          |            |            |
|----------------------|------|-----------|--------------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------------------|--------------------------|------------|------------|-------------------------------------------------------|--------------------------|------------|------------|
| 外径<br>DC             | RE   | 首下長<br>LU | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                                | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )             | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | ae<br>(mm) |
| 3                    | R0.2 | 8         | 12,000                                                                               | 3,000                    | 0.024      | 0.096      | 11,000                                            | 2,100                    | 0.02       | 0.08       | 10,000                                                | 1,650                    | 0.012      | 0.064      |
|                      |      | 12        | 12,000                                                                               | 3,000                    | 0.024      | 0.096      | 11,000                                            | 2,100                    | 0.02       | 0.08       | 10,000                                                | 1,650                    | 0.012      | 0.064      |
|                      |      | 16        | 10,500                                                                               | 2,400                    | 0.024      | 0.096      | 9,600                                             | 1,730                    | 0.02       | 0.08       | 9,000                                                 | 1,320                    | 0.012      | 0.064      |
|                      |      | 20        | 9,300                                                                                | 2,030                    | 0.024      | 0.077      | 8,400                                             | 1,410                    | 0.02       | 0.064      | 7,850                                                 | 1,100                    | 0.012      | 0.051      |
|                      |      | 25        | 8,900                                                                                | 1,650                    | 0.014      | 0.058      | 8,050                                             | 1,200                    | 0.012      | 0.048      | 7,550                                                 | 920                      | 0.007      | 0.038      |
|                      |      | 30        | 8,600                                                                                | 1,500                    | 0.01       | 0.048      | 7,800                                             | 1,080                    | 0.008      | 0.04       | 7,300                                                 | 840                      | 0.005      | 0.032      |
|                      | R0.3 | 35        | 7,950                                                                                | 1,320                    | 0.007      | 0.043      | 7,200                                             | 950                      | 0.006      | 0.036      | 6,750                                                 | 720                      | 0.004      | 0.029      |
|                      |      | 12        | 12,000                                                                               | 3,000                    | 0.036      | 0.096      | 11,000                                            | 2,100                    | 0.03       | 0.08       | 10,000                                                | 1,650                    | 0.018      | 0.064      |
|                      |      | 16        | 10,500                                                                               | 2,400                    | 0.036      | 0.096      | 9,600                                             | 1,730                    | 0.03       | 0.08       | 9,000                                                 | 1,320                    | 0.018      | 0.064      |
|                      |      | 20        | 9,300                                                                                | 2,030                    | 0.036      | 0.077      | 8,400                                             | 1,410                    | 0.03       | 0.064      | 7,850                                                 | 1,100                    | 0.018      | 0.051      |
|                      |      | 25        | 8,900                                                                                | 1,650                    | 0.022      | 0.058      | 8,050                                             | 1,200                    | 0.018      | 0.048      | 7,550                                                 | 920                      | 0.011      | 0.038      |
|                      |      | 30        | 8,600                                                                                | 1,500                    | 0.014      | 0.048      | 7,800                                             | 1,080                    | 0.012      | 0.04       | 7,300                                                 | 840                      | 0.007      | 0.032      |
|                      | R0.5 | 35        | 7,950                                                                                | 1,320                    | 0.011      | 0.043      | 7,200                                             | 950                      | 0.009      | 0.036      | 6,750                                                 | 720                      | 0.005      | 0.029      |
|                      |      | 12        | 12,000                                                                               | 3,000                    | 0.06       | 0.096      | 11,000                                            | 2,100                    | 0.05       | 0.08       | 10,000                                                | 1,650                    | 0.03       | 0.064      |
|                      |      | 16        | 10,500                                                                               | 2,400                    | 0.06       | 0.096      | 9,600                                             | 1,730                    | 0.05       | 0.08       | 9,000                                                 | 1,320                    | 0.03       | 0.064      |
|                      |      | 20        | 9,300                                                                                | 2,030                    | 0.06       | 0.077      | 8,400                                             | 1,410                    | 0.05       | 0.064      | 7,850                                                 | 1,100                    | 0.03       | 0.051      |
|                      |      | 25        | 8,900                                                                                | 1,650                    | 0.036      | 0.058      | 8,050                                             | 1,200                    | 0.03       | 0.048      | 7,550                                                 | 920                      | 0.018      | 0.038      |
|                      |      | 30        | 8,600                                                                                | 1,500                    | 0.024      | 0.048      | 7,800                                             | 1,080                    | 0.02       | 0.04       | 7,300                                                 | 840                      | 0.012      | 0.032      |
| 4                    | R0.2 | 35        | 7,950                                                                                | 1,320                    | 0.018      | 0.043      | 7,200                                             | 950                      | 0.015      | 0.036      | 6,750                                                 | 720                      | 0.009      | 0.029      |
|                      |      | 16        | 7,900                                                                                | 2,500                    | 0.024      | 0.096      | 7,150                                             | 2,050                    | 0.02       | 0.08       | 6,450                                                 | 1,450                    | 0.012      | 0.064      |
|                      |      | 20        | 7,450                                                                                | 2,400                    | 0.024      | 0.096      | 6,750                                             | 1,950                    | 0.02       | 0.08       | 6,100                                                 | 1,350                    | 0.012      | 0.064      |
|                      |      | 25        | 6,550                                                                                | 2,000                    | 0.024      | 0.086      | 5,950                                             | 1,650                    | 0.02       | 0.072      | 5,350                                                 | 1,150                    | 0.012      | 0.058      |
|                      |      | 30        | 6,100                                                                                | 1,650                    | 0.017      | 0.067      | 5,550                                             | 1,350                    | 0.014      | 0.056      | 5,000                                                 | 960                      | 0.008      | 0.045      |
|                      | R0.3 | 40        | 5,700                                                                                | 1,300                    | 0.01       | 0.048      | 5,150                                             | 1,050                    | 0.008      | 0.04       | 4,650                                                 | 730                      | 0.005      | 0.032      |
|                      |      | 16        | 7,900                                                                                | 2,500                    | 0.036      | 0.096      | 7,150                                             | 2,050                    | 0.03       | 0.08       | 6,450                                                 | 1,450                    | 0.018      | 0.064      |
|                      |      | 20        | 7,450                                                                                | 2,400                    | 0.036      | 0.096      | 6,750                                             | 1,950                    | 0.03       | 0.08       | 6,100                                                 | 1,350                    | 0.018      | 0.064      |
|                      |      | 25        | 6,550                                                                                | 2,000                    | 0.036      | 0.086      | 5,950                                             | 1,650                    | 0.03       | 0.072      | 5,350                                                 | 1,150                    | 0.018      | 0.058      |
|                      |      | 30        | 6,100                                                                                | 1,650                    | 0.025      | 0.067      | 5,550                                             | 1,350                    | 0.021      | 0.056      | 5,000                                                 | 960                      | 0.013      | 0.045      |
|                      | R0.5 | 40        | 5,700                                                                                | 1,300                    | 0.014      | 0.048      | 5,150                                             | 1,050                    | 0.012      | 0.04       | 4,650                                                 | 730                      | 0.007      | 0.032      |
|                      |      | 16        | 7,900                                                                                | 2,500                    | 0.06       | 0.096      | 7,150                                             | 2,050                    | 0.05       | 0.08       | 6,450                                                 | 1,450                    | 0.03       | 0.064      |
|                      |      | 20        | 7,450                                                                                | 2,400                    | 0.06       | 0.096      | 6,750                                             | 1,950                    | 0.05       | 0.08       | 6,100                                                 | 1,350                    | 0.03       | 0.064      |
|                      |      | 25        | 6,550                                                                                | 2,000                    | 0.06       | 0.086      | 5,950                                             | 1,650                    | 0.05       | 0.072      | 5,350                                                 | 1,150                    | 0.03       | 0.058      |
|                      |      | 30        | 6,100                                                                                | 1,650                    | 0.042      | 0.067      | 5,550                                             | 1,350                    | 0.035      | 0.056      | 5,000                                                 | 960                      | 0.021      | 0.045      |
|                      | R1   | 40        | 5,700                                                                                | 1,300                    | 0.024      | 0.048      | 5,150                                             | 1,050                    | 0.02       | 0.04       | 4,650                                                 | 730                      | 0.012      | 0.032      |
|                      |      | 50        | 5,000                                                                                | 960                      | 0.018      | 0.043      | 4,550                                             | 790                      | 0.015      | 0.036      | 4,100                                                 | 550                      | 0.009      | 0.029      |
|                      |      | 16        | 7,900                                                                                | 2,500                    | 0.096      | 0.096      | 7,150                                             | 2,050                    | 0.08       | 0.08       | 6,450                                                 | 1,450                    | 0.048      | 0.064      |
|                      |      | 20        | 7,450                                                                                | 2,400                    | 0.096      | 0.096      | 6,750                                             | 1,950                    | 0.08       | 0.08       | 6,100                                                 | 1,350                    | 0.048      | 0.064      |
|                      |      | 25        | 6,550                                                                                | 2,000                    | 0.096      | 0.086      | 5,950                                             | 1,650                    | 0.08       | 0.072      | 5,350                                                 | 1,150                    | 0.048      | 0.058      |
| 切込深さ<br>Depth of Cut |      |           | ae                                                                                   |                          |            |            |                                                   |                          |            |            |                                                       |                          |            |            |
|                      |      |           |  |                          |            |            |                                                   |                          |            |            |                                                       |                          |            |            |

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL(Minimum Quantity Lubrication / mist coolant) is recommended.
3. The above condition shows an approximate standard for contouring operation(side milling) with a low machining load.  
If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of  $\phi$  0.5 or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage.  
Therefore, adjust the cutting conditions based on the machining situation.
7. Adjust the speed, feed rate, and the depth of the cut according to the shape of the work, rigidity of the machine, and how the work is held.
8. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



# 高硬度鋼用超硬エンドミル ロングネックボールタイプ

## 高精度仕上げ用2刃

2-flute high-finishing long neck carbide ball end mill for high-hardness steel

### AE-LNBD-H

#### 1 中心部の厚み

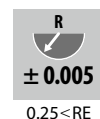
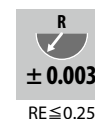
Thickness at the center

- ・中心部を厚くすることでボール先端のつぶれやチッピングを抑制
- ・ Thickening of the center core to prevent deformation of the ball tip and improve control of chipping

#### 2 優れたボールR精度

Superior ball R precision

- ・180°間安定したR精度を確保 (P.27参照)
- ・ Secures stable R accuracy across 180° (refer p.27)

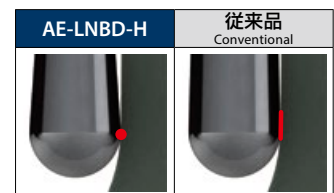


#### 3 外周部ティアドロップ形状

Teardrop-shaped outer periphery

- ・強バックテーパにより点での切削となり  
びびりが抑制され、欠け防止、加工面精度  
が向上
- ・ Strong back taper geometry enables milling by  
point, which prevents chattering and chipping,  
resulting in improvement of surface accuracy

注1：R2以上はティアドロップ形状ではありません  
Note: Teardrop-shaped specification does not apply to items above R2



#### 4 優れたシャンク精度

Superior shank accuracy

- ・h4公差 (0/-0.004) に対応
- ・ Supports h4 tolerance (0/-0.004)

#### 5 平滑化処理 (P.27参照)

Smooth Surface Treatment (refer p.27)

- ・コーティング表面の平滑化処理により、加工面精度が向上 (R0.3以上)
- ・ Improves surface accuracy by smoothening the coating surface (R0.3 or above)

#### 6 豊富なバリエーション

Abundant variations

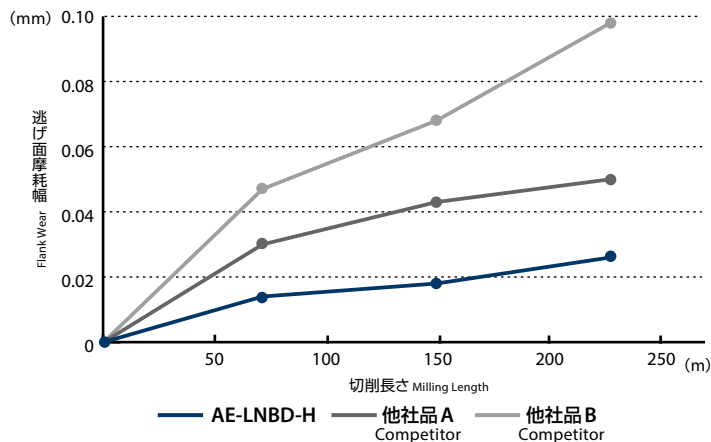
- ・261アイテム (R0.05 ~ R3) で幅広い加工に対応可能
- ・ 261 items (R0.05 to R3) are available to accommodate a wide range of applications



## 安定加工 Stable Performance

### SKD11 (60HRC)において、安定した摩耗推移 Stable wear transition in SKD11 (60 HRC)

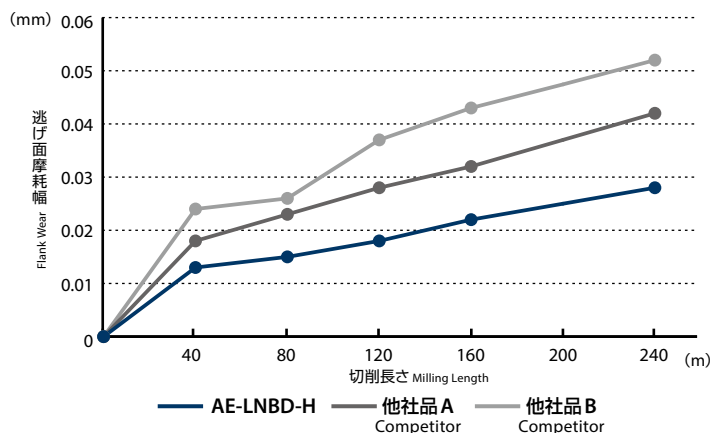
|                        |                                                |                   |
|------------------------|------------------------------------------------|-------------------|
| 使用工具<br>Tool           | AE-LNBD-H<br>R1×10×4                           | 他社品<br>Competitor |
| 被削材<br>Work Material   | SKD11 (60HRC)                                  |                   |
| 切削方法<br>Milling Method | 走査線加工<br>Scanning Line Cutting                 |                   |
| 切削速度<br>Cutting Speed  | 107m/min(17,000min <sup>-1</sup> )             |                   |
| 送り速度<br>Feed           | 1,400mm/min(0.041mm/t)                         |                   |
| 切込深さ<br>Depth of Cut   | a <sub>p</sub> =0.05mm Pf=0.1mm                |                   |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                              |                   |
| 使用機械<br>Machine        | 立形マシニングセンタ(HSK32)<br>Vertical Machining Center |                   |



## 長寿命 Long Tool Life

### 熱間ダイス鋼DH31-Sにおいて、優れた耐久性を実現 Enables superior durability in hot die steel DH31-S

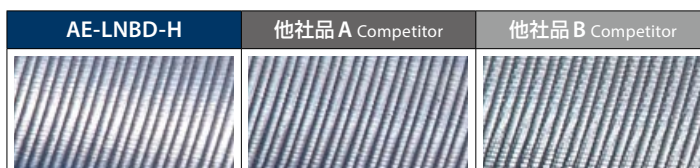
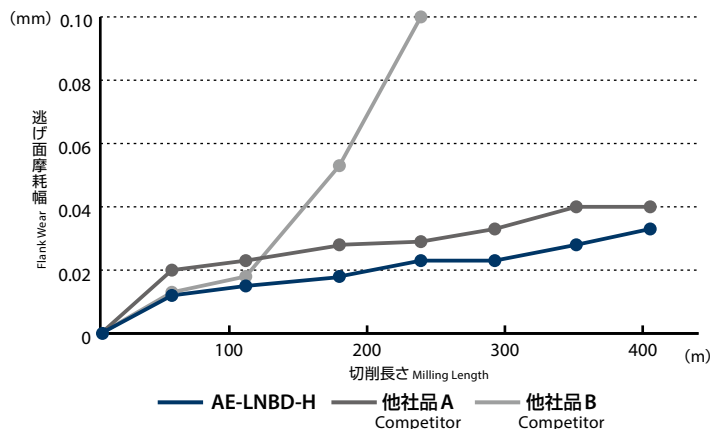
|                        |                                                  |                   |
|------------------------|--------------------------------------------------|-------------------|
| 使用工具<br>Tool           | AE-LNBD-H<br>R1×10×4                             | 他社品<br>Competitor |
| 被削材<br>Work Material   | DH31-S (43HRC)                                   |                   |
| 切削方法<br>Milling Method | ポケット加工<br>Pocket Milling                         |                   |
| 切削速度<br>Cutting Speed  | 88m/min(14,000min <sup>-1</sup> )                |                   |
| 送り速度<br>Feed           | 1,000mm/min(0.036mm/t)                           |                   |
| 切込深さ<br>Depth of Cut   | a <sub>p</sub> =0.05mm Pf=0.1mm                  |                   |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                                |                   |
| 使用機械<br>Machine        | 横形マシニングセンタ(HSK63)<br>Horizontal Machining Center |                   |



## 仕上げ加工 Finishing

### STAVAX (53HRC)において、良好な耐久性と加工面を実現 Enables excellent durability and surface finish in STAVAX (53 HRC)

|                        |                                                |                   |
|------------------------|------------------------------------------------|-------------------|
| 使用工具<br>Tool           | AE-LNBD-H<br>R1×10×4                           | 他社品<br>Competitor |
| 被削材<br>Work Material   | STAVAX (53HRC)                                 |                   |
| 切削方法<br>Milling Method | 走査線加工<br>Scanning Line Cutting                 |                   |
| 切削速度<br>Cutting Speed  | 150m/min(24,000min <sup>-1</sup> )             |                   |
| 送り速度<br>Feed           | 2,400mm/min(0.05mm/t)                          |                   |
| 切込深さ<br>Depth of Cut   | a <sub>p</sub> =0.05mm Pf=0.1mm                |                   |
| 切削油剤<br>Coolant        | エアブロー<br>Air Blow                              |                   |
| 使用機械<br>Machine        | 立形マシニングセンタ(HSK32)<br>Vertical Machining Center |                   |

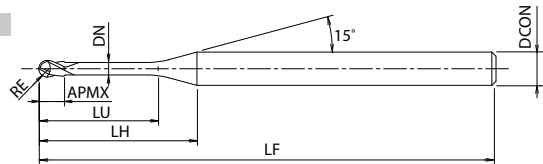


## AE-LNBD-H

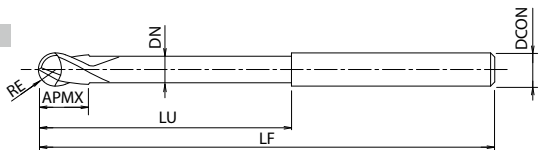
| CARBIDE | DUROREY | $\pm 0.003$    | $\pm 0.005$ | SHANK<br>h4 | SHRINK<br>FIT | 30° | SPEED<br>FEED<br>P55~P62 |
|---------|---------|----------------|-------------|-------------|---------------|-----|--------------------------|
|         |         | RE $\leq 0.25$ |             | 0.25 < RE   |               |     |                          |



Type1



Type2



単位:mm Unit:mm

| ツールNo.<br>EDP No. | ボール半径×首下長×シャンク径<br>RE × LU × DCON | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | ワーク勾配角αに対する実有効長Le <sup>注1</sup><br>Effective length by inclined angles |      |      |      |      | 形状<br>Type | 在庫<br>Stock | 標準価格<br>(Yen) |       |
|-------------------|-----------------------------------|----------|------------|------|----------|------------------------|------------------------------------------------------------------------|------|------|------|------|------------|-------------|---------------|-------|
|                   |                                   |          |            |      |          |                        | 0.5°                                                                   | 1°   | 1.5° | 2°   | 3°   |            |             |               |       |
| 3056100           | R0.05 × 0.2 × 4                   | 45       | 0.08       | 7.5  | 0.09     | 14.7°                  | 0.2                                                                    | 0.21 | 0.21 | 0.22 | 0.23 | 1          | A           | ●             | 9,530 |
| 3056101           | R0.05 × 0.3 × 4                   |          |            | 7.6  |          | 14.52°                 | 0.3                                                                    | 0.31 | 0.32 | 0.33 | 0.35 |            |             | ●             | 8,390 |
| 3056102           | R0.05 × 0.5 × 4                   |          |            | 7.8  |          | 14.07°                 | 0.53                                                                   | 0.56 | 0.59 | 0.62 | 0.67 |            |             | ●             | 9,100 |
| 3056103           | R0.1 × 0.3 × 4                    | 45       | 0.16       | 7.4  | 0.19     | 14.59°                 | 0.3                                                                    | 0.31 | 0.32 | 0.32 | 0.34 | 1          | A           | ●             | 5,800 |
| 3056104           | R0.1 × 0.5 × 4                    |          |            | 7.6  |          | 14.12°                 | 0.53                                                                   | 0.56 | 0.58 | 0.61 | 0.65 |            |             | ●             | 5,800 |
| 3056105           | R0.1 × 0.75 × 4                   |          |            | 7.9  |          | 13.74°                 | 0.79                                                                   | 0.83 | 0.87 | 0.9  | 0.96 |            |             | ●             | 5,800 |
| 3056106           | R0.1 × 1 × 4                      |          |            | 8.1  |          | 13.33°                 | 1.06                                                                   | 1.11 | 1.15 | 1.19 | 1.27 |            |             | ●             | 5,800 |
| 3056107           | R0.1 × 1 × 6                      |          |            | 11.9 |          | 13.86°                 |                                                                        |      |      |      |      |            |             | ●             | 8,290 |
| 3056108           | R0.1 × 1.25 × 4                   |          |            | 8.4  |          | 12.94°                 | 1.32                                                                   | 1.38 | 1.43 | 1.47 | 1.59 |            |             | ●             | 6,340 |
| 3056109           | R0.1 × 1.5 × 4                    |          |            | 8.6  |          | 12.58°                 | 1.58                                                                   | 1.65 | 1.7  | 1.76 | 1.9  |            |             | ●             | 6,340 |
| 3056110           | R0.1 × 1.75 × 4                   |          |            | 8.9  |          | 12.23°                 | 1.85                                                                   | 1.91 | 1.98 | 2.05 | 2.21 |            |             | ●             | 7,030 |
| 3056111           | R0.1 × 2 × 4                      |          |            | 9.1  |          | 11.9°                  | 2.11                                                                   | 2.18 | 2.26 | 2.34 | 2.52 |            |             | ●             | 7,030 |
| 3056112           | R0.1 × 2.5 × 4                    |          |            | 9.6  |          | 11.29°                 | 2.63                                                                   | 2.72 | 2.81 | 2.91 | 3.14 |            |             | ●             | 7,710 |
| 3056113           | R0.1 × 3 × 4                      |          |            | 10.1 |          | 10.74°                 | 3.14                                                                   | 3.25 | 3.36 | 3.49 | 3.76 |            |             | ●             | 8,290 |
| 3056114           | R0.15 × 0.5 × 4                   | 45       | 0.24       | 7.4  | 0.285    | 14.22°                 | 0.52                                                                   | 0.54 | 0.56 | 0.59 | 0.63 | 1          | A           | ●             | 5,800 |
| 3056115           | R0.15 × 0.6 × 4                   |          |            | 7.5  |          | 14.04°                 | 0.63                                                                   | 0.65 | 0.68 | 0.7  | 0.75 |            |             | ●             | 5,800 |
| 3056116           | R0.15 × 0.75 × 4                  |          |            | 7.7  |          | 13.77°                 | 0.78                                                                   | 0.82 | 0.85 | 0.88 | 0.93 |            |             | ●             | 5,800 |
| 3056117           | R0.15 × 1 × 4                     |          |            | 7.9  |          | 13.35°                 | 1.05                                                                   | 1.09 | 1.13 | 1.16 | 1.25 |            |             | ●             | 5,800 |
| 3056118           | R0.15 × 1.25 × 4                  |          |            | 8.2  |          | 12.95°                 | 1.31                                                                   | 1.36 | 1.4  | 1.45 | 1.56 |            |             | ●             | 6,210 |
| 3056119           | R0.15 × 1.5 × 4                   |          |            | 8.4  |          | 12.57°                 | 1.57                                                                   | 1.63 | 1.68 | 1.74 | 1.87 |            |             | ●             | 6,210 |
| 3056120           | R0.15 × 1.5 × 6                   |          |            | 12.2 |          | 13.33°                 |                                                                        |      |      |      |      |            |             | ●             | 8,690 |
| 3056121           | R0.15 × 1.75 × 4                  |          |            | 8.7  |          | 12.22°                 | 1.83                                                                   | 1.9  | 1.96 | 2.03 | 2.18 |            |             | ●             | 6,210 |
| 3056122           | R0.15 × 2 × 4                     |          |            | 8.9  |          | 11.88°                 | 2.09                                                                   | 2.16 | 2.24 | 2.31 | 2.49 |            |             | ●             | 6,210 |
| 3056123           | R0.15 × 2.25 × 4                  |          |            | 9.2  |          | 11.56°                 | 2.35                                                                   | 2.43 | 2.51 | 2.6  | 2.8  |            |             | ●             | 6,340 |
| 3056124           | R0.15 × 2.5 × 4                   |          |            | 9.4  |          | 11.26°                 | 2.61                                                                   | 2.7  | 2.79 | 2.89 | 3.11 |            |             | ●             | 6,340 |
| 3056125           | R0.15 × 3 × 4                     |          |            | 9.9  |          | 10.7°                  | 3.13                                                                   | 3.23 | 3.34 | 3.46 | 3.73 |            |             | ●             | 6,340 |
| 3056126           | R0.15 × 3.5 × 4                   |          |            | 10.4 |          | 10.19°                 | 3.65                                                                   | 3.77 | 3.9  | 4.04 | 4.35 |            |             | ●             | 6,520 |
| 3056127           | R0.15 × 4 × 4                     |          |            | 10.9 |          | 9.73°                  | 4.16                                                                   | 4.3  | 4.45 | 4.61 | 4.97 |            |             | ●             | 6,520 |
| 3056128           | R0.15 × 4.5 × 4                   |          |            | 11.4 |          | 9.31°                  | 4.68                                                                   | 4.84 | 5.01 | 5.19 | 5.6  |            |             | ●             | 7,030 |
| 3056129           | R0.15 × 5 × 4                     |          |            | 11.9 |          | 8.92°                  | 5.2                                                                    | 5.37 | 5.56 | 5.76 | 6.22 |            |             | ●             | 7,030 |

● = 標準在庫品 ● = Standard stock item

・アイコンの説明はp.10をご覧ください。See p.10 for explanation of icons.

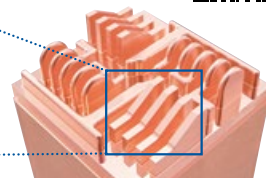
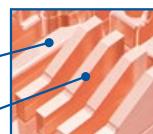
注1: ワーク勾配角 $\alpha$ に対する実有効長( $L_e$ )はp.52を参照下さい。数値がないものは干渉無しを表します。Note: Please refer to p.52 for the actual effective length ( $L_e$ ) based on the inclination angle ( $\alpha$ ) of the workpiece.If there is no value in the actual effective length ( $L_e$  column), it indicates no interference.

NEXT

## 形彫り放電加工に銅電極用DLC超硬エンドミル

DLC coated carbide end mill for copper electrodes  
used in EDM

## AE-LNBD-N

高精度仕上げ用2刃ロングネックボールタイプ  
2-flute high-precision finishing long neck ball typeA  
The A Brand詳細は  
こちらから  
Scan for details形彫り放電加工に使用する銅電極をバリがなく高品位に加工する  
銅電極用DLC超硬エンドミルCopper electrodes used for die-sinking electric discharge machining (EDM) can be machined  
with high quality without burrs by the DLC coated carbide end mill for copper electrodes.良好な加工面精度  
Excellent machined surface accuracyバリのない綺麗なエッジ  
Beautiful edge without burrs

FROM

単位:mm Unit:mm

| ツールNo.<br>EDP No. | ボール半径×首下長×シャンク径<br>RE×LU×DCON | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | ワーク勾配角αに対する実有効長Le <sup>注1</sup><br>Effective length by inclined angles |       |       |       |       | 形状<br>Type | 在庫<br>Stock | 標準価格<br>(Yen) |       |
|-------------------|-------------------------------|----------|------------|------|----------|------------------------|------------------------------------------------------------------------|-------|-------|-------|-------|------------|-------------|---------------|-------|
|                   |                               |          |            |      |          |                        | 0.5°                                                                   | 1°    | 1.5°  | 2°    | 3°    |            |             |               |       |
| 3056130           | R0.2 × 0.5 × 4                | 45       | 0.3        | 7.2  | 0.38     | 14.27°                 | 0.51                                                                   | 0.53  | 0.55  | 0.57  | 0.6   | 1          | A           | ●             | 4,010 |
| 3056131           | R0.2 × 0.75 × 4               |          |            | 7.5  |          | 13.8°                  | 0.78                                                                   | 0.81  | 0.83  | 0.86  | 0.91  |            |             | ●             | 4,010 |
| 3056132           | R0.2 × 0.8 × 4                |          |            | 7.5  |          | 13.71°                 | 0.83                                                                   | 0.86  | 0.89  | 0.92  | 0.97  |            |             | ●             | 4,010 |
| 3056133           | R0.2 × 1 × 4                  |          |            | 7.7  |          | 13.37°                 | 1.04                                                                   | 1.08  | 1.11  | 1.15  | 1.22  |            |             | ●             | 4,010 |
| 3056134           | R0.2 × 1 × 6                  |          |            | 11.5 |          | 13.91°                 |                                                                        |       |       |       |       |            |             | ●             | 5,860 |
| 3056135           | R0.2 × 1.5 × 4                |          |            | 8.2  |          | 12.57°                 | 1.56                                                                   | 1.62  | 1.67  | 1.72  | 1.84  |            |             | ●             | 4,060 |
| 3056136           | R0.2 × 2 × 4                  |          |            | 8.7  |          | 11.86°                 | 2.08                                                                   | 2.15  | 2.22  | 2.3   | 2.46  |            |             | ●             | 4,110 |
| 3056137           | R0.2 × 2 × 6                  |          |            | 12.5 |          | 12.82°                 |                                                                        |       |       |       |       |            |             | ●             | 6,100 |
| 3056138           | R0.2 × 2.5 × 4                |          |            | 9.2  |          | 11.22°                 | 2.6                                                                    | 2.68  | 2.77  | 2.87  | 3.09  |            |             | ●             | 4,310 |
| 3056139           | R0.2 × 3 × 4                  |          |            | 9.7  |          | 10.65°                 | 3.12                                                                   | 3.22  | 3.33  | 3.45  | 3.71  |            |             | ●             | 4,550 |
| 3056140           | R0.2 × 3.5 × 4                |          |            | 10.2 |          | 10.14°                 | 3.63                                                                   | 3.75  | 3.88  | 4.02  | 4.33  |            |             | ●             | 4,970 |
| 3056141           | R0.2 × 4 × 4                  |          |            | 10.7 |          | 9.67°                  | 4.15                                                                   | 4.29  | 4.44  | 4.59  | 4.95  |            |             | ●             | 4,970 |
| 3056142           | R0.2 × 4.5 × 4                |          |            | 11.2 |          | 9.24°                  | 4.67                                                                   | 4.82  | 4.99  | 5.17  | 5.57  |            |             | ●             | 5,180 |
| 3056143           | R0.2 × 5 × 4                  |          |            | 11.7 |          | 8.85°                  | 5.19                                                                   | 5.36  | 5.54  | 5.74  | 6.19  |            |             | ●             | 5,180 |
| 3056144           | R0.2 × 5.5 × 4                |          |            | 12.2 |          | 8.49°                  | 5.7                                                                    | 5.89  | 6.1   | 6.32  | 6.81  |            |             | ●             | 5,800 |
| 3056145           | R0.2 × 6 × 4                  |          |            | 12.7 |          | 8.15°                  | 6.22                                                                   | 6.43  | 6.65  | 6.89  | 7.44  |            |             | ●             | 6,020 |
| 3056146           | R0.25 × 0.75 × 4              | 45       | 0.4        | 7.3  | 0.475    | 13.84°                 | 0.77                                                                   | 0.8   | 0.82  | 0.84  | 0.89  | 1          | A           | ●             | 3,930 |
| 3056147           | R0.25 × 1 × 4                 |          |            | 7.6  |          | 13.39°                 | 1.03                                                                   | 1.07  | 1.1   | 1.13  | 1.2   |            |             | ●             | 3,930 |
| 3056148           | R0.25 × 1.5 × 4               |          |            | 8.1  |          | 12.56°                 | 1.55                                                                   | 1.6   | 1.65  | 1.7   | 1.82  |            |             | ●             | 3,930 |
| 3056149           | R0.25 × 2 × 4                 |          |            | 8.6  |          | 11.84°                 | 2.07                                                                   | 2.14  | 2.21  | 2.28  | 2.44  |            |             | ●             | 3,930 |
| 3056150           | R0.25 × 2.5 × 4               |          |            | 9.1  |          | 11.19°                 | 2.59                                                                   | 2.67  | 2.76  | 2.85  | 3.06  |            |             | ●             | 3,930 |
| 3056151           | R0.25 × 3 × 4                 |          |            | 9.6  |          | 10.61°                 | 3.11                                                                   | 3.21  | 3.31  | 3.43  | 3.68  |            |             | ●             | 3,930 |
| 3056152           | R0.25 × 3.5 × 4               |          |            | 10.1 |          | 10.08°                 | 3.63                                                                   | 3.74  | 3.87  | 4     | 4.31  |            |             | ●             | 3,930 |
| 3056153           | R0.25 × 4 × 4                 |          |            | 10.6 |          | 9.6°                   | 4.14                                                                   | 4.28  | 4.42  | 4.58  | 4.93  |            |             | ●             | 3,930 |
| 3056154           | R0.25 × 4.5 × 4               |          |            | 11.1 |          | 9.17°                  | 4.66                                                                   | 4.81  | 4.98  | 5.15  | 5.55  |            |             | ●             | 4,060 |
| 3056155           | R0.25 × 5 × 4                 |          |            | 11.6 |          | 8.77°                  | 5.18                                                                   | 5.35  | 5.53  | 5.73  | 6.17  |            |             | ●             | 4,060 |
| 3056156           | R0.25 × 5.5 × 4               |          |            | 12.1 |          | 8.41°                  | 5.69                                                                   | 5.88  | 6.09  | 6.3   | 6.79  |            |             | ●             | 4,150 |
| 3056157           | R0.25 × 6 × 4                 |          |            | 12.6 |          | 8.07°                  | 6.21                                                                   | 6.42  | 6.64  | 6.88  | 7.41  |            |             | ●             | 4,150 |
| 3056158           | R0.25 × 7 × 4                 |          |            | 13.6 |          | 7.48°                  | 7.24                                                                   | 7.49  | 7.75  | 8.03  | 8.66  |            |             | ●             | 4,490 |
| 3056159           | R0.25 × 8 × 4                 |          |            | 14.6 |          | 6.96°                  | 8.28                                                                   | 8.56  | 8.86  | 9.18  | 9.9   |            |             | ●             | 4,520 |
| 3056160           | R0.25 × 9 × 4                 |          |            | 15.6 |          | 6.51°                  | 9.31                                                                   | 9.63  | 9.96  | 10.33 | 11.14 |            |             | ●             | 5,380 |
| 3056161           | R0.25 × 10 × 4                |          |            | 16.6 |          | 6.12°                  | 10.34                                                                  | 10.7  | 11.07 | 11.48 | 12.39 |            |             | ●             | 6,020 |
| 3056162           | R0.3 × 0.75 × 4               | 45       | 0.5        | 7.1  | 0.55     | 13.8°                  | 0.76                                                                   | 0.78  | 0.8   | 0.81  | 0.85  | 1          | A           | ●             | 3,360 |
| 3056163           | R0.3 × 1 × 4                  |          |            | 7.3  |          | 13.34°                 | 1.02                                                                   | 1.05  | 1.07  | 1.1   | 1.16  |            |             | ●             | 3,360 |
| 3056164           | R0.3 × 1.2 × 4                |          |            | 7.5  |          | 12.99°                 | 1.23                                                                   | 1.26  | 1.29  | 1.33  | 1.41  |            |             | ●             | 3,110 |
| 3056165           | R0.3 × 1.5 × 4                |          |            | 7.8  |          | 12.5°                  | 1.54                                                                   | 1.58  | 1.63  | 1.68  | 1.78  |            |             | ●             | 3,020 |
| 3056166           | R0.3 × 2 × 4                  |          |            | 8.3  |          | 11.76°                 | 2.05                                                                   | 2.12  | 2.18  | 2.25  | 2.41  |            |             | ●             | 3,020 |
| 3056167           | R0.3 × 2 × 6                  |          |            | 12.1 |          | 12.78°                 |                                                                        |       |       |       |       |            |             | ●             | 4,660 |
| 3056168           | R0.3 × 2.5 × 4                |          |            | 8.8  |          | 11.1°                  | 2.57                                                                   | 2.65  | 2.74  | 2.83  | 3.03  |            |             | ●             | 3,110 |
| 3056169           | R0.3 × 3 × 4                  |          |            | 9.3  |          | 10.51°                 | 3.09                                                                   | 3.19  | 3.29  | 3.4   | 3.65  |            |             | ●             | 3,110 |
| 3056170           | R0.3 × 3 × 6                  |          |            | 13.1 |          | 11.83°                 |                                                                        |       |       |       |       |            |             | ●             | 4,770 |
| 3056171           | R0.3 × 3.5 × 4                |          |            | 9.8  |          | 9.98°                  | 3.61                                                                   | 3.72  | 3.84  | 3.98  | 4.27  |            |             | ●             | 3,210 |
| 3056172           | R0.3 × 4 × 4                  |          |            | 10.3 |          | 9.5°                   | 4.12                                                                   | 4.26  | 4.4   | 4.55  | 4.89  |            |             | ●             | 3,210 |
| 3056173           | R0.3 × 4 × 6                  |          |            | 14.1 |          | 11°                    |                                                                        |       |       |       |       |            |             | ●             | 4,930 |
| 3056174           | R0.3 × 4.5 × 4                |          |            | 10.8 |          | 9.06°                  | 4.64                                                                   | 4.79  | 4.95  | 5.13  | 5.51  |            |             | ●             | 3,210 |
| 3056175           | R0.3 × 5 × 4                  |          |            | 11.3 |          | 8.67°                  | 5.16                                                                   | 5.32  | 5.51  | 5.7   | 6.14  |            |             | ●             | 3,210 |
| 3056176           | R0.3 × 5.5 × 4                |          |            | 11.8 |          | 8.3°                   | 5.67                                                                   | 5.86  | 6.06  | 6.28  | 6.76  |            |             | ●             | 3,210 |
| 3056177           | R0.3 × 6 × 4                  |          |            | 12.3 |          | 7.96°                  | 6.19                                                                   | 6.39  | 6.61  | 6.85  | 7.38  |            |             | ●             | 3,210 |
| 3056178           | R0.3 × 6.5 × 4                |          |            | 12.8 |          | 7.65°                  | 6.71                                                                   | 6.93  | 7.17  | 7.42  | 8     |            |             | ●             | 3,210 |
| 3056179           | R0.3 × 7 × 4                  |          |            | 13.3 |          | 7.37°                  | 7.22                                                                   | 7.46  | 7.72  | 8     | 8.62  |            |             | ●             | 3,640 |
| 3056180           | R0.3 × 7.5 × 4                |          |            | 13.8 |          | 7.1°                   | 7.74                                                                   | 8     | 8.28  | 8.57  | 9.24  |            |             | ●             | 3,640 |
| 3056181           | R0.3 × 8 × 4                  |          |            | 14.3 |          | 6.85°                  | 8.26                                                                   | 8.53  | 8.83  | 9.15  | 9.86  |            |             | ●             | 4,310 |
| 3056182           | R0.3 × 8.5 × 4                |          |            | 14.8 |          | 6.62°                  | 8.77                                                                   | 9.07  | 9.38  | 9.72  | 10.49 |            |             | ●             | 4,360 |
| 3056183           | R0.3 × 9 × 4                  |          |            | 15.3 |          | 6.41°                  | 9.29                                                                   | 9.6   | 9.94  | 10.3  | 11.11 |            |             | ●             | 4,470 |
| 3056184           | R0.3 × 9.5 × 4                |          |            | 15.8 |          | 6.2°                   | 9.81                                                                   | 10.14 | 10.49 | 10.87 | 11.73 |            |             | ●             | 4,470 |
| 3056185           | R0.3 × 10 × 4                 |          |            | 16.3 |          | 6.01°                  | 10.32                                                                  | 10.67 | 11.05 | 11.45 | 12.35 |            |             | ●             | 4,470 |
| 3056186           | R0.3 × 11 × 4                 | 50       |            | 17.3 |          | 5.67°                  | 11.36                                                                  | 11.74 | 12.16 | 12.6  | 13.59 |            |             | ●             | 4,770 |
| 3056187           | R0.3 × 12 × 4                 |          |            | 18.3 |          | 5.36°                  | 12.39                                                                  | 12.81 | 13.26 | 13.75 | 14.84 |            |             | ●             | 4,950 |

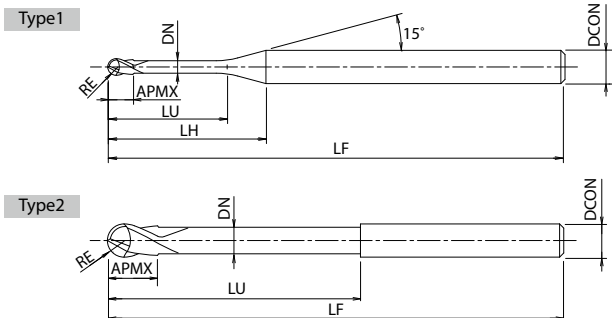
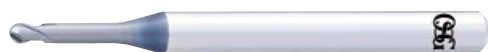
● = 標準在庫品 ● = Standard stock item



NEXT

## AE-LNBD-H

|         |         |             |             |           |            |     |                    |
|---------|---------|-------------|-------------|-----------|------------|-----|--------------------|
| CARBIDE | DUROREY | $\pm 0.003$ | $\pm 0.005$ | SHANK h4  | SHRINK FIT | 30° | SPEED FEED P55~P62 |
|         |         | RE ≤ 0.25   |             | 0.25 < RE |            |     |                    |



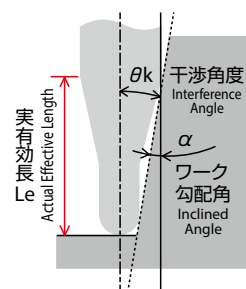
FROM

単位:mm Unit:mm

| ツールNo.<br>EDP No. | ボール半径×首下長×シャンク径<br>RE × LU × DCON | 全長<br>LF | 刃長<br>APMX | LH   | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | ワーク勾配角αに対する実有効長 <sup>注1</sup><br>Effective length by inclined angles |       |       |       |       | 形状<br>Type | 在庫<br>Stock | 標準価格<br>(Yen) |       |
|-------------------|-----------------------------------|----------|------------|------|----------|------------------------|----------------------------------------------------------------------|-------|-------|-------|-------|------------|-------------|---------------|-------|
|                   |                                   |          |            |      |          |                        | 0.5°                                                                 | 1°    | 1.5°  | 2°    | 3°    |            |             |               |       |
| 3056188           | R0.4 × 1 × 4                      | 45       | 0.6        | 7    | 0.75     | 13.41°                 | 1.02                                                                 | 1.04  | 1.06  | 1.08  | 1.14  | 1          | A           | ●             | 3,270 |
| 3056189           | R0.4 × 1.5 × 4                    |          |            | 7.5  |          | 12.52°                 | 1.53                                                                 | 1.57  | 1.62  | 1.66  | 1.76  |            |             | ●             | 3,270 |
| 3056190           | R0.4 × 2 × 4                      |          |            | 8    |          | 11.74°                 | 2.05                                                                 | 2.11  | 2.17  | 2.23  | 2.38  |            |             | ●             | 3,020 |
| 3056191           | R0.4 × 2 × 6                      |          |            | 11.7 |          | 12.81°                 |                                                                      |       |       |       |       |            |             | ●             | 4,660 |
| 3056192           | R0.4 × 2.5 × 4                    |          |            | 8.5  |          | 11.04°                 | 2.57                                                                 | 2.64  | 2.72  | 2.81  | 3     |            |             | ●             | 3,270 |
| 3056193           | R0.4 × 3 × 4                      |          |            | 9    |          | 10.42°                 | 3.09                                                                 | 3.18  | 3.28  | 3.38  | 3.62  |            |             | ●             | 3,270 |
| 3056194           | R0.4 × 4 × 4                      |          |            | 10   |          | 9.37°                  | 4.12                                                                 | 4.25  | 4.39  | 4.53  | 4.87  |            |             | ●             | 3,270 |
| 3056195           | R0.4 × 5 × 4                      |          |            | 11   |          | 8.51°                  | 5.15                                                                 | 5.32  | 5.49  | 5.68  | 6.11  |            |             | ●             | 3,270 |
| 3056196           | R0.4 × 6 × 4                      |          |            | 12   |          | 7.8°                   | 6.19                                                                 | 6.39  | 6.6   | 6.83  | 7.35  |            |             | ●             | 3,270 |
| 3056197           | R0.4 × 7 × 4                      |          |            | 13   |          | 7.19°                  | 7.22                                                                 | 7.46  | 7.71  | 7.98  | 8.6   |            |             | ●             | 3,270 |
| 3056198           | R0.4 × 8 × 4                      |          |            | 14   |          | 6.67°                  | 8.25                                                                 | 8.53  | 8.82  | 9.13  | 9.84  |            |             | ●             | 3,270 |
| 3056199           | R0.4 × 9 × 4                      |          |            | 15   |          | 6.22°                  | 9.29                                                                 | 9.6   | 9.93  | 10.28 | 11.08 |            |             | ●             | 3,740 |
| 3056200           | R0.4 × 10 × 4                     | 50       | 0.6        | 16   | 0.75     | 5.83°                  | 10.32                                                                | 10.67 | 11.04 | 11.43 | 12.32 | 1          | A           | ●             | 4,310 |
| 3056201           | R0.4 × 12 × 4                     |          |            | 18   |          | 5.18°                  | 12.39                                                                | 12.81 | 13.25 | 13.73 | 14.81 |            |             | ●             | 4,310 |
| 3056202           | R0.5 × 1.5 × 4                    | 45       | 0.8        | 7.1  | 0.95     | 12.54°                 | 1.53                                                                 | 1.57  | 1.6   | 1.64  | 1.73  | 1          | A           | ●             | 2,590 |
| 3056203           | R0.5 × 2 × 4                      |          |            | 7.6  |          | 11.71°                 | 2.05                                                                 | 2.1   | 2.16  | 2.22  | 2.35  |            |             | ●             | 2,590 |
| 3056204           | R0.5 × 2 × 6                      |          |            | 11.3 |          | 12.83°                 |                                                                      |       |       |       |       |            |             | ●             | 4,150 |
| 3056205           | R0.5 × 2.5 × 4                    |          |            | 8.1  |          | 10.97°                 | 2.56                                                                 | 2.64  | 2.71  | 2.79  | 2.98  |            |             | ●             | 2,590 |
| 3056206           | R0.5 × 3 × 4                      |          |            | 8.6  |          | 10.33°                 | 3.08                                                                 | 3.17  | 3.27  | 3.37  | 3.6   |            |             | ●             | 2,590 |
| 3056207           | R0.5 × 3 × 6                      |          |            | 12.3 |          | 11.8°                  |                                                                      |       |       |       |       |            |             | ●             | 4,150 |
| 3056208           | R0.5 × 4 × 4                      |          |            | 9.6  |          | 9.23°                  | 4.12                                                                 | 4.24  | 4.38  | 4.52  | 4.84  |            |             | ●             | 2,880 |
| 3056209           | R0.5 × 4 × 6                      |          |            | 13.3 |          | 10.91°                 |                                                                      |       |       |       |       |            |             | ●             | 4,550 |
| 3056210           | R0.5 × 5 × 4                      |          |            | 10.6 |          | 8.35°                  | 5.15                                                                 | 5.31  | 5.48  | 5.67  | 6.08  |            |             | ●             | 2,880 |
| 3056211           | R0.5 × 5 × 6                      |          |            | 14.3 |          | 10.15°                 |                                                                      |       |       |       |       |            |             | ●             | 4,550 |
| 3056212           | R0.5 × 6 × 4                      |          |            | 11.6 |          | 7.62°                  | 6.18                                                                 | 6.38  | 6.59  | 6.82  | 7.33  |            |             | ●             | 3,110 |
| 3056213           | R0.5 × 6 × 6                      |          |            | 15.3 |          | 9.49°                  |                                                                      |       |       |       |       |            |             | ●             | 4,770 |
| 3056214           | R0.5 × 7 × 4                      |          |            | 12.6 |          | 7°                     | 7.22                                                                 | 7.45  | 7.7   | 7.97  | 8.57  |            |             | ●             | 3,110 |
| 3056215           | R0.5 × 7 × 6                      |          |            | 16.3 |          | 8.91°                  |                                                                      |       |       |       |       |            |             | ●             | 4,770 |
| 3056216           | R0.5 × 8 × 4                      |          |            | 13.6 |          | 6.48°                  | 8.25                                                                 | 8.52  | 8.81  | 9.12  | 9.81  |            |             | ●             | 3,110 |
| 3056217           | R0.5 × 8 × 6                      |          |            | 17.3 |          | 8.39°                  |                                                                      |       |       |       |       |            |             | ●             | 4,770 |
| 3056218           | R0.5 × 9 × 4                      |          |            | 14.6 |          | 6.03°                  | 9.28                                                                 | 9.59  | 9.92  | 10.27 | 11.06 |            |             | ●             | 3,110 |
| 3056219           | R0.5 × 10 × 4                     |          |            | 15.6 |          | 5.64°                  |                                                                      |       |       |       |       |            |             | ●             | 3,110 |
| 3056220           | R0.5 × 10 × 6                     | 50       | 0.8        | 19.3 | 7.52°    | 10.32                  | 10.66                                                                | 11.02 | 11.42 | 12.3  | 1     | A          | ●           | 4,770         |       |
| 3056221           | R0.5 × 12 × 4                     | 45       | 0.8        | 17.6 | 4.99°    | 12.38                  | 12.8                                                                 | 13.24 | 13.72 | 14.79 |       |            | ●           | 3,110         |       |
| 3056222           | R0.5 × 13 × 4                     | 50       | 0.8        | 18.6 | 4.71°    | 13.42                  | 13.87                                                                | 14.35 | 14.87 | 16.03 |       |            | ●           | 3,640         |       |
| 3056223           | R0.5 × 14 × 4                     |          | 0.8        | 19.6 | 4.47°    | 14.45                  | 14.94                                                                | 15.46 | 16.02 | 17.27 |       |            | ●           | 3,640         |       |
| 3056224           | R0.5 × 16 × 4                     | 55       | 0.8        | 21.6 | 4.05°    | 16.52                  | 17.08                                                                | 17.67 | 18.32 | 19.76 |       |            | ●           | 4,310         |       |
| 3056225           | R0.5 × 18 × 4                     |          | 0.8        | 23.6 | 3.7°     | 18.59                  | 19.22                                                                | 19.89 | 20.62 | 22.24 |       |            | ●           | 4,310         |       |
| 3056226           | R0.5 × 20 × 4                     | 60       | 0.8        | 25.6 | 3.41°    | 20.65                  | 21.36                                                                | 22.11 | 22.92 | 24.73 |       |            | ●           | 5,250         |       |
| 3056227           | R0.5 × 22 × 4                     |          | 0.8        | 27.6 | 3.16°    | 22.72                  | 23.5                                                                 | 24.32 | 25.22 | 27.22 |       |            | ●           | 5,250         |       |
| 3056228           | R0.5 × 22 × 6                     | 60       | 0.8        | 31.3 | 4.62°    |                        |                                                                      |       |       |       |       |            | ●           | 7,860         |       |

・アイコンの説明はp.10をご覧ください。 See p.10 for explanation of icons.

● = 標準在庫品 ● = Standard stock item



注 1: ワーク勾配角  $\alpha$  に対する実有効長  $Le$  欄に数値がないものは干渉無しを表します。

Note: If there is no value in the actual effective length ( $Le$  column) for the work gradient angle  $\alpha$ , it indicates no interference.

FROM

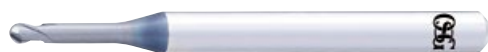
単位:mm Unit:mm

| ツールNo.<br>EDP No. | ボール半径×首下長×シャンク径<br>RE × LU × DCON | 全長<br>LF | 刃長<br>APMX | LH    | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | ワーク勾配角αに対する実有効長 Le 注1<br>Effective length by inclined angles |       |         |         |       | 形状<br>Type | 在庫<br>Stock | 標準価格<br>(Yen) |         |         |         |
|-------------------|-----------------------------------|----------|------------|-------|----------|------------------------|--------------------------------------------------------------|-------|---------|---------|-------|------------|-------------|---------------|---------|---------|---------|
|                   |                                   |          |            |       |          |                        | 0.5°                                                         | 1°    | 1.5°    | 2°      | 3°    |            |             |               |         |         |         |
| 3056229           | R0.6 × 2 × 4                      | 45       | 1          | 7.3   | 1.15     | 11.67°                 | 2.08                                                         | 2.17  | 2.24    | 2.32    | 2.45  | 1          | A           | ● 3,900       |         |         |         |
| 3056230           | R0.6 × 2 × 6                      |          |            |       |          | 12.86°                 |                                                              |       |         |         |       |            |             | ● 5,800       |         |         |         |
| 3056231           | R0.6 × 2.4 × 4                    |          |            |       |          | 11.04°                 | 2.51                                                         | 2.61  | 2.7     | 2.78    | 2.95  |            |             | ● 3,900       |         |         |         |
| 3056232           | R0.6 × 2.5 × 4                    |          |            |       |          | 10.9°                  | 2.61                                                         | 2.71  | 2.81    | 2.89    | 3.07  |            |             | ● 3,900       |         |         |         |
| 3056233           | R0.6 × 3 × 4                      |          |            |       |          | 10.22°                 | 3.14                                                         | 3.26  | 3.37    | 3.47    | 3.69  |            |             | ● 3,900       |         |         |         |
| 3056234           | R0.6 × 4 × 4                      |          |            |       |          | 9.08°                  | 4.19                                                         | 4.34  | 4.47    | 4.62    | 4.94  |            |             | ● 3,900       |         |         |         |
| 3056235           | R0.6 × 4 × 6                      |          |            |       |          | 10.87°                 |                                                              |       |         |         |       |            |             | ● 5,800       |         |         |         |
| 3056236           | R0.6 × 6 × 4                      |          |            |       |          | 11.3                   | 7.42°                                                        | 6.27  | 6.48    | 6.69    | 6.92  |            |             | 7.42          | ● 4,230 |         |         |
| 3056237           | R0.6 × 8 × 4                      |          |            |       |          | 13.3                   | 6.27°                                                        | 8.35  | 8.62    | 8.91    | 9.22  |            |             | 9.91          | ● 4,230 |         |         |
| 3056238           | R0.6 × 10 × 4                     |          |            |       |          | 15.3                   | 5.43°                                                        | 10.42 | 10.76   | 11.12   | 11.52 |            |             | 12.4          | ● 4,230 |         |         |
| 3056239           | R0.6 × 12 × 4                     | 50       | 55         | 17.3  | 1.15     | 4.78°                  | 12.48                                                        | 12.9  | 13.34   | 13.82   | 14.88 | 1          | A           | ● 4,230       |         |         |         |
| 3056240           | R0.6 × 14 × 4                     |          |            |       |          | 4.28°                  | 14.55                                                        | 15.04 | 15.56   | 16.12   | 17.37 |            |             | ● 4,230       |         |         |         |
| 3056241           | R0.6 × 16 × 4                     |          |            |       |          | 21.3                   | 3.87°                                                        | 16.62 | 17.18   | 17.77   | 18.42 |            |             | 19.85         | ● 4,970 |         |         |
| 3056242           | R0.6 × 18 × 4                     | 55       | 55         | 23.3  | 1.15     | 3.53°                  | 18.69                                                        | 19.32 | 19.99   | 20.71   | 22.34 | 1          | A           | ● 5,480       |         |         |         |
| 3056243           | R0.6 × 20 × 4                     |          |            |       |          | 25.3                   | 3.24°                                                        | 20.75 | 21.45   | 22.21   | 23.01 |            |             | 24.83         | ● 6,100 |         |         |
| 3056244           | R0.75 × 2 × 4                     | 45       | 1.2        | 6.8   | 1.45     | 11.61°                 | 2.08                                                         | 2.15  | 2.22    | 2.29    | 2.41  | 1          | A           | ● 3,000       |         |         |         |
| 3056245           | R0.75 × 2.5 × 4                   |          |            |       |          | 10.76°                 | 2.6                                                          | 2.7   | 2.79    | 2.87    | 3.03  |            |             | ● 3,000       |         |         |         |
| 3056246           | R0.75 × 3 × 4                     |          |            |       |          | 10.03°                 | 3.13                                                         | 3.25  | 3.35    | 3.44    | 3.65  |            |             | ● 3,000       |         |         |         |
| 3056247           | R0.75 × 3 × 6                     |          |            |       |          | 11.75°                 |                                                              |       |         |         |       |            |             | ● 4,870       |         |         |         |
| 3056248           | R0.75 × 4 × 4                     |          |            |       |          | 8.8                    | 8.81°                                                        | 4.18  | 4.33    | 4.46    | 4.59  |            |             | 4.9           | ● 3,000 |         |         |
| 3056249           | R0.75 × 5 × 4                     |          |            |       |          | 9.8                    | 7.86°                                                        | 5.22  | 5.4     | 5.56    | 5.74  |            |             | 6.14          |         |         | ● 3,000 |
| 3056250           | R0.75 × 5 × 6                     |          |            |       |          | 13.5                   | 9.97°                                                        |       |         |         |       |            |             |               |         |         | ● 4,870 |
| 3056251           | R0.75 × 6 × 4                     |          |            |       |          | 10.8                   | 7.09°                                                        | 6.27  | 6.47    | 6.67    | 6.89  |            |             | 7.38          |         |         | ● 3,000 |
| 3056252           | R0.75 × 6 × 6                     |          |            |       |          | 14.5                   | 9.26°                                                        |       |         |         |       |            |             |               |         |         | ● 4,870 |
| 3056253           | R0.75 × 8 × 4                     |          |            |       |          | 12.8                   | 5.93°                                                        | 8.34  | 8.61    | 8.89    | 9.19  |            |             | 9.87          |         |         | ● 3,110 |
| 3056254           | R0.75 × 8 × 6                     |          |            |       |          | 16.5                   | 8.11°                                                        |       |         |         |       |            |             |               |         |         | ● 4,870 |
| 3056255           | R0.75 × 10 × 4                    | 50       | 55         | 14.8  | 1.45     | 5.09°                  | 10.41                                                        | 10.75 | 11.11   | 11.49   | 12.36 | 1          | A           | ● 3,380       |         |         |         |
| 3056256           | R0.75 × 12 × 4                    |          |            |       |          | 4.46°                  | 12.48                                                        | 12.89 | 13.32   | 13.79   | 14.84 |            |             | ● 3,640       |         |         |         |
| 3056257           | R0.75 × 14 × 4                    |          |            |       |          | 18.8                   | 3.97°                                                        | 14.55 | 15.03   | 15.54   | 16.09 |            |             | 17.33         | ● 3,640 |         |         |
| 3056258           | R0.75 × 16 × 4                    | 55       | 60         | 20.8  | 1.45     | 3.58°                  | 16.61                                                        | 17.17 | 17.76   | 18.39   | 19.82 | 1          | A           | ● 3,640       |         |         |         |
| 3056259           | R0.75 × 18 × 4                    |          |            |       |          | 22.8                   | 3.25°                                                        | 18.68 | 19.3    | 19.97   | 20.69 |            |             | 22.3          | ● 3,640 |         |         |
| 3056260           | R0.75 × 20 × 4                    |          |            |       |          | 24.8                   | 2.98°                                                        | 20.75 | 21.44   | 22.19   | 22.99 |            |             | —             | ● 3,640 |         |         |
| 3056261           | R0.75 × 22 × 4                    | 60       | 26.8       | 2.75° | 22.82    | 23.58                  | 24.41                                                        | 25.29 | ● 3,640 |         |       |            |             |               |         |         |         |
| 3056262           | R0.75 × 25 × 4                    | 65       | 29.8       | 2.47° | 25.92    | 26.79                  | 27.73                                                        | 28.74 | ● 3,640 |         |       |            |             |               |         |         |         |
| 3056263           | R0.75 × 30 × 4                    | 70       | 34.8       | 2.11° | 31.08    | 32.14                  | 33.27                                                        | 34.49 | ● 3,640 |         |       |            |             |               |         |         |         |
| 3056264           | R0.8 × 4 × 4                      | 45       | 1.3        | 8.6   | 1.55     | 8.72°                  | 4.18                                                         | 4.32  | 4.45    | 4.59    | 4.88  | 1          | A           | ● 4,230       |         |         |         |
| 3056265           | R0.8 × 8 × 4                      |          |            |       |          | 12.6                   | 5.81°                                                        | 8.34  | 8.6     | 8.88    | 9.18  |            |             | 9.86          | ● 4,230 |         |         |
| 3056266           | R0.8 × 12 × 4                     |          |            |       |          | 16.6                   | 4.35°                                                        | 12.48 | 12.88   | 13.32   | 13.78 |            |             | 14.83         | ● 4,230 |         |         |
| 3056267           | R0.8 × 16 × 4                     |          |            |       |          | 50                     | 20.6                                                         | 3.47° | 16.61   | 17.16   | 17.75 |            |             | 18.38         | 19.8    | ● 4,230 |         |
| 3056268           | R0.8 × 20 × 4                     | 55       | 24.6       | 2.89° | 20.75    | 21.44                  | 22.18                                                        | 22.98 | —       | ● 4,230 |       |            |             |               |         |         |         |

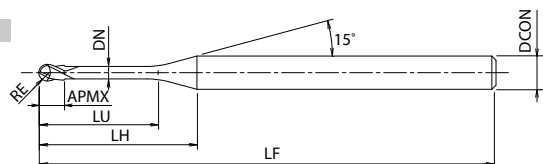
● = 標準在庫品 ● = Standard stock item

## AE-LNBD-H

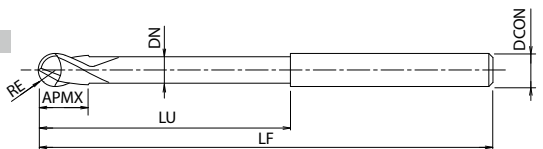
| CARBIDE | DUROREY | $\pm 0.003$    | $\pm 0.005$ | SHANK<br>h4 | SHRINK<br>FIT | SPEED<br>FEED<br>P55~P62 |
|---------|---------|----------------|-------------|-------------|---------------|--------------------------|
|         |         | RE $\leq 0.25$ | 0.25<RE     |             |               |                          |



Type1



Type2

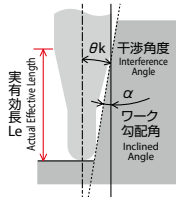


単位:mm Unit:mm

| ツールNo.<br>EDP No. | ボール半径×首下長×シャンク径<br>RE × LU × DCON | 全長<br>LF | 刃長<br>APMX | LH    | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | ワーク勾配角αに対する実有効長 <sup>注1</sup><br>Effective length by inclined angles |       |       |       |       | 形状<br>Type | 在庫<br>Stock | 標準価格<br>(Yen) |       |
|-------------------|-----------------------------------|----------|------------|-------|----------|------------------------|----------------------------------------------------------------------|-------|-------|-------|-------|------------|-------------|---------------|-------|
|                   |                                   |          |            |       |          |                        | 0.5°                                                                 | 1°    | 1.5°  | 2°    | 3°    |            |             |               |       |
| 3056269           | R1 × 2.5 × 4                      | 45       | 1.6        | 6.7   | 1.95     | 10.46°                 | 2.61                                                                 | 2.74  | 2.87  | 3     | 3.28  | 1          | A           | ●             | 2,590 |
| 3056270           | R1 × 3 × 4                        |          |            | 7.2   |          | 9.61°                  | 3.15                                                                 | 3.31  | 3.47  | 3.63  | 3.95  |            |             | ●             | 2,590 |
| 3056271           | R1 × 3 × 6                        |          |            | 10.9  |          | 11.7°                  |                                                                      |       |       |       |       |            |             | ●             | 3,930 |
| 3056272           | R1 × 4 × 4                        |          |            | 8.2   |          | 8.25°                  | 4.22                                                                 | 4.44  | 4.65  | 4.85  | 5.25  |            |             | ●             | 2,590 |
| 3056273           | R1 × 4 × 6                        |          |            | 11.9  |          | 10.64°                 |                                                                      |       |       |       |       |            |             | ●             | 3,930 |
| 3056274           | R1 × 5 × 4                        |          |            | 9.2   |          | 7.23°                  | 5.29                                                                 | 5.56  | 5.81  | 6.05  | 6.48  |            |             | ●             | 2,920 |
| 3056275           | R1 × 6 × 4                        |          |            | 10.2  |          | 6.43°                  | 6.35                                                                 | 6.67  | 6.96  | 7.23  | 7.73  |            |             | ●             | 2,920 |
| 3056276           | R1 × 6 × 6                        |          |            | 13.9  |          | 9°                     |                                                                      |       |       |       |       |            |             | ●             | 4,470 |
| 3056277           | R1 × 8 × 4                        |          |            | 12.2  |          | 5.26°                  | 8.47                                                                 | 8.87  | 9.22  | 9.53  | 10.21 |            |             | ●             | 3,110 |
| 3056278           | R1 × 8 × 6                        |          |            | 15.9  |          | 7.79°                  |                                                                      |       |       |       |       |            |             | ●             | 4,770 |
| 3056279           | R1 × 10 × 4                       | 50       | 1.6        | 14.2  | 1.95     | 4.45°                  | 10.58                                                                | 11.04 | 11.45 | 11.83 | 12.7  | 1          | A           | ●             | 3,110 |
| 3056280           | R1 × 10 × 6                       |          |            | 17.9  |          | 6.87°                  |                                                                      |       |       |       |       |            |             | ●             | 4,770 |
| 3056281           | R1 × 12 × 4                       | 45       | 1.6        | 16.2  | 1.95     | 3.86°                  | 12.68                                                                | 13.21 | 13.66 | 14.13 | 15.19 | 1          | A           | ●             | 3,110 |
| 3056282           | R1 × 12 × 6                       | 50       |            | 19.9  |          | 6.14°                  |                                                                      |       |       |       |       |            |             | ●             | 4,770 |
| 3056283           | R1 × 13 × 4                       | 50       |            | 17.2  |          | 3.61°                  | 13.73                                                                | 14.28 | 14.77 | 15.28 | 16.43 |            |             | ●             | 3,110 |
| 3056284           | R1 × 14 × 4                       |          |            | 18.2  |          | 3.4°                   | 14.78                                                                | 15.36 | 15.88 | 16.43 | 17.67 |            |             | ●             | 3,110 |
| 3056285           | R1 × 16 × 4                       |          |            | 20.2  |          | 3.04°                  | 16.87                                                                | 17.5  | 18.09 | 18.73 | 20.16 |            |             | ●             | 3,110 |
| 3056286           | R1 × 16 × 6                       | 23.9     |            | 5.06° |          | ●                      |                                                                      |       |       |       |       |            |             | 4,770         |       |
| 3056287           | R1 × 18 × 4                       | 55       |            | 22.2  |          | 2.75°                  | 18.96                                                                | 19.64 | 20.31 | 21.03 | —     |            |             | ●             | 3,110 |
| 3056288           | R1 × 20 × 4                       |          |            | 24.2  |          | 2.51°                  | 21.04                                                                | 21.78 | 22.53 | 23.33 |       |            |             | 25.13         | ●     |
| 3056289           | R1 × 20 × 6                       | 60       |            | 27.9  |          | 4.31°                  | 23.12                                                                | 23.92 | 24.74 | 25.63 | —     | ●          | 4,770       |               |       |
| 3056290           | R1 × 22 × 4                       |          |            | 26.2  |          | 2.31°                  |                                                                      |       |       |       |       | 23.12      | 23.92       | 24.74         | 25.63 |
| 3056291           | R1 × 25 × 4                       | 65       |            | 29.2  |          | 2.06°                  | 26.24                                                                | 27.13 | 28.07 | 29.08 | 31.35 | ●          | 4,360       |               |       |
| 3056292           | R1 × 25 × 6                       |          |            | 32.9  |          | 3.63°                  |                                                                      |       |       |       |       | ●          | 4,470       |               |       |
| 3056293           | R1 × 30 × 4                       | 70       |            | 34.2  |          | 1.75°                  | 31.42                                                                | 32.47 | 33.61 | —     | —     | ●          | 4,970       |               |       |
| 3056294           | R1 × 35 × 4                       |          |            | 39.2  |          | 1.52°                  | 36.58                                                                | 37.82 | 39.15 |       |       | ●          | 6,840       |               |       |
| 3056295           | R1 × 40 × 4                       |          |            | 80    |          | 44.2                   | 1.34°                                                                | 41.75 | 43.17 |       |       | —          | ●           | 6,840         |       |
| 3056296           | R1.25 × 6 × 4                     | 45       | 2          | 9     | 2.35     | 5.44°                  | 6.26                                                                 | 6.51  | 6.75  | 6.98  | 7.42  | 1          | A           | ●             | 3,850 |
| 3056297           | R1.25 × 8 × 4                     |          |            | 11    |          | 4.35°                  | 8.36                                                                 | 8.69  | 8.99  | 9.27  | 9.91  |            |             | ●             | 3,420 |
| 3056298           | R1.25 × 10 × 4                    |          |            | 13    |          | 3.62°                  | 10.45                                                                | 10.85 | 11.2  | 11.57 | 12.4  |            |             | ●             | 4,060 |
| 3056299           | R1.25 × 15 × 4                    | 50       | 18         | 2.55° | 15.67    | 16.21                  | 16.74                                                                | 17.32 | —     | —     | ●     | 4,230      |             |               |       |
| 3056300           | R1.25 × 20 × 4                    | 55       | 23         | 1.97° | 20.86    | 21.55                  | 22.29                                                                | ●     |       |       | 4,930 |            |             |               |       |
| 3056301           | R1.25 × 25 × 4                    | 65       | 28         | 1.61° | 26.04    | 26.9                   | 27.83                                                                | ●     |       |       | 5,300 |            |             |               |       |
| 3056302           | R1.25 × 30 × 4                    | 70       | 33         | 1.35° | 31.21    | 32.25                  | —                                                                    | ●     |       |       | 6,070 |            |             |               |       |
| 3056303           | R1.25 × 35 × 4                    |          | 38         | 1.17° | 36.38    | 37.6                   |                                                                      | ●     |       |       | 7,440 |            |             |               |       |

・アイコンの説明はp.10をご覧ください。 See p.10 for explanation of icons.

● = 標準在庫品 ● = Standard stock item

注1: ワーク勾配角 $\alpha$ に対する実有効長  $L_e$  欄に数値がないものは干渉無しを表します。Note: If there is no value in the actual effective length ( $L_e$  column) for the work gradient angle  $\alpha$ , it indicates no interference.

FROM

単位:mm Unit:mm

| ツールNo.<br>EDP No. | ボール半径×首下長×シャンク径<br>RE × LU × DCON | 全長<br>LF | 刃長<br>APMX | LH    | 首径<br>DN | 干渉角度<br>θ <sub>k</sub> | ワーク勾配角αに対する実有効長Le <sup>注1</sup><br>Effective length by inclined angles |       |       |       |       | 形状<br>Type | 在庫<br>Stock | 標準価格<br>(Yen) |       |       |
|-------------------|-----------------------------------|----------|------------|-------|----------|------------------------|------------------------------------------------------------------------|-------|-------|-------|-------|------------|-------------|---------------|-------|-------|
|                   |                                   |          |            |       |          |                        | 0.5°                                                                   | 1°    | 1.5°  | 2°    | 3°    |            |             |               |       |       |
| 3056304           | R1.5 × 6 × 6                      | 50       | 2.4        | 11.8  | 2.85     | 8.15°                  | 6.25                                                                   | 6.49  | 6.72  | 6.94  | 7.36  | 1          | A           | ●             | 3,180 |       |
| 3056305           | R1.5 × 8 × 6                      |          |            | 13.8  |          | 6.87°                  | 8.35                                                                   | 8.66  | 8.96  | 9.23  | 9.84  |            |             | ●             | 3,180 |       |
| 3056306           | R1.5 × 10 × 6                     |          |            | 15.8  |          | 5.93°                  | 10.44                                                                  | 10.83 | 11.17 | 11.53 | 12.33 |            |             | ●             | 3,610 |       |
| 3056307           | R1.5 × 12 × 6                     | 55       |            | 17.8  |          | 5.22°                  | 12.53                                                                  | 12.98 | 13.39 | 13.83 | 14.82 |            |             | ●             | 3,610 |       |
| 3056308           | R1.5 × 13 × 6                     |          |            | 18.8  |          | 4.92°                  | 13.57                                                                  | 14.05 | 14.5  | 14.98 | 16.06 |            |             | ●             | 4,230 |       |
| 3056309           | R1.5 × 14 × 6                     |          |            | 19.8  |          | 4.66°                  | 14.62                                                                  | 15.12 | 15.61 | 16.13 | 17.3  |            |             | ●             | 4,230 |       |
| 3056310           | R1.5 × 15 × 6                     | 60       |            | 20.8  |          | 4.42°                  | 15.66                                                                  | 16.19 | 16.72 | 17.28 | 18.55 |            |             | ●             | 4,230 |       |
| 3056311           | R1.5 × 16 × 6                     |          |            | 21.8  |          | 4.2°                   | 16.7                                                                   | 17.26 | 17.82 | 18.43 | 19.79 |            |             | ●             | 4,230 |       |
| 3056312           | R1.5 × 20 × 6                     |          |            | 25.8  |          | 3.52°                  | 20.85                                                                  | 21.54 | 22.26 | 23.03 | 24.76 |            |             | ●             | 4,110 |       |
| 3056313           | R1.5 × 25 × 6                     | 65       |            | 30.8  |          | 2.92°                  | 26.03                                                                  | 26.89 | 27.8  | 28.78 | —     |            |             | ●             | 4,110 |       |
| 3056314           | R1.5 × 30 × 6                     | 70       |            | 35.8  |          | 2.5°                   | 31.2                                                                   | 32.23 | 33.34 | 34.53 |       |            |             | ●             | 4,630 |       |
| 3056315           | R1.5 × 35 × 6                     | 80       |            | 40.8  |          | 2.18°                  | 36.37                                                                  | 37.58 | 38.88 | 40.28 |       |            |             | ●             | 5,890 |       |
| 3056316           | R1.5 × 40 × 6                     | 90       |            | 45.8  |          | 1.94°                  | 41.54                                                                  | 42.93 | 44.42 | —     | ●     |            |             | 7,330         |       |       |
| 3056317           | R1.75 × 10 × 6                    | 50       | 2.8        | 14.9  | 3.35     | 5.38°                  | 10.43                                                                  | 10.81 | 11.15 | 11.49 | 12.26 | 1          | A           | ●             | 5,380 |       |
| 3056318           | R1.75 × 15 × 6                    | 55       |            | 19.9  |          | 3.92°                  | 15.65                                                                  | 16.17 | 16.69 | 17.24 | 18.48 |            |             | ●             | 5,380 |       |
| 3056319           | R1.75 × 16 × 6                    |          |            | 20.9  |          | 3.72°                  | 16.69                                                                  | 17.24 | 17.8  | 18.39 | 19.72 |            |             | ●             | 5,380 |       |
| 3056320           | R1.75 × 20 × 6                    |          |            | 24.9  |          | 3.08°                  | 20.84                                                                  | 21.52 | 22.23 | 22.99 | 24.7  |            |             | ●             | 5,380 |       |
| 3056321           | R1.75 × 25 × 6                    | 65       |            | 29.9  |          | 2.54°                  | 26.02                                                                  | 26.87 | 27.77 | 28.74 | —     |            |             | ●             | 5,610 |       |
| 3056322           | R1.75 × 30 × 6                    | 70       |            | 34.9  |          | 2.16°                  | 31.19                                                                  | 32.22 | 33.31 | 34.49 |       |            |             | ●             | 5,610 |       |
| 3056323           | R1.75 × 35 × 6                    | 80       |            | 39.9  |          | 1.88°                  | 36.36                                                                  | 37.56 | 38.85 | —     |       |            |             | ●             | 7,250 |       |
| 3056324           | R1.75 × 40 × 6                    | 90       |            | 44.9  |          | 1.66°                  | 41.53                                                                  | 42.91 | 44.4  | —     | —     |            |             | ●             | 7,250 |       |
| 3056325           | R1.75 × 45 × 6                    |          |            | 49.9  |          | 1.49°                  | 46.7                                                                   | 48.26 | —     | —     | —     |            |             | ●             | 8,690 |       |
| 3056326           | R2 × 8 × 4                        |          | 55         | —     | —        | —                      | —                                                                      | —     | —     | —     | 2     | 1          | A           | ●             | 3,110 |       |
| 3056327           | R2 × 8 × 6                        | 60       |            | 12    | 5.65°    | 8.32                   | 8.62                                                                   | 8.9   | 9.15  | 9.71  | ●     |            |             | 3,270         |       |       |
| 3056328           | R2 × 10 × 6                       |          |            | 14    | 4.73°    | 10.42                  | 10.79                                                                  | 11.12 | 11.45 | 12.2  | ●     |            |             | 3,270         |       |       |
| 3056329           | R2 × 12 × 6                       |          | 16         | 4.07° | 12.51    | 12.94                  | 13.33                                                                  | 13.75 | 14.69 | ●     | 4,250 |            |             |               |       |       |
| 3056330           | R2 × 13 × 6                       |          | 17         | 3.8°  | 13.55    | 14.02                  | 14.44                                                                  | 14.9  | 15.93 | ●     | 4,250 |            |             |               |       |       |
| 3056331           | R2 × 14 × 6                       |          | 18         | 3.56° | 14.59    | 15.09                  | 15.55                                                                  | 16.05 | 17.17 | ●     | 4,250 |            |             |               |       |       |
| 3056332           | R2 × 15 × 6                       |          | 19         | 3.36° | 15.64    | 16.15                  | 16.66                                                                  | 17.2  | 18.41 | ●     | 4,250 |            |             |               |       |       |
| 3056333           | R2 × 16 × 6                       |          | 20         | 3.17° | 16.68    | 17.22                  | 17.77                                                                  | 18.35 | 19.66 | ●     | 4,250 |            |             |               |       |       |
| 3056334           | R2 × 20 × 6                       |          | 65         | 24    | 2.6°     | 20.83                  | 21.5                                                                   | 22.2  | 22.95 | —     | ●     |            |             | 4,250         |       |       |
| 3056335           | R2 × 25 × 6                       |          | 70         | 29    | 2.12°    | 26.01                  | 26.85                                                                  | 27.74 | 28.7  |       | ●     |            |             | 4,250         |       |       |
| 3056336           | R2 × 30 × 6                       | 80       | 34         | 1.79° | 31.18    | 32.2                   | 33.28                                                                  | —     | —     |       | ●     |            |             | 4,250         |       |       |
| 3056337           | R2 × 35 × 6                       |          | 39         | 1.55° | 36.35    | 37.55                  | 38.83                                                                  | —     | —     | ●     | 4,890 |            |             |               |       |       |
| 3056338           | R2 × 40 × 6                       |          | 90         | 44    | 1.37°    | 41.52                  | 42.89                                                                  | —     | —     | —     | ●     |            |             | 5,500         |       |       |
| 3056339           | R2 × 45 × 6                       | 49       |            | 1.22° | 46.69    | 48.24                  | —                                                                      | —     | —     | ●     | 7,070 |            |             |               |       |       |
| 3056340           | R2 × 50 × 6                       | 100      |            | 54    | 1.11°    | 51.86                  | 53.59                                                                  | —     | —     | —     | ●     |            |             | 7,660         |       |       |
| 3056341           | R2.5 × 10 × 6                     | 60       | 4          | 12.1  | 4.85     | 2.95°                  | 10.39                                                                  | 10.75 | 11.07 | 11.37 | 1     | A          | ●           | 4,970         |       |       |
| 3056342           | R2.5 × 15 × 6                     |          |            | 17.1  |          | 1.95°                  | 15.62                                                                  | 16.12 | 16.6  | —     |       |            | —           | —             | ●     | 6,930 |
| 3056343           | R2.5 × 20 × 6                     |          |            | 70    |          | 22.1                   | 1.46°                                                                  | 20.81 | 21.47 |       |       |            | —           | —             | —     | ●     |
| 3056344           | R2.5 × 25 × 6                     | 27.1     |            |       |          | 1.17°                  | 26                                                                     | 26.81 | —     |       |       |            | —           | —             | ●     | 7,060 |
| 3056345           | R2.5 × 30 × 6                     | 80       |            |       |          | 32.1                   | 0.97°                                                                  | 31.17 | —     | —     |       |            | —           | —             | ●     | 7,590 |
| 3056346           | R2.5 × 35 × 6                     |          |            | 37.1  |          | 0.83°                  | 36.34                                                                  | —     |       | —     |       |            | —           | ●             | 8,480 |       |
| 3056347           | R2.5 × 40 × 6                     |          |            | 42.1  |          | 0.73°                  | 41.5                                                                   | —     |       | —     |       |            | —           | ●             | 9,100 |       |
| 3056348           | R2.5 × 45 × 6                     | 90       |            | 47.1  |          | 0.65°                  | 46.67                                                                  | —     | —     | —     |       |            | —           | —             | ●     | 9,530 |
| 3056349           | R2.5 × 50 × 6                     |          |            | 52.1  |          | 0.58°                  | 51.84                                                                  |       | —     | —     |       |            | —           | —             | ●     | 9,950 |
| 3056350           | R3 × 10 × 6                       |          | 60         | 4.8   | —        | 5.85                   | —                                                                      |       | —     | —     | —     | —          | 2           | A             | ●     | 5,300 |
| 3056351           | R3 × 12 × 6                       | 65       |            |       |          |                        |                                                                        | ●     |       |       |       |            |             |               | 5,300 |       |
| 3056352           | R3 × 15 × 6                       | 70       |            |       |          |                        |                                                                        | ●     |       |       |       |            |             |               | 5,300 |       |
| 3056353           | R3 × 20 × 6                       |          | ●          |       |          |                        |                                                                        | 5,300 |       |       |       |            |             |               |       |       |
| 3056354           | R3 × 25 × 6                       |          | ●          |       |          |                        |                                                                        | 5,300 |       |       |       |            |             |               |       |       |
| 3056355           | R3 × 30 × 6                       | 80       | ●          |       |          |                        |                                                                        | 5,450 |       |       |       |            |             |               |       |       |
| 3056356           | R3 × 35 × 6                       |          | ●          |       |          |                        |                                                                        | 5,450 |       |       |       |            |             |               |       |       |
| 3056357           | R3 × 40 × 6                       |          | ●          |       |          |                        |                                                                        | 6,020 |       |       |       |            |             |               |       |       |
| 3056358           | R3 × 45 × 6                       | 90       | ●          |       |          |                        |                                                                        | 6,210 |       |       |       |            |             |               |       |       |
| 3056359           | R3 × 50 × 6                       | 100      | ●          |       |          |                        |                                                                        | 6,420 |       |       |       |            |             |               |       |       |
| 3056360           | R3 × 60 × 6                       |          | ●          |       |          |                        |                                                                        | 6,930 |       |       |       |            |             |               |       |       |

● = 標準在庫品 ● = Standard stock item



多刃スクエアタイプ・ラジアスタップ Multi-flute square type and radius type

ボールタイプ Ball Type

ロングネックタイプ Long Neck Type

ヘッド交換式 Exchangeable Head

AE-MSS-H

AE-MS-H

AE-ML-H

AE-BM-H

AE-BD-H

AE-CPR4-H

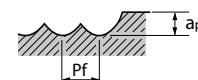
AE-LNBD-H

PXSH

# AE-LNBD-H 切削条件基準表 Cutting Condition

加工パスは等高線加工を前提としています。 The machining path is on condition of contouring line operation

| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel・Hardened Steel<br>Prehardened Steel |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|-----------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   | SKD11・SKD61・NAK80<br>(~45HRC)                                         |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
| RE                   | 首下長<br>LU<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R0.05                | 0.2               | 50,000                                                                | 80                       | 0.003      | 0.003      | 50,000                                | 70                       | 0.003      | 0.003      | 50,000                                | 70                       | 0.003      | 0.003      | 50,000                                | 60                       | 0.003      | 0.003      | 50,000                                | 50                       | 0.003      | 0.003      |
|                      | 0.3               | 50,000                                                                | 70                       | 0.003      | 0.003      | 50,000                                | 60                       | 0.003      | 0.003      | 50,000                                | 60                       | 0.003      | 0.003      | 50,000                                | 50                       | 0.003      | 0.003      | 50,000                                | 40                       | 0.003      | 0.003      |
|                      | 0.5               | 50,000                                                                | 50                       | 0.003      | 0.003      | 50,000                                | 40                       | 0.003      | 0.003      | 50,000                                | 40                       | 0.003      | 0.003      | 50,000                                | 30                       | 0.003      | 0.003      | 50,000                                | 20                       | 0.003      | 0.003      |
| R0.1                 | 0.3               | 50,000                                                                | 400                      | 0.005      | 0.005      | 50,000                                | 280                      | 0.005      | 0.005      | 50,000                                | 220                      | 0.004      | 0.005      | 50,000                                | 190                      | 0.004      | 0.005      | 50,000                                | 140                      | 0.004      | 0.005      |
|                      | 0.5               | 50,000                                                                | 380                      | 0.005      | 0.005      | 50,000                                | 260                      | 0.005      | 0.005      | 50,000                                | 200                      | 0.004      | 0.005      | 50,000                                | 170                      | 0.004      | 0.005      | 50,000                                | 130                      | 0.004      | 0.005      |
|                      | 0.75              | 50,000                                                                | 340                      | 0.005      | 0.005      | 50,000                                | 230                      | 0.005      | 0.005      | 50,000                                | 180                      | 0.004      | 0.005      | 50,000                                | 150                      | 0.004      | 0.005      | 50,000                                | 110                      | 0.004      | 0.005      |
|                      | 1                 | 50,000                                                                | 340                      | 0.005      | 0.005      | 50,000                                | 230                      | 0.005      | 0.005      | 50,000                                | 180                      | 0.004      | 0.005      | 50,000                                | 150                      | 0.004      | 0.005      | 45,000                                | 110                      | 0.004      | 0.005      |
|                      | 1.25              | 50,000                                                                | 300                      | 0.005      | 0.005      | 50,000                                | 210                      | 0.005      | 0.005      | 50,000                                | 150                      | 0.004      | 0.005      | 46,500                                | 130                      | 0.004      | 0.005      | 37,200                                | 100                      | 0.004      | 0.005      |
|                      | 1.5               | 50,000                                                                | 280                      | 0.005      | 0.005      | 50,000                                | 190                      | 0.005      | 0.005      | 49,200                                | 130                      | 0.004      | 0.005      | 44,300                                | 110                      | 0.004      | 0.005      | 35,500                                | 80                       | 0.004      | 0.005      |
|                      | 1.75              | 50,000                                                                | 240                      | 0.005      | 0.005      | 50,000                                | 170                      | 0.005      | 0.005      | 45,600                                | 120                      | 0.004      | 0.005      | 41,100                                | 100                      | 0.004      | 0.005      | 32,900                                | 80                       | 0.004      | 0.005      |
|                      | 2                 | 45,600                                                                | 210                      | 0.005      | 0.005      | 44,500                                | 140                      | 0.005      | 0.005      | 39,600                                | 100                      | 0.004      | 0.005      | 35,700                                | 90                       | 0.004      | 0.005      | 28,600                                | 70                       | 0.004      | 0.005      |
|                      | 2.5               | 38,400                                                                | 160                      | 0.004      | 0.005      | 37,200                                | 100                      | 0.004      | 0.005      | 37,200                                | 80                       | 0.004      | 0.005      | 33,500                                | 70                       | 0.004      | 0.005      | 26,800                                | 50                       | 0.004      | 0.005      |
|                      | 3                 | 38,400                                                                | 140                      | 0.004      | 0.005      | 37,200                                | 90                       | 0.004      | 0.005      | 37,200                                | 70                       | 0.004      | 0.005      | 33,500                                | 60                       | 0.004      | 0.005      | 26,800                                | 50                       | 0.004      | 0.005      |
| R0.15                | 0.5               | 50,000                                                                | 600                      | 0.005      | 0.1        | 50,000                                | 400                      | 0.005      | 0.01       | 50,000                                | 300                      | 0.005      | 0.01       | 50,000                                | 260                      | 0.005      | 0.01       | 50,000                                | 200                      | 0.01       | 0.01       |
|                      | 0.6               | 50,000                                                                | 570                      | 0.005      | 0.1        | 50,000                                | 390                      | 0.005      | 0.01       | 50,000                                | 300                      | 0.005      | 0.01       | 50,000                                | 260                      | 0.005      | 0.01       | 50,000                                | 200                      | 0.01       | 0.01       |
|                      | 0.75              | 50,000                                                                | 570                      | 0.005      | 0.1        | 50,000                                | 390                      | 0.05       | 0.01       | 50,000                                | 300                      | 0.005      | 0.01       | 50,000                                | 260                      | 0.005      | 0.01       | 50,000                                | 200                      | 0.01       | 0.01       |
|                      | 1                 | 50,000                                                                | 570                      | 0.005      | 0.01       | 50,000                                | 390                      | 0.005      | 0.01       | 50,000                                | 300                      | 0.005      | 0.01       | 50,000                                | 260                      | 0.005      | 0.01       | 50,000                                | 200                      | 0.01       | 0.01       |
|                      | 1.25              | 50,000                                                                | 570                      | 0.005      | 0.01       | 50,000                                | 380                      | 0.005      | 0.01       | 50,000                                | 300                      | 0.005      | 0.01       | 50,000                                | 260                      | 0.005      | 0.01       | 50,000                                | 200                      | 0.01       | 0.01       |
|                      | 1.5               | 50,000                                                                | 570                      | 0.005      | 0.01       | 50,000                                | 370                      | 0.005      | 0.01       | 50,000                                | 290                      | 0.005      | 0.01       | 50,000                                | 250                      | 0.005      | 0.01       | 46,500                                | 190                      | 0.01       | 0.01       |
|                      | 1.75              | 50,000                                                                | 480                      | 0.005      | 0.01       | 50,000                                | 310                      | 0.005      | 0.01       | 50,000                                | 220                      | 0.005      | 0.01       | 46,500                                | 190                      | 0.005      | 0.01       | 37,200                                | 140                      | 0.01       | 0.01       |
|                      | 2                 | 50,000                                                                | 450                      | 0.005      | 0.005      | 50,000                                | 290                      | 0.005      | 0.005      | 49,200                                | 210                      | 0.004      | 0.005      | 44,300                                | 180                      | 0.004      | 0.005      | 35,500                                | 140                      | 0.004      | 0.005      |
|                      | 2.25              | 50,000                                                                | 380                      | 0.005      | 0.005      | 50,000                                | 250                      | 0.005      | 0.005      | 49,200                                | 180                      | 0.004      | 0.005      | 44,300                                | 150                      | 0.004      | 0.005      | 35,500                                | 110                      | 0.004      | 0.005      |
|                      | 2.5               | 48,000                                                                | 280                      | 0.005      | 0.005      | 48,000                                | 190                      | 0.005      | 0.005      | 43,200                                | 130                      | 0.004      | 0.005      | 38,900                                | 110                      | 0.004      | 0.005      | 31,200                                | 80                       | 0.004      | 0.005      |
|                      | 3                 | 45,600                                                                | 230                      | 0.005      | 0.005      | 44,400                                | 150                      | 0.005      | 0.005      | 39,600                                | 100                      | 0.004      | 0.005      | 35,700                                | 90                       | 0.004      | 0.005      | 28,600                                | 70                       | 0.004      | 0.005      |
|                      | 3.5               | 40,800                                                                | 190                      | 0.004      | 0.005      | 39,600                                | 120                      | 0.004      | 0.005      | 39,600                                | 95                       | 0.004      | 0.005      | 35,700                                | 80                       | 0.004      | 0.005      | 28,600                                | 60                       | 0.004      | 0.005      |
|                      | 4                 | 38,400                                                                | 140                      | 0.004      | 0.005      | 37,200                                | 90                       | 0.004      | 0.005      | 37,200                                | 70                       | 0.004      | 0.005      | 33,500                                | 60                       | 0.004      | 0.005      | 26,800                                | 50                       | 0.004      | 0.005      |
|                      | 4.5               | 38,400                                                                | 120                      | 0.004      | 0.005      | 37,200                                | 80                       | 0.004      | 0.005      | 37,200                                | 60                       | 0.004      | 0.005      | 33,500                                | 50                       | 0.004      | 0.005      | 26,800                                | 40                       | 0.004      | 0.005      |
|                      | 5                 | 34,800                                                                | 95                       | 0.004      | 0.005      | 33,600                                | 60                       | 0.004      | 0.005      | 33,600                                | 50                       | 0.004      | 0.005      | 30,300                                | 40                       | 0.004      | 0.005      | 24,200                                | 30                       | 0.004      | 0.005      |



- 機械、ホルダは剛性のある精度の高いものをご使用下さい。
- 炭素鋼や焼入れ鋼の切削では、MQL (オイルミストクーラント) またはエアブローを推奨いたします。
- 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。
- 上表は等高線加工における負荷の少ない安定した状況を基準としたものです。値は目安ですので実際の加工における切削条件は上表を参考に状況に応じて設定下さい。
- 加工精度、加工形状、加工パスによって条件の調整を行って下さい。
- φ0.5 (R0.25) 未満あるいはL/D (アスペクト比) が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
- 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。

FROM

| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel · Hardened Steel<br>Prehardened Steel<br>SKD11・SKD61・NAK80<br>(~45HRC) |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|----------------------------------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   |                                                                                                          |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
|                      |                   |                                                                                                          |                          |            |            | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| RE                   | 首下長<br>LU<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                                                    | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R0.2                 | 0.5               | 50,000                                                                                                   | 900                      | 0.01       | 0.02       | 50,000                                | 630                      | 0.01       | 0.02       | 50,000                                | 500                      | 0.008      | 0.015      | 50,000                                | 430                      | 0.008      | 0.015      | 50,000                                | 320                      | 0.008      | 0.015      |
|                      | 0.75              | 50,000                                                                                                   | 850                      | 0.01       | 0.02       | 50,000                                | 590                      | 0.01       | 0.02       | 50,000                                | 470                      | 0.008      | 0.015      | 50,000                                | 400                      | 0.008      | 0.015      | 50,000                                | 300                      | 0.008      | 0.015      |
|                      | 0.8               | 50,000                                                                                                   | 850                      | 0.01       | 0.02       | 50,000                                | 590                      | 0.01       | 0.02       | 50,000                                | 470                      | 0.008      | 0.015      | 50,000                                | 400                      | 0.008      | 0.015      | 50,000                                | 300                      | 0.008      | 0.015      |
|                      | 1                 | 50,000                                                                                                   | 850                      | 0.01       | 0.02       | 50,000                                | 550                      | 0.01       | 0.02       | 50,000                                | 440                      | 0.008      | 0.015      | 50,000                                | 370                      | 0.008      | 0.015      | 50,000                                | 280                      | 0.008      | 0.015      |
|                      | 1.5               | 50,000                                                                                                   | 760                      | 0.01       | 0.02       | 50,000                                | 520                      | 0.01       | 0.02       | 50,000                                | 410                      | 0.008      | 0.015      | 50,000                                | 350                      | 0.008      | 0.015      | 46,500                                | 260                      | 0.008      | 0.015      |
|                      | 2                 | 50,000                                                                                                   | 660                      | 0.01       | 0.02       | 50,000                                | 460                      | 0.01       | 0.02       | 50,000                                | 330                      | 0.008      | 0.015      | 48,600                                | 280                      | 0.008      | 0.015      | 38,900                                | 210                      | 0.008      | 0.015      |
|                      | 2.5               | 50,000                                                                                                   | 520                      | 0.008      | 0.015      | 50,000                                | 360                      | 0.008      | 0.015      | 49,200                                | 260                      | 0.008      | 0.015      | 44,300                                | 220                      | 0.008      | 0.015      | 35,500                                | 170                      | 0.008      | 0.015      |
|                      | 3                 | 50,000                                                                                                   | 470                      | 0.005      | 0.01       | 50,000                                | 320                      | 0.005      | 0.01       | 45,600                                | 220                      | 0.005      | 0.01       | 41,100                                | 190                      | 0.005      | 0.01       | 32,900                                | 140                      | 0.005      | 0.01       |
|                      | 3.5               | 48,000                                                                                                   | 400                      | 0.005      | 0.01       | 48,000                                | 280                      | 0.005      | 0.01       | 43,200                                | 200                      | 0.005      | 0.01       | 38,900                                | 170                      | 0.005      | 0.01       | 31,200                                | 130                      | 0.005      | 0.01       |
|                      | 4                 | 43,200                                                                                                   | 350                      | 0.005      | 0.005      | 42,000                                | 230                      | 0.005      | 0.005      | 37,200                                | 160                      | 0.005      | 0.005      | 33,500                                | 140                      | 0.005      | 0.005      | 26,800                                | 110                      | 0.005      | 0.005      |
|                      | 4.5               | 38,400                                                                                                   | 270                      | 0.004      | 0.005      | 37,200                                | 180                      | 0.004      | 0.005      | 33,600                                | 130                      | 0.004      | 0.005      | 30,300                                | 110                      | 0.004      | 0.005      | 24,200                                | 80                       | 0.004      | 0.005      |
|                      | 5                 | 38,400                                                                                                   | 260                      | 0.004      | 0.005      | 37,200                                | 170                      | 0.004      | 0.005      | 33,600                                | 120                      | 0.004      | 0.005      | 30,300                                | 100                      | 0.004      | 0.005      | 24,200                                | 80                       | 0.004      | 0.005      |
|                      | 5.5               | 36,000                                                                                                   | 210                      | 0.004      | 0.005      | 34,800                                | 140                      | 0.004      | 0.005      | 31,200                                | 100                      | 0.004      | 0.005      | 28,100                                | 90                       | 0.004      | 0.005      | 22,500                                | 70                       | 0.004      | 0.005      |
|                      | 6                 | 36,000                                                                                                   | 190                      | 0.004      | 0.005      | 34,800                                | 120                      | 0.004      | 0.005      | 31,200                                | 100                      | 0.004      | 0.005      | 28,100                                | 90                       | 0.004      | 0.005      | 22,500                                | 70                       | 0.004      | 0.005      |
| R0.25                | 0.75              | 50,000                                                                                                   | 1,100                    | 0.015      | 0.03       | 50,000                                | 750                      | 0.015      | 0.03       | 50,000                                | 590                      | 0.01       | 0.02       | 50,000                                | 500                      | 0.01       | 0.02       | 50,000                                | 380                      | 0.01       | 0.02       |
|                      | 1                 | 50,000                                                                                                   | 1,050                    | 0.015      | 0.03       | 50,000                                | 730                      | 0.015      | 0.03       | 50,000                                | 580                      | 0.01       | 0.02       | 50,000                                | 490                      | 0.01       | 0.02       | 50,000                                | 370                      | 0.01       | 0.02       |
|                      | 1.5               | 50,000                                                                                                   | 1,050                    | 0.015      | 0.03       | 50,000                                | 700                      | 0.015      | 0.03       | 50,000                                | 560                      | 0.01       | 0.02       | 50,000                                | 480                      | 0.01       | 0.02       | 48,000                                | 360                      | 0.01       | 0.02       |
|                      | 2                 | 50,000                                                                                                   | 950                      | 0.015      | 0.03       | 50,000                                | 650                      | 0.015      | 0.03       | 50,000                                | 520                      | 0.01       | 0.02       | 48,600                                | 440                      | 0.01       | 0.02       | 38,900                                | 330                      | 0.01       | 0.02       |
|                      | 2.5               | 50,000                                                                                                   | 950                      | 0.015      | 0.03       | 50,000                                | 600                      | 0.015      | 0.03       | 50,000                                | 430                      | 0.01       | 0.02       | 46,500                                | 370                      | 0.01       | 0.02       | 37,200                                | 280                      | 0.01       | 0.02       |
|                      | 3                 | 50,000                                                                                                   | 850                      | 0.01       | 0.02       | 50,000                                | 550                      | 0.01       | 0.02       | 48,000                                | 390                      | 0.01       | 0.02       | 43,200                                | 330                      | 0.01       | 0.02       | 34,600                                | 250                      | 0.01       | 0.02       |
|                      | 3.5               | 50,000                                                                                                   | 650                      | 0.01       | 0.02       | 50,000                                | 450                      | 0.01       | 0.02       | 45,600                                | 320                      | 0.01       | 0.02       | 41,100                                | 270                      | 0.01       | 0.02       | 32,900                                | 200                      | 0.01       | 0.02       |
|                      | 4                 | 50,000                                                                                                   | 570                      | 0.01       | 0.01       | 50,000                                | 390                      | 0.01       | 0.01       | 40,800                                | 270                      | 0.01       | 0.01       | 36,800                                | 230                      | 0.01       | 0.01       | 29,400                                | 170                      | 0.01       | 0.01       |
|                      | 4.5               | 45,600                                                                                                   | 470                      | 0.01       | 0.01       | 45,600                                | 320                      | 0.01       | 0.01       | 31,200                                | 220                      | 0.01       | 0.01       | 28,100                                | 190                      | 0.01       | 0.01       | 22,500                                | 140                      | 0.01       | 0.01       |
|                      | 5                 | 36,000                                                                                                   | 380                      | 0.005      | 0.01       | 34,800                                | 250                      | 0.005      | 0.01       | 28,800                                | 170                      | 0.005      | 0.01       | 26,000                                | 140                      | 0.005      | 0.01       | 20,800                                | 110                      | 0.005      | 0.01       |
|                      | 5.5               | 33,600                                                                                                   | 280                      | 0.004      | 0.005      | 32,400                                | 180                      | 0.004      | 0.005      | 26,400                                | 120                      | 0.004      | 0.005      | 23,800                                | 100                      | 0.004      | 0.005      | 19,100                                | 80                       | 0.004      | 0.005      |
|                      | 6                 | 31,200                                                                                                   | 230                      | 0.004      | 0.005      | 30,000                                | 150                      | 0.004      | 0.005      | 24,000                                | 100                      | 0.004      | 0.005      | 21,600                                | 90                       | 0.004      | 0.005      | 17,300                                | 70                       | 0.004      | 0.005      |
|                      | 7                 | 28,800                                                                                                   | 190                      | 0.004      | 0.005      | 27,600                                | 130                      | 0.004      | 0.005      | 24,000                                | 100                      | 0.004      | 0.005      | 21,600                                | 90                       | 0.004      | 0.005      | 17,300                                | 70                       | 0.004      | 0.005      |
|                      | 8                 | 26,400                                                                                                   | 150                      | 0.004      | 0.005      | 25,200                                | 110                      | 0.004      | 0.005      | 24,000                                | 100                      | 0.004      | 0.005      | 21,600                                | 90                       | 0.004      | 0.005      | 17,300                                | 70                       | 0.004      | 0.005      |
|                      | 9                 | 24,000                                                                                                   | 110                      | 0.004      | 0.005      | 25,200                                | 100                      | 0.004      | 0.005      | 24,000                                | 90                       | 0.004      | 0.005      | 21,600                                | 80                       | 0.004      | 0.005      | 17,300                                | 60                       | 0.004      | 0.005      |
|                      | 10                | 24,000                                                                                                   | 95                       | 0.004      | 0.005      | 25,200                                | 100                      | 0.004      | 0.005      | 24,000                                | 90                       | 0.004      | 0.005      | 21,600                                | 80                       | 0.004      | 0.005      | 17,300                                | 60                       | 0.004      | 0.005      |

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of  $\phi$  0.5 (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



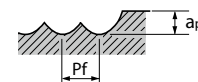
NEXT

# AE-LNBD-H 切削条件基準表 Cutting Condition

FROM

加工パスは等高線加工を前提としています。 The machining path is on condition of contouring line operation

| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel · Hardened Steel<br>Prehardened Steel |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|-------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   | SKD11・SKD61・NAK80<br>(~45HRC)                                           |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
| RE                   | 首下長<br>LU<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                   | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R0.3                 | 0.75              | 50,000                                                                  | 1,250                    | 0.03       | 0.05       | 50,000                                | 880                      | 0.03       | 0.05       | 50,000                                | 700                      | 0.01       | 0.02       | 50,000                                | 600                      | 0.01       | 0.02       | 50,000                                | 450                      | 0.01       | 0.02       |
|                      | 1                 | 50,000                                                                  | 1,200                    | 0.03       | 0.05       | 50,000                                | 840                      | 0.03       | 0.05       | 50,000                                | 670                      | 0.01       | 0.02       | 50,000                                | 570                      | 0.01       | 0.02       | 50,000                                | 430                      | 0.01       | 0.02       |
|                      | 1.2               | 50,000                                                                  | 1,200                    | 0.03       | 0.05       | 50,000                                | 840                      | 0.03       | 0.05       | 50,000                                | 670                      | 0.01       | 0.02       | 50,000                                | 570                      | 0.01       | 0.02       | 50,000                                | 430                      | 0.01       | 0.02       |
|                      | 1.5               | 50,000                                                                  | 1,200                    | 0.03       | 0.05       | 50,000                                | 830                      | 0.03       | 0.05       | 50,000                                | 660                      | 0.01       | 0.02       | 50,000                                | 560                      | 0.01       | 0.02       | 50,000                                | 420                      | 0.01       | 0.02       |
|                      | 2                 | 50,000                                                                  | 1,200                    | 0.03       | 0.05       | 50,000                                | 820                      | 0.03       | 0.05       | 50,000                                | 650                      | 0.01       | 0.02       | 50,000                                | 550                      | 0.01       | 0.02       | 50,000                                | 410                      | 0.01       | 0.02       |
|                      | 2.5               | 50,000                                                                  | 1,100                    | 0.03       | 0.05       | 50,000                                | 770                      | 0.03       | 0.05       | 50,000                                | 610                      | 0.01       | 0.02       | 50,000                                | 520                      | 0.01       | 0.02       | 48,000                                | 390                      | 0.01       | 0.02       |
|                      | 3                 | 50,000                                                                  | 1,100                    | 0.02       | 0.03       | 50,000                                | 750                      | 0.02       | 0.03       | 50,000                                | 540                      | 0.01       | 0.02       | 48,600                                | 460                      | 0.01       | 0.02       | 38,900                                | 350                      | 0.01       | 0.02       |
|                      | 3.5               | 50,000                                                                  | 950                      | 0.02       | 0.03       | 50,000                                | 660                      | 0.02       | 0.03       | 49,200                                | 480                      | 0.01       | 0.02       | 44,300                                | 410                      | 0.01       | 0.02       | 35,500                                | 310                      | 0.01       | 0.02       |
|                      | 4                 | 48,000                                                                  | 850                      | 0.01       | 0.02       | 48,000                                | 590                      | 0.01       | 0.02       | 43,200                                | 420                      | 0.01       | 0.02       | 38,900                                | 360                      | 0.01       | 0.02       | 31,200                                | 270                      | 0.01       | 0.02       |
|                      | 4.5               | 40,800                                                                  | 740                      | 0.01       | 0.02       | 40,800                                | 510                      | 0.01       | 0.02       | 37,200                                | 370                      | 0.01       | 0.02       | 33,500                                | 310                      | 0.01       | 0.02       | 26,800                                | 230                      | 0.01       | 0.02       |
|                      | 5                 | 36,000                                                                  | 640                      | 0.01       | 0.02       | 36,000                                | 440                      | 0.01       | 0.02       | 32,400                                | 310                      | 0.01       | 0.02       | 29,200                                | 260                      | 0.01       | 0.02       | 23,400                                | 200                      | 0.01       | 0.02       |
|                      | 5.5               | 33,600                                                                  | 610                      | 0.01       | 0.02       | 33,600                                | 420                      | 0.01       | 0.02       | 30,000                                | 300                      | 0.01       | 0.02       | 27,000                                | 260                      | 0.01       | 0.02       | 21,600                                | 200                      | 0.01       | 0.02       |
|                      | 6                 | 31,200                                                                  | 570                      | 0.01       | 0.02       | 30,000                                | 380                      | 0.01       | 0.02       | 26,400                                | 260                      | 0.01       | 0.02       | 23,800                                | 220                      | 0.01       | 0.02       | 19,100                                | 170                      | 0.01       | 0.02       |
|                      | 6.5               | 28,800                                                                  | 520                      | 0.01       | 0.01       | 27,600                                | 340                      | 0.01       | 0.01       | 24,000                                | 230                      | 0.01       | 0.01       | 21,600                                | 200                      | 0.01       | 0.01       | 17,300                                | 150                      | 0.01       | 0.01       |
|                      | 7                 | 27,600                                                                  | 420                      | 0.01       | 0.01       | 26,400                                | 280                      | 0.01       | 0.01       | 22,800                                | 190                      | 0.01       | 0.01       | 20,600                                | 160                      | 0.01       | 0.01       | 16,500                                | 120                      | 0.01       | 0.01       |
|                      | 7.5               | 27,600                                                                  | 380                      | 0.01       | 0.01       | 26,400                                | 250                      | 0.01       | 0.01       | 22,800                                | 170                      | 0.01       | 0.01       | 20,600                                | 140                      | 0.01       | 0.01       | 16,500                                | 110                      | 0.01       | 0.01       |
|                      | 8                 | 24,000                                                                  | 300                      | 0.005      | 0.01       | 22,800                                | 200                      | 0.005      | 0.01       | 20,400                                | 140                      | 0.005      | 0.01       | 18,400                                | 120                      | 0.005      | 0.01       | 14,700                                | 90                       | 0.005      | 0.01       |
|                      | 8.5               | 24,000                                                                  | 280                      | 0.005      | 0.01       | 22,800                                | 180                      | 0.005      | 0.01       | 20,400                                | 130                      | 0.005      | 0.01       | 18,400                                | 110                      | 0.005      | 0.01       | 14,700                                | 80                       | 0.005      | 0.01       |
|                      | 9                 | 24,000                                                                  | 260                      | 0.005      | 0.01       | 22,800                                | 170                      | 0.005      | 0.01       | 20,400                                | 120                      | 0.005      | 0.01       | 18,400                                | 100                      | 0.005      | 0.01       | 14,700                                | 80                       | 0.005      | 0.01       |
|                      | 9.5               | 24,000                                                                  | 220                      | 0.005      | 0.008      | 22,800                                | 140                      | 0.005      | 0.008      | 20,400                                | 110                      | 0.005      | 0.008      | 18,400                                | 90                       | 0.005      | 0.008      | 14,700                                | 70                       | 0.005      | 0.008      |
|                      | 10                | 24,000                                                                  | 190                      | 0.005      | 0.008      | 22,800                                | 120                      | 0.005      | 0.008      | 20,400                                | 100                      | 0.005      | 0.008      | 18,400                                | 90                       | 0.005      | 0.008      | 14,700                                | 70                       | 0.005      | 0.008      |
|                      | 11                | 21,600                                                                  | 140                      | 0.005      | 0.008      | 20,400                                | 90                       | 0.005      | 0.008      | 20,400                                | 80                       | 0.005      | 0.008      | 18,400                                | 70                       | 0.005      | 0.008      | 14,700                                | 50                       | 0.005      | 0.008      |
|                      | 12                | 21,600                                                                  | 110                      | 0.005      | 0.005      | 20,400                                | 80                       | 0.005      | 0.005      | 20,400                                | 70                       | 0.004      | 0.005      | 18,400                                | 60                       | 0.004      | 0.005      | 14,700                                | 50                       | 0.004      | 0.005      |



- 機械、ホルダは剛性のある精度の高いものをご使用下さい。
- 炭素鋼や焼入れ鋼の切削では、MQL (オイルミストクーラント) またはエアブローを推奨いたします。
- 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。
- 上表は等高線加工における負荷の少ない安定した状況を基準としたものです。値は目安ですので実際の加工における切削条件は上表を参考に状況に応じて設定下さい。
- 加工精度、加工形状、加工パスによって条件の調整を行って下さい。
- φ0.5 (R0.25) 未満あるいはL/D (アスペクト比) が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
- 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。

NEXT



FROM

| 被削材<br>Work Material |     | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel · Hardened Steel<br>Prehardened Steel |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-----|-------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |     | SKD11・SKD61・NAK80<br>(~45HRC)                                           |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
|                      |     | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                   | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R0.4                 | 1   | 50,000                                                                  | 2,200                    | 0.04       | 0.08       | 50,000                                | 1,800                    | 0.04       | 0.08       | 50,000                                | 1,400                    | 0.04       | 0.08       | 50,000                                | 1,190                    | 0.04       | 0.08       | 50,000                                | 890                      | 0.04       | 0.08       |
|                      | 1.5 | 50,000                                                                  | 2,000                    | 0.04       | 0.08       | 50,000                                | 1,700                    | 0.04       | 0.08       | 50,000                                | 1,300                    | 0.04       | 0.08       | 50,000                                | 1,110                    | 0.04       | 0.08       | 50,000                                | 830                      | 0.04       | 0.08       |
|                      | 2   | 50,000                                                                  | 1,900                    | 0.04       | 0.08       | 50,000                                | 1,600                    | 0.04       | 0.08       | 50,000                                | 1,200                    | 0.015      | 0.03       | 50,000                                | 1,020                    | 0.015      | 0.03       | 50,000                                | 770                      | 0.015      | 0.03       |
|                      | 2.5 | 50,000                                                                  | 1,700                    | 0.04       | 0.08       | 50,000                                | 1,400                    | 0.04       | 0.08       | 50,000                                | 1,000                    | 0.015      | 0.03       | 50,000                                | 850                      | 0.015      | 0.03       | 41,500                                | 640                      | 0.015      | 0.03       |
|                      | 3   | 50,000                                                                  | 1,500                    | 0.04       | 0.08       | 50,000                                | 1,100                    | 0.04       | 0.08       | 50,000                                | 820                      | 0.015      | 0.03       | 48,600                                | 700                      | 0.015      | 0.03       | 38,900                                | 530                      | 0.015      | 0.03       |
|                      | 4   | 48,000                                                                  | 1,100                    | 0.04       | 0.08       | 48,000                                | 1,000                    | 0.04       | 0.08       | 45,600                                | 760                      | 0.015      | 0.03       | 41,100                                | 650                      | 0.015      | 0.03       | 32,900                                | 490                      | 0.015      | 0.03       |
|                      | 5   | 40,800                                                                  | 900                      | 0.03       | 0.05       | 40,800                                | 800                      | 0.03       | 0.05       | 37,200                                | 580                      | 0.015      | 0.03       | 33,500                                | 490                      | 0.015      | 0.03       | 26,800                                | 370                      | 0.015      | 0.03       |
|                      | 6   | 36,000                                                                  | 760                      | 0.03       | 0.05       | 36,000                                | 650                      | 0.03       | 0.05       | 32,400                                | 460                      | 0.015      | 0.03       | 29,200                                | 390                      | 0.015      | 0.03       | 23,400                                | 290                      | 0.015      | 0.03       |
|                      | 7   | 30,000                                                                  | 570                      | 0.01       | 0.02       | 30,000                                | 450                      | 0.01       | 0.02       | 26,400                                | 310                      | 0.01       | 0.02       | 23,800                                | 260                      | 0.01       | 0.02       | 19,100                                | 200                      | 0.01       | 0.02       |
|                      | 8   | 27,600                                                                  | 420                      | 0.005      | 0.01       | 27,600                                | 300                      | 0.005      | 0.01       | 24,000                                | 200                      | 0.005      | 0.01       | 21,600                                | 170                      | 0.005      | 0.01       | 17,300                                | 130                      | 0.005      | 0.01       |
|                      | 9   | 25,200                                                                  | 360                      | 0.005      | 0.009      | 24,000                                | 250                      | 0.005      | 0.009      | 22,200                                | 190                      | 0.005      | 0.009      | 20,000                                | 160                      | 0.005      | 0.009      | 16,000                                | 120                      | 0.005      | 0.009      |
|                      | 10  | 21,600                                                                  | 300                      | 0.005      | 0.008      | 20,400                                | 200                      | 0.005      | 0.008      | 20,400                                | 170                      | 0.005      | 0.008      | 18,400                                | 140                      | 0.005      | 0.008      | 14,700                                | 110                      | 0.005      | 0.008      |
|                      | 12  | 20,400                                                                  | 230                      | 0.005      | 0.005      | 19,200                                | 160                      | 0.005      | 0.005      | 19,200                                | 110                      | 0.005      | 0.005      | 17,300                                | 90                       | 0.005      | 0.005      | 13,900                                | 70                       | 0.005      | 0.005      |
| R0.5                 | 1.5 | 50,000                                                                  | 3,900                    | 0.05       | 0.1        | 50,000                                | 3,900                    | 0.05       | 0.1        | 50,000                                | 3,100                    | 0.02       | 0.05       | 50,000                                | 2,640                    | 0.02       | 0.05       | 50,000                                | 1,980                    | 0.02       | 0.05       |
|                      | 2   | 50,000                                                                  | 3,700                    | 0.05       | 0.1        | 50,000                                | 3,700                    | 0.05       | 0.1        | 50,000                                | 3,000                    | 0.02       | 0.05       | 50,000                                | 2,550                    | 0.02       | 0.05       | 50,000                                | 1,910                    | 0.02       | 0.05       |
|                      | 2.5 | 50,000                                                                  | 3,350                    | 0.05       | 0.1        | 50,000                                | 3,100                    | 0.05       | 0.1        | 50,000                                | 2,500                    | 0.02       | 0.05       | 50,000                                | 2,130                    | 0.02       | 0.05       | 48,000                                | 1,600                    | 0.02       | 0.05       |
|                      | 3   | 50,000                                                                  | 3,000                    | 0.05       | 0.1        | 50,000                                | 2,400                    | 0.05       | 0.1        | 50,000                                | 1,900                    | 0.02       | 0.05       | 48,600                                | 1,620                    | 0.02       | 0.05       | 38,900                                | 1,220                    | 0.02       | 0.05       |
|                      | 4   | 48,000                                                                  | 2,850                    | 0.05       | 0.1        | 48,000                                | 2,200                    | 0.05       | 0.1        | 48,000                                | 1,700                    | 0.02       | 0.05       | 43,200                                | 1,450                    | 0.02       | 0.05       | 34,600                                | 1,090                    | 0.02       | 0.05       |
|                      | 5   | 43,200                                                                  | 2,100                    | 0.05       | 0.1        | 43,200                                | 1,600                    | 0.05       | 0.1        | 43,200                                | 1,200                    | 0.02       | 0.05       | 38,900                                | 1,020                    | 0.02       | 0.05       | 31,200                                | 770                      | 0.02       | 0.05       |
|                      | 6   | 36,000                                                                  | 1,900                    | 0.05       | 0.1        | 36,000                                | 1,500                    | 0.05       | 0.1        | 36,000                                | 1,200                    | 0.02       | 0.05       | 32,400                                | 1,020                    | 0.02       | 0.05       | 26,000                                | 770                      | 0.02       | 0.05       |
|                      | 7   | 32,400                                                                  | 1,600                    | 0.05       | 0.1        | 32,400                                | 1,300                    | 0.05       | 0.1        | 32,400                                | 1,000                    | 0.02       | 0.05       | 29,200                                | 850                      | 0.02       | 0.05       | 23,400                                | 640                      | 0.02       | 0.05       |
|                      | 8   | 31,200                                                                  | 1,500                    | 0.05       | 0.1        | 31,200                                | 1,200                    | 0.05       | 0.1        | 31,200                                | 960                      | 0.02       | 0.05       | 28,100                                | 820                      | 0.02       | 0.05       | 22,500                                | 620                      | 0.02       | 0.05       |
|                      | 9   | 28,800                                                                  | 1,100                    | 0.03       | 0.05       | 28,800                                | 880                      | 0.03       | 0.05       | 28,800                                | 700                      | 0.02       | 0.05       | 26,000                                | 600                      | 0.02       | 0.05       | 20,800                                | 450                      | 0.02       | 0.05       |
|                      | 10  | 26,400                                                                  | 1,000                    | 0.01       | 0.02       | 25,200                                | 760                      | 0.01       | 0.02       | 21,600                                | 520                      | 0.01       | 0.02       | 19,500                                | 440                      | 0.01       | 0.02       | 15,600                                | 330                      | 0.01       | 0.02       |
|                      | 12  | 24,000                                                                  | 760                      | 0.01       | 0.01       | 22,800                                | 570                      | 0.01       | 0.01       | 20,400                                | 400                      | 0.01       | 0.01       | 18,400                                | 340                      | 0.01       | 0.01       | 14,700                                | 260                      | 0.01       | 0.01       |
|                      | 13  | 22,800                                                                  | 670                      | 0.005      | 0.01       | 21,600                                | 500                      | 0.005      | 0.01       | 19,200                                | 350                      | 0.005      | 0.01       | 17,300                                | 300                      | 0.005      | 0.01       | 13,900                                | 230                      | 0.005      | 0.01       |
|                      | 14  | 21,600                                                                  | 570                      | 0.005      | 0.01       | 20,400                                | 430                      | 0.005      | 0.01       | 18,000                                | 300                      | 0.005      | 0.01       | 16,200                                | 260                      | 0.005      | 0.01       | 13,000                                | 200                      | 0.005      | 0.01       |
|                      | 16  | 19,200                                                                  | 400                      | 0.005      | 0.01       | 18,000                                | 300                      | 0.005      | 0.01       | 15,600                                | 200                      | 0.005      | 0.01       | 14,100                                | 170                      | 0.005      | 0.01       | 11,300                                | 130                      | 0.005      | 0.01       |
|                      | 18  | 16,800                                                                  | 300                      | 0.005      | 0.005      | 15,600                                | 220                      | 0.005      | 0.005      | 14,400                                | 160                      | 0.004      | 0.005      | 13,000                                | 140                      | 0.004      | 0.005      | 10,400                                | 110                      | 0.004      | 0.005      |
|                      | 20  | 15,600                                                                  | 285                      | 0.005      | 0.005      | 14,400                                | 180                      | 0.005      | 0.005      | 14,400                                | 140                      | 0.004      | 0.005      | 13,000                                | 120                      | 0.004      | 0.005      | 10,400                                | 90                       | 0.004      | 0.005      |
|                      | 22  | 14,400                                                                  | 190                      | 0.005      | 0.005      | 14,400                                | 110                      | 0.005      | 0.005      | 14,400                                | 100                      | 0.004      | 0.005      | 13,000                                | 90                       | 0.004      | 0.005      | 10,400                                | 70                       | 0.004      | 0.005      |

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of  $\phi$  0.5 (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

多刃スクエアタイプ・ラジアスタップ Multi-flute square type and radius type

ボールタイプ Ball Type

ロングネックタイプ Long Neck Type

ヘッド交換式 Exchangable Head

AE-MSS-H

AE-MS-H

AE-ML-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-LNBD-H

PXSH

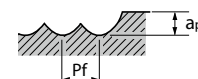
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# AE-LNBD-H 切削条件基準表 Cutting Condition

FROM

加工パスは等高線加工を前提としています。 The machining path is on condition of contouring line operation

| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel・Hardened Steel<br>Prehardened Steel |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|-----------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   | SKD11・SKD61・NAK80<br>(~45HRC)                                         |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
| RE                   | 首下長<br>LU<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R0.6                 | 2                 | 50,000                                                                | 3,800                    | 0.06       | 0.12       | 50,000                                | 3,800                    | 0.06       | 0.12       | 50,000                                | 3,200                    | 0.02       | 0.05       | 50,000                                | 2,720                    | 0.02       | 0.05       | 50,000                                | 2,040                    | 0.02       | 0.05       |
|                      | 2.4               | 50,000                                                                | 3,600                    | 0.06       | 0.12       | 50,000                                | 3,600                    | 0.06       | 0.12       | 50,000                                | 3,000                    | 0.02       | 0.05       | 50,000                                | 2,550                    | 0.02       | 0.05       | 50,000                                | 1,910                    | 0.02       | 0.05       |
|                      | 2.5               | 50,000                                                                | 3,600                    | 0.06       | 0.12       | 50,000                                | 3,600                    | 0.06       | 0.12       | 50,000                                | 3,000                    | 0.02       | 0.05       | 50,000                                | 2,550                    | 0.02       | 0.05       | 48,000                                | 1,910                    | 0.02       | 0.05       |
|                      | 3                 | 50,000                                                                | 3,200                    | 0.06       | 0.12       | 50,000                                | 3,200                    | 0.06       | 0.12       | 50,000                                | 2,600                    | 0.02       | 0.05       | 46,500                                | 2,210                    | 0.02       | 0.05       | 37,200                                | 1,660                    | 0.02       | 0.05       |
|                      | 4                 | 48,000                                                                | 2,850                    | 0.06       | 0.12       | 48,000                                | 2,300                    | 0.06       | 0.12       | 45,600                                | 1,750                    | 0.02       | 0.05       | 41,100                                | 1,490                    | 0.02       | 0.05       | 32,900                                | 1,120                    | 0.02       | 0.05       |
|                      | 6                 | 38,400                                                                | 2,000                    | 0.06       | 0.12       | 38,400                                | 1,600                    | 0.06       | 0.12       | 36,000                                | 1,200                    | 0.02       | 0.05       | 32,400                                | 1,020                    | 0.02       | 0.05       | 26,000                                | 770                      | 0.02       | 0.05       |
|                      | 8                 | 30,000                                                                | 1,600                    | 0.06       | 0.12       | 30,000                                | 1,200                    | 0.06       | 0.12       | 30,000                                | 960                      | 0.02       | 0.05       | 27,000                                | 820                      | 0.02       | 0.05       | 21,600                                | 620                      | 0.02       | 0.05       |
|                      | 10                | 24,000                                                                | 1,100                    | 0.05       | 0.1        | 21,600                                | 800                      | 0.05       | 0.1        | 19,200                                | 560                      | 0.02       | 0.05       | 17,300                                | 480                      | 0.02       | 0.05       | 13,900                                | 360                      | 0.02       | 0.05       |
|                      | 12                | 20,400                                                                | 850                      | 0.03       | 0.05       | 19,200                                | 640                      | 0.03       | 0.05       | 16,800                                | 440                      | 0.02       | 0.05       | 15,200                                | 370                      | 0.02       | 0.05       | 12,100                                | 280                      | 0.02       | 0.05       |
|                      | 14                | 19,200                                                                | 610                      | 0.03       | 0.05       | 18,000                                | 450                      | 0.03       | 0.05       | 15,600                                | 310                      | 0.02       | 0.05       | 14,100                                | 260                      | 0.02       | 0.05       | 11,300                                | 200                      | 0.02       | 0.05       |
|                      | 16                | 18,000                                                                | 420                      | 0.02       | 0.05       | 16,800                                | 300                      | 0.02       | 0.05       | 14,400                                | 200                      | 0.02       | 0.05       | 13,000                                | 170                      | 0.02       | 0.05       | 10,400                                | 130                      | 0.02       | 0.05       |
|                      | 18                | 18,000                                                                | 330                      | 0.005      | 0.005      | 16,800                                | 200                      | 0.005      | 0.005      | 14,400                                | 130                      | 0.004      | 0.005      | 13,000                                | 110                      | 0.004      | 0.005      | 10,400                                | 80                       | 0.004      | 0.005      |
|                      | 20                | 15,600                                                                | 300                      | 0.005      | 0.005      | 14,400                                | 180                      | 0.005      | 0.005      | 12,000                                | 120                      | 0.004      | 0.005      | 10,800                                | 100                      | 0.004      | 0.005      | 8,700                                 | 80                       | 0.004      | 0.005      |
| R0.75                | 2                 | 50,000                                                                | 5,200                    | 0.075      | 0.15       | 50,000                                | 5,200                    | 0.075      | 0.15       | 50,000                                | 4,200                    | 0.03       | 0.06       | 50,000                                | 3,570                    | 0.03       | 0.06       | 50,000                                | 2,680                    | 0.03       | 0.06       |
|                      | 2.5               | 50,000                                                                | 5,000                    | 0.075      | 0.15       | 50,000                                | 5,000                    | 0.075      | 0.15       | 50,000                                | 4,000                    | 0.03       | 0.06       | 50,000                                | 3,400                    | 0.03       | 0.06       | 50,000                                | 2,550                    | 0.03       | 0.06       |
|                      | 3                 | 50,000                                                                | 4,800                    | 0.075      | 0.15       | 50,000                                | 4,800                    | 0.075      | 0.15       | 50,000                                | 3,900                    | 0.03       | 0.06       | 50,000                                | 3,320                    | 0.03       | 0.06       | 48,000                                | 2,490                    | 0.03       | 0.06       |
|                      | 4                 | 48,000                                                                | 3,700                    | 0.075      | 0.15       | 48,000                                | 2,900                    | 0.075      | 0.15       | 45,600                                | 2,200                    | 0.03       | 0.06       | 41,100                                | 1,870                    | 0.03       | 0.06       | 32,900                                | 1,400                    | 0.03       | 0.06       |
|                      | 5                 | 42,000                                                                | 3,200                    | 0.075      | 0.15       | 42,000                                | 2,600                    | 0.075      | 0.15       | 39,600                                | 1,900                    | 0.03       | 0.06       | 35,700                                | 1,620                    | 0.03       | 0.06       | 28,600                                | 1,220                    | 0.03       | 0.06       |
|                      | 6                 | 36,000                                                                | 2,700                    | 0.075      | 0.15       | 36,000                                | 2,200                    | 0.075      | 0.15       | 32,400                                | 1,500                    | 0.03       | 0.06       | 29,200                                | 1,280                    | 0.03       | 0.06       | 23,400                                | 960                      | 0.03       | 0.06       |
|                      | 8                 | 28,800                                                                | 2,100                    | 0.075      | 0.15       | 28,800                                | 1,700                    | 0.075      | 0.15       | 25,200                                | 1,100                    | 0.03       | 0.06       | 22,700                                | 940                      | 0.03       | 0.06       | 18,200                                | 710                      | 0.03       | 0.06       |
|                      | 10                | 28,800                                                                | 1,900                    | 0.075      | 0.15       | 28,800                                | 1,500                    | 0.075      | 0.15       | 25,200                                | 1,000                    | 0.03       | 0.06       | 22,700                                | 850                      | 0.03       | 0.06       | 18,200                                | 640                      | 0.03       | 0.06       |
|                      | 12                | 25,200                                                                | 1,300                    | 0.075      | 0.1        | 25,200                                | 1,000                    | 0.075      | 0.1        | 21,600                                | 680                      | 0.03       | 0.06       | 19,500                                | 580                      | 0.03       | 0.06       | 15,600                                | 440                      | 0.03       | 0.06       |
|                      | 14                | 20,400                                                                | 1,100                    | 0.05       | 0.1        | 20,400                                | 900                      | 0.05       | 0.1        | 18,000                                | 630                      | 0.03       | 0.06       | 16,200                                | 540                      | 0.03       | 0.06       | 13,000                                | 410                      | 0.03       | 0.06       |
|                      | 16                | 16,800                                                                | 760                      | 0.05       | 0.1        | 15,600                                | 560                      | 0.05       | 0.1        | 12,000                                | 340                      | 0.03       | 0.05       | 10,800                                | 290                      | 0.03       | 0.05       | 8,700                                 | 220                      | 0.03       | 0.05       |
|                      | 18                | 15,600                                                                | 470                      | 0.03       | 0.05       | 14,400                                | 350                      | 0.03       | 0.05       | 12,000                                | 230                      | 0.03       | 0.05       | 10,800                                | 200                      | 0.03       | 0.05       | 8,700                                 | 150                      | 0.03       | 0.05       |
|                      | 20                | 14,400                                                                | 340                      | 0.02       | 0.05       | 13,200                                | 240                      | 0.02       | 0.05       | 10,800                                | 150                      | 0.02       | 0.05       | 9,800                                 | 130                      | 0.02       | 0.05       | 7,800                                 | 100                      | 0.02       | 0.05       |
|                      | 22                | 14,400                                                                | 300                      | 0.02       | 0.05       | 13,200                                | 220                      | 0.02       | 0.05       | 10,800                                | 140                      | 0.02       | 0.05       | 9,800                                 | 120                      | 0.02       | 0.05       | 7,800                                 | 90                       | 0.02       | 0.05       |
|                      | 25                | 13,800                                                                | 250                      | 0.02       | 0.05       | 12,600                                | 180                      | 0.02       | 0.05       | 10,800                                | 120                      | 0.02       | 0.05       | 9,800                                 | 100                      | 0.02       | 0.05       | 7,800                                 | 80                       | 0.02       | 0.05       |
|                      | 30                | 13,200                                                                | 190                      | 0.005      | 0.01       | 12,000                                | 120                      | 0.005      | 0.01       | 10,800                                | 90                       | 0.005      | 0.01       | 9,800                                 | 80                       | 0.005      | 0.01       | 7,800                                 | 60                       | 0.01       | 0.01       |



- 機械、ホルダは剛性のある精度の高いものをご使用下さい。
- 炭素鋼や焼入れ鋼の切削では、MQL (オイルミストクーラント) またはエアブローを推奨いたします。
- 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。
- 上表は等高線加工における負荷の少ない安定した状況を基準としたものです。値は目安ですので実際の加工における切削条件は上表を参考に状況に応じて設定下さい。
- 加工精度、加工形状、加工パスによって条件の調整を行って下さい。
- φ0.5 (R0.25) 未満あるいはL/D (アスペクト比) が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
- 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。

NEXT



FROM

| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel · Hardened Steel<br>Prehardened Steel<br>SKD11・SKD61・NAK80<br>(~45HRC) |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|----------------------------------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   |                                                                                                          |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
|                      |                   |                                                                                                          |                          |            |            | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| RE                   | 首下長<br>LU<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                                                    | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R0.8                 | 4                 | 36,000                                                                                                   | 3,500                    | 0.08       | 0.16       | 34,800                                | 2,700                    | 0.08       | 0.16       | 31,200                                | 2,000                    | 0.03       | 0.08       | 28,100                                | 1,700                    | 0.03       | 0.08       | 22,500                                | 1,280                    | 0.03       | 0.08       |
|                      | 8                 | 28,800                                                                                                   | 2,800                    | 0.08       | 0.16       | 27,600                                | 2,100                    | 0.08       | 0.16       | 24,000                                | 1,400                    | 0.03       | 0.08       | 21,600                                | 1,190                    | 0.03       | 0.08       | 17,300                                | 890                      | 0.03       | 0.08       |
|                      | 12                | 25,200                                                                                                   | 1,700                    | 0.05       | 0.1        | 24,000                                | 1,380                    | 0.05       | 0.1        | 21,600                                | 990                      | 0.03       | 0.08       | 19,500                                | 840                      | 0.03       | 0.08       | 15,600                                | 630                      | 0.03       | 0.08       |
|                      | 16                | 16,800                                                                                                   | 760                      | 0.05       | 0.1        | 15,600                                | 600                      | 0.05       | 0.1        | 13,200                                | 400                      | 0.03       | 0.08       | 11,900                                | 340                      | 0.03       | 0.08       | 9,600                                 | 260                      | 0.03       | 0.08       |
|                      | 20                | 14,400                                                                                                   | 360                      | 0.03       | 0.05       | 13,200                                | 280                      | 0.03       | 0.05       | 12,000                                | 200                      | 0.03       | 0.05       | 10,800                                | 170                      | 0.03       | 0.05       | 8,700                                 | 130                      | 0.03       | 0.05       |
| R1                   | 2.5               | 50,000                                                                                                   | 6,400                    | 0.1        | 0.2        | 50,000                                | 6,000                    | 0.1        | 0.2        | 50,000                                | 4,400                    | 0.05       | 0.1        | 50,000                                | 3,740                    | 0.05       | 0.1        | 43,200                                | 2,810                    | 0.05       | 0.1        |
|                      | 3                 | 50,000                                                                                                   | 6,000                    | 0.1        | 0.2        | 50,000                                | 5,700                    | 0.1        | 0.2        | 50,000                                | 4,000                    | 0.05       | 0.1        | 48,600                                | 3,400                    | 0.05       | 0.1        | 38,900                                | 2,550                    | 0.05       | 0.1        |
|                      | 4                 | 50,000                                                                                                   | 5,600                    | 0.1        | 0.2        | 50,000                                | 5,300                    | 0.1        | 0.2        | 48,000                                | 3,600                    | 0.05       | 0.1        | 43,200                                | 3,060                    | 0.05       | 0.1        | 34,600                                | 2,300                    | 0.05       | 0.1        |
|                      | 5                 | 48,000                                                                                                   | 4,500                    | 0.1        | 0.2        | 46,800                                | 4,300                    | 0.1        | 0.2        | 40,800                                | 2,700                    | 0.05       | 0.1        | 36,800                                | 2,300                    | 0.05       | 0.1        | 29,400                                | 1,730                    | 0.05       | 0.1        |
|                      | 6                 | 43,200                                                                                                   | 2,800                    | 0.1        | 0.2        | 42,000                                | 2,700                    | 0.1        | 0.2        | 36,000                                | 1,800                    | 0.05       | 0.1        | 32,400                                | 1,530                    | 0.05       | 0.1        | 26,000                                | 1,150                    | 0.05       | 0.1        |
|                      | 8                 | 30,000                                                                                                   | 2,400                    | 0.1        | 0.2        | 28,800                                | 2,300                    | 0.1        | 0.2        | 24,000                                | 1,500                    | 0.05       | 0.1        | 21,600                                | 1,280                    | 0.05       | 0.1        | 17,300                                | 960                      | 0.05       | 0.1        |
|                      | 10                | 24,000                                                                                                   | 2,200                    | 0.1        | 0.2        | 22,800                                | 2,000                    | 0.1        | 0.2        | 20,400                                | 1,400                    | 0.05       | 0.1        | 18,400                                | 1,190                    | 0.05       | 0.1        | 14,700                                | 890                      | 0.05       | 0.1        |
|                      | 12                | 19,200                                                                                                   | 1,900                    | 0.1        | 0.2        | 18,000                                | 1,700                    | 0.1        | 0.2        | 15,600                                | 1,100                    | 0.05       | 0.1        | 14,100                                | 940                      | 0.05       | 0.1        | 11,300                                | 710                      | 0.05       | 0.1        |
|                      | 13                | 19,200                                                                                                   | 1,800                    | 0.1        | 0.2        | 18,000                                | 1,600                    | 0.1        | 0.2        | 15,600                                | 1,050                    | 0.05       | 0.1        | 14,100                                | 890                      | 0.05       | 0.1        | 11,300                                | 670                      | 0.05       | 0.1        |
|                      | 14                | 18,000                                                                                                   | 1,700                    | 0.1        | 0.2        | 16,800                                | 1,500                    | 0.1        | 0.2        | 14,400                                | 1,000                    | 0.05       | 0.1        | 13,000                                | 850                      | 0.05       | 0.1        | 10,400                                | 640                      | 0.05       | 0.1        |
|                      | 16                | 16,800                                                                                                   | 1,600                    | 0.1        | 0.1        | 15,600                                | 1,400                    | 0.1        | 0.1        | 13,200                                | 950                      | 0.05       | 0.1        | 11,900                                | 810                      | 0.05       | 0.1        | 9,600                                 | 610                      | 0.05       | 0.1        |
|                      | 18                | 15,600                                                                                                   | 1,500                    | 0.1        | 0.1        | 14,400                                | 1,200                    | 0.1        | 0.1        | 12,000                                | 800                      | 0.05       | 0.1        | 10,800                                | 680                      | 0.05       | 0.1        | 8,700                                 | 510                      | 0.05       | 0.1        |
|                      | 20                | 13,200                                                                                                   | 1,100                    | 0.05       | 0.1        | 12,000                                | 890                      | 0.05       | 0.1        | 10,800                                | 640                      | 0.05       | 0.1        | 9,800                                 | 540                      | 0.05       | 0.1        | 7,800                                 | 410                      | 0.05       | 0.1        |
|                      | 22                | 10,800                                                                                                   | 950                      | 0.05       | 0.1        | 10,800                                | 860                      | 0.05       | 0.1        | 9,000                                 | 570                      | 0.05       | 0.1        | 8,100                                 | 480                      | 0.05       | 0.1        | 6,500                                 | 360                      | 0.05       | 0.1        |
|                      | 25                | 10,800                                                                                                   | 760                      | 0.03       | 0.05       | 10,800                                | 680                      | 0.03       | 0.05       | 9,000                                 | 450                      | 0.03       | 0.05       | 8,100                                 | 380                      | 0.03       | 0.05       | 6,500                                 | 290                      | 0.03       | 0.05       |
|                      | 30                | 10,800                                                                                                   | 470                      | 0.02       | 0.05       | 10,800                                | 360                      | 0.02       | 0.05       | 9,000                                 | 240                      | 0.02       | 0.05       | 8,100                                 | 200                      | 0.02       | 0.05       | 6,500                                 | 150                      | 0.02       | 0.05       |
|                      | 35                | 9,000                                                                                                    | 230                      | 0.02       | 0.03       | 8,400                                 | 130                      | 0.02       | 0.03       | 7,200                                 | 100                      | 0.02       | 0.03       | 6,500                                 | 90                       | 0.02       | 0.03       | 5,200                                 | 70                       | 0.02       | 0.03       |
|                      | 40                | 7,200                                                                                                    | 140                      | 0.02       | 0.03       | 7,200                                 | 100                      | 0.02       | 0.03       | 7,200                                 | 90                       | 0.02       | 0.03       | 6,500                                 | 80                       | 0.02       | 0.03       | 5,200                                 | 60                       | 0.02       | 0.03       |
| R1.25                | 6                 | 28,800                                                                                                   | 3,600                    | 0.1        | 0.2        | 27,600                                | 3,400                    | 0.1        | 0.2        | 24,000                                | 2,400                    | 0.05       | 0.1        | 21,600                                | 2,040                    | 0.05       | 0.1        | 17,300                                | 1,530                    | 0.05       | 0.1        |
|                      | 8                 | 26,400                                                                                                   | 3,350                    | 0.1        | 0.2        | 25,200                                | 3,150                    | 0.1        | 0.2        | 21,600                                | 2,150                    | 0.05       | 0.1        | 19,500                                | 1,830                    | 0.05       | 0.1        | 15,600                                | 1,370                    | 0.05       | 0.1        |
|                      | 10                | 24,000                                                                                                   | 3,100                    | 0.1        | 0.2        | 22,800                                | 2,900                    | 0.1        | 0.2        | 19,200                                | 1,900                    | 0.05       | 0.1        | 17,300                                | 1,620                    | 0.05       | 0.1        | 13,900                                | 1,220                    | 0.05       | 0.1        |
|                      | 15                | 20,400                                                                                                   | 2,600                    | 0.1        | 0.2        | 19,200                                | 2,400                    | 0.1        | 0.2        | 16,800                                | 1,600                    | 0.05       | 0.1        | 15,200                                | 1,360                    | 0.05       | 0.1        | 12,100                                | 1,020                    | 0.05       | 0.1        |
|                      | 20                | 18,000                                                                                                   | 1,700                    | 0.1        | 0.2        | 16,800                                | 1,600                    | 0.1        | 0.2        | 14,400                                | 1,000                    | 0.05       | 0.1        | 13,000                                | 850                      | 0.05       | 0.1        | 10,400                                | 640                      | 0.05       | 0.1        |
|                      | 25                | 13,200                                                                                                   | 950                      | 0.03       | 0.05       | 12,000                                | 830                      | 0.03       | 0.05       | 10,800                                | 590                      | 0.03       | 0.05       | 9,800                                 | 500                      | 0.03       | 0.05       | 7,800                                 | 380                      | 0.03       | 0.05       |
|                      | 30                | 10,800                                                                                                   | 760                      | 0.03       | 0.05       | 9,600                                 | 650                      | 0.03       | 0.05       | 8,400                                 | 450                      | 0.03       | 0.05       | 7,600                                 | 380                      | 0.03       | 0.05       | 6,100                                 | 290                      | 0.03       | 0.05       |
|                      | 35                | 9,000                                                                                                    | 470                      | 0.02       | 0.03       | 8,400                                 | 430                      | 0.02       | 0.03       | 7,200                                 | 290                      | 0.02       | 0.03       | 6,500                                 | 250                      | 0.02       | 0.03       | 5,200                                 | 190                      | 0.02       | 0.03       |

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of  $\phi$  0.5 (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

多刃スクエアタイプ・ラジアスタイプ Multi-flute square type and radius type

ボールタイプ Ball Type

ロングネックタイプ Long Neck Type

ヘッド交換式 Exchangable Head

AE-MSS-H

AE-MS-H

AE-ML-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-LNBD-H

PXSH

60

# AE-LNBD-H 切削条件基準表 Cutting Condition

FROM

加工パスは等高線加工を前提としています。 The machining path is on condition of contouring line operation

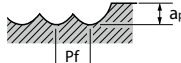
| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel・Hardened Steel<br>Prehardened Steel |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|-----------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   | SKD11・SKD61・NAK80<br>(~45HRC)                                         |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
|                      |                   | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                 | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R1.5                 | 首下長<br>LU<br>(mm) |                                                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|                      | 6                 | 49,800                                                                | 6,200                    | 0.15       | 0.3        | 38,400                                | 4,800                    | 0.15       | 0.3        | 31,800                                | 3,300                    | 0.06       | 0.15       | 28,700                                | 2,810                    | 0.06       | 0.15       | 22,900                                | 2,110                    | 0.06       | 0.15       |
|                      | 8                 | 36,000                                                                | 4,200                    | 0.15       | 0.3        | 30,000                                | 3,500                    | 0.15       | 0.3        | 26,400                                | 2,400                    | 0.06       | 0.15       | 23,800                                | 2,040                    | 0.06       | 0.15       | 19,100                                | 1,530                    | 0.06       | 0.15       |
|                      | 10                | 30,000                                                                | 3,600                    | 0.15       | 0.3        | 24,000                                | 2,800                    | 0.15       | 0.3        | 21,600                                | 2,000                    | 0.06       | 0.15       | 19,500                                | 1,700                    | 0.06       | 0.15       | 15,600                                | 1,280                    | 0.06       | 0.15       |
|                      | 12                | 24,000                                                                | 2,800                    | 0.15       | 0.3        | 21,600                                | 2,500                    | 0.15       | 0.3        | 19,200                                | 1,700                    | 0.06       | 0.15       | 17,300                                | 1,450                    | 0.06       | 0.15       | 13,900                                | 1,090                    | 0.06       | 0.15       |
|                      | 13                | 22,800                                                                | 2,650                    | 0.15       | 0.3        | 19,800                                | 2,250                    | 0.15       | 0.3        | 17,400                                | 1,500                    | 0.06       | 0.15       | 15,700                                | 1,280                    | 0.06       | 0.15       | 12,600                                | 960                      | 0.06       | 0.15       |
|                      | 14                | 21,600                                                                | 2,500                    | 0.15       | 0.3        | 18,000                                | 2,000                    | 0.15       | 0.3        | 15,600                                | 1,300                    | 0.06       | 0.15       | 14,100                                | 1,110                    | 0.06       | 0.15       | 11,300                                | 830                      | 0.06       | 0.15       |
|                      | 15                | 19,200                                                                | 2,200                    | 0.1        | 0.3        | 15,600                                | 1,800                    | 0.1        | 0.3        | 13,200                                | 1,200                    | 0.06       | 0.15       | 11,900                                | 1,020                    | 0.06       | 0.15       | 9,600                                 | 770                      | 0.06       | 0.15       |
|                      | 16                | 19,200                                                                | 1,900                    | 0.1        | 0.2        | 15,600                                | 1,500                    | 0.1        | 0.2        | 13,200                                | 1,100                    | 0.06       | 0.15       | 11,900                                | 940                      | 0.06       | 0.15       | 9,600                                 | 710                      | 0.06       | 0.15       |
|                      | 20                | 16,800                                                                | 1,700                    | 0.1        | 0.2        | 13,200                                | 1,600                    | 0.1        | 0.2        | 12,000                                | 1,000                    | 0.06       | 0.15       | 10,800                                | 850                      | 0.06       | 0.15       | 8,700                                 | 640                      | 0.06       | 0.15       |
|                      | 25                | 14,400                                                                | 1,100                    | 0.05       | 0.1        | 10,800                                | 820                      | 0.05       | 0.1        | 9,600                                 | 580                      | 0.05       | 0.1        | 8,700                                 | 490                      | 0.05       | 0.1        | 7,000                                 | 370                      | 0.05       | 0.1        |
|                      | 30                | 10,800                                                                | 760                      | 0.03       | 0.05       | 8,400                                 | 590                      | 0.03       | 0.05       | 7,200                                 | 400                      | 0.03       | 0.05       | 6,500                                 | 340                      | 0.03       | 0.05       | 5,200                                 | 260                      | 0.03       | 0.05       |
|                      | 35                | 9,000                                                                 | 570                      | 0.02       | 0.05       | 7,200                                 | 460                      | 0.02       | 0.05       | 6,000                                 | 300                      | 0.02       | 0.05       | 5,400                                 | 260                      | 0.02       | 0.05       | 4,400                                 | 200                      | 0.02       | 0.05       |
|                      | 40                | 7,800                                                                 | 470                      | 0.02       | 0.03       | 6,000                                 | 360                      | 0.02       | 0.03       | 4,800                                 | 230                      | 0.02       | 0.03       | 4,400                                 | 200                      | 0.02       | 0.03       | 3,500                                 | 150                      | 0.02       | 0.03       |
| R1.75                | 10                | 24,000                                                                | 3,100                    | 0.1        | 0.3        | 19,200                                | 2,200                    | 0.1        | 0.3        | 16,800                                | 1,500                    | 0.07       | 0.15       | 15,200                                | 1,280                    | 0.07       | 0.15       | 12,100                                | 960                      | 0.07       | 0.15       |
|                      | 15                | 21,600                                                                | 2,800                    | 0.1        | 0.3        | 16,800                                | 2,000                    | 0.1        | 0.3        | 14,400                                | 1,300                    | 0.07       | 0.15       | 13,000                                | 1,110                    | 0.07       | 0.15       | 10,400                                | 830                      | 0.07       | 0.15       |
|                      | 16                | 20,400                                                                | 2,700                    | 0.1        | 0.3        | 15,600                                | 1,900                    | 0.1        | 0.2        | 13,200                                | 1,250                    | 0.07       | 0.15       | 11,900                                | 1,060                    | 0.07       | 0.15       | 9,600                                 | 800                      | 0.07       | 0.15       |
|                      | 20                | 19,200                                                                | 2,500                    | 0.1        | 0.2        | 14,400                                | 1,800                    | 0.1        | 0.2        | 12,000                                | 1,200                    | 0.07       | 0.15       | 10,800                                | 1,020                    | 0.07       | 0.15       | 8,700                                 | 770                      | 0.07       | 0.15       |
|                      | 25                | 14,400                                                                | 1,900                    | 0.1        | 0.1        | 10,800                                | 1,300                    | 0.1        | 0.1        | 9,600                                 | 920                      | 0.07       | 0.15       | 8,700                                 | 780                      | 0.07       | 0.15       | 7,000                                 | 590                      | 0.07       | 0.15       |
|                      | 30                | 12,000                                                                | 1,500                    | 0.05       | 0.1        | 9,600                                 | 1,100                    | 0.05       | 0.1        | 8,400                                 | 770                      | 0.05       | 0.1        | 7,600                                 | 650                      | 0.05       | 0.1        | 6,100                                 | 490                      | 0.05       | 0.1        |
|                      | 35                | 10,800                                                                | 950                      | 0.05       | 0.05       | 8,400                                 | 700                      | 0.05       | 0.05       | 6,000                                 | 400                      | 0.05       | 0.05       | 5,400                                 | 340                      | 0.05       | 0.05       | 4,400                                 | 260                      | 0.05       | 0.05       |
|                      | 40                | 9,000                                                                 | 760                      | 0.05       | 0.05       | 7,200                                 | 580                      | 0.05       | 0.05       | 4,800                                 | 300                      | 0.05       | 0.05       | 4,400                                 | 260                      | 0.05       | 0.05       | 3,500                                 | 200                      | 0.05       | 0.05       |
| R2                   | 45                | 7,800                                                                 | 570                      | 0.03       | 0.03       | 6,000                                 | 420                      | 0.03       | 0.03       | 4,800                                 | 260                      | 0.03       | 0.03       | 4,400                                 | 220                      | 0.03       | 0.03       | 3,500                                 | 170                      | 0.03       | 0.03       |
|                      | 8                 | 37,200                                                                | 5,700                    | 0.2        | 0.5        | 28,800                                | 4,400                    | 0.2        | 0.5        | 24,000                                | 3,200                    | 0.08       | 0.2        | 21,600                                | 2,720                    | 0.08       | 0.2        | 17,300                                | 2,040                    | 0.08       | 0.2        |
|                      | 10                | 30,000                                                                | 4,200                    | 0.2        | 0.5        | 24,000                                | 3,300                    | 0.2        | 0.5        | 21,600                                | 2,300                    | 0.08       | 0.2        | 19,500                                | 1,960                    | 0.08       | 0.2        | 15,600                                | 1,470                    | 0.08       | 0.2        |
|                      | 12                | 24,000                                                                | 3,400                    | 0.2        | 0.5        | 20,400                                | 2,900                    | 0.2        | 0.5        | 16,800                                | 1,900                    | 0.08       | 0.2        | 15,200                                | 1,620                    | 0.08       | 0.2        | 12,100                                | 1,220                    | 0.08       | 0.2        |
|                      | 13                | 24,000                                                                | 3,400                    | 0.2        | 0.5        | 19,800                                | 2,800                    | 0.2        | 0.5        | 15,600                                | 1,750                    | 0.08       | 0.2        | 14,100                                | 1,490                    | 0.08       | 0.2        | 11,300                                | 1,120                    | 0.08       | 0.2        |
|                      | 14                | 24,000                                                                | 3,400                    | 0.2        | 0.5        | 19,800                                | 2,800                    | 0.2        | 0.5        | 15,600                                | 1,750                    | 0.08       | 0.2        | 14,100                                | 1,490                    | 0.08       | 0.2        | 11,300                                | 1,120                    | 0.08       | 0.2        |
|                      | 15                | 24,000                                                                | 3,400                    | 0.2        | 0.5        | 19,200                                | 2,700                    | 0.2        | 0.5        | 14,400                                | 1,600                    | 0.08       | 0.2        | 13,000                                | 1,360                    | 0.08       | 0.2        | 10,400                                | 1,020                    | 0.08       | 0.2        |
|                      | 16                | 21,600                                                                | 3,000                    | 0.2        | 0.5        | 18,000                                | 2,500                    | 0.2        | 0.5        | 12,000                                | 1,300                    | 0.08       | 0.2        | 10,800                                | 1,110                    | 0.08       | 0.2        | 8,700                                 | 830                      | 0.08       | 0.2        |
|                      | 20                | 19,200                                                                | 2,600                    | 0.2        | 0.4        | 16,800                                | 2,300                    | 0.2        | 0.4        | 9,600                                 | 1,000                    | 0.08       | 0.2        | 8,700                                 | 850                      | 0.08       | 0.2        | 7,000                                 | 640                      | 0.08       | 0.2        |
|                      | 25                | 19,200                                                                | 2,600                    | 0.1        | 0.3        | 15,600                                | 2,200                    | 0.1        | 0.3        | 7,200                                 | 810                      | 0.08       | 0.2        | 6,500                                 | 690                      | 0.08       | 0.2        | 5,200                                 | 520                      | 0.08       | 0.2        |
|                      | 30                | 16,800                                                                | 2,200                    | 0.1        | 0.2        | 14,400                                | 1,900                    | 0.1        | 0.2        | 6,000                                 | 630                      | 0.08       | 0.2        | 5,400                                 | 540                      | 0.08       | 0.2        | 4,400                                 | 410                      | 0.08       | 0.2        |
|                      | 35                | 14,400                                                                | 1,700                    | 0.1        | 0.2        | 10,800                                | 1,200                    | 0.1        | 0.2        | 4,800                                 | 420                      | 0.08       | 0.2        | 4,400                                 | 360                      | 0.08       | 0.2        | 3,500                                 | 270                      | 0.08       | 0.2        |
|                      | 40                | 10,800                                                                | 1,200                    | 0.05       | 0.1        | 9,600                                 | 1,000                    | 0.05       | 0.1        | 4,800                                 | 400                      | 0.05       | 0.1        | 4,400                                 | 340                      | 0.05       | 0.1        | 3,500                                 | 260                      | 0.05       | 0.1        |
|                      | 45                | 9,000                                                                 | 950                      | 0.05       | 0.05       | 8,400                                 | 890                      | 0.05       | 0.05       | 4,400                                 | 360                      | 0.05       | 0.05       | 3,900                                 | 310                      | 0.05       | 0.05       | 3,200                                 | 230                      | 0.05       | 0.05       |
|                      | 50                | 7,800                                                                 | 660                      | 0.02       | 0.05       | 7,200                                 | 600                      | 0.02       | 0.05       | 4,400                                 | 280                      | 0.02       | 0.05       | 3,900                                 | 240                      | 0.02       | 0.05       | 3,200                                 | 180                      | 0.02       | 0.05       |

使用上の注意はp.62をご参照下さい。 See p.62 for precaution for use.

NEXT



FROM

| 被削材<br>Work Material |                   | 工具鋼・調質鋼<br>・プリハードン鋼<br>Tool Steel · Hardened Steel<br>Prehardened Steel<br>SKD11・SKD61・NAK80<br>(~45HRC) |                          |            |            | 調質鋼<br>Hardened Steel                 |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
|----------------------|-------------------|----------------------------------------------------------------------------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|---------------------------------------|--------------------------|------------|------------|
|                      |                   |                                                                                                          |                          |            |            | ~ 55HRC                               |                          |            |            | ~ 62HRC                               |                          |            |            | ~ 66HRC                               |                          |            |            | ~ 70HRC                               |                          |            |            |
|                      |                   |                                                                                                          |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |
| RE                   | 首下長<br>LU<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> )                                                                    | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) | 回転速度<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>(mm/min) | ap<br>(mm) | Pf<br>(mm) |
| R2.5                 | 10                | 30,000                                                                                                   | 5,400                    | 0.25       | 0.5        | 22,800                                | 4,000                    | 0.25       | 0.5        | 19,200                                | 2,800                    | 0.1        | 0.25       | 17,300                                | 2,380                    | 0.1        | 0.25       | 13,900                                | 1,790                    | 0.1        | 0.25       |
|                      | 15                | 24,000                                                                                                   | 3,900                    | 0.25       | 0.5        | 20,400                                | 3,300                    | 0.25       | 0.5        | 15,600                                | 2,000                    | 0.1        | 0.25       | 14,100                                | 1,700                    | 0.1        | 0.25       | 11,300                                | 1,280                    | 0.1        | 0.25       |
|                      | 20                | 19,200                                                                                                   | 3,300                    | 0.25       | 0.5        | 15,600                                | 2,700                    | 0.25       | 0.5        | 9,600                                 | 1,300                    | 0.1        | 0.25       | 8,700                                 | 1,110                    | 0.1        | 0.25       | 7,000                                 | 830                      | 0.1        | 0.25       |
|                      | 25                | 18,000                                                                                                   | 3,000                    | 0.2        | 0.3        | 14,400                                | 2,400                    | 0.2        | 0.3        | 7,200                                 | 960                      | 0.1        | 0.25       | 6,500                                 | 820                      | 0.1        | 0.25       | 5,200                                 | 620                      | 0.1        | 0.25       |
|                      | 30                | 16,800                                                                                                   | 2,300                    | 0.1        | 0.3        | 13,200                                | 1,800                    | 0.1        | 0.3        | 4,800                                 | 520                      | 0.1        | 0.25       | 4,400                                 | 440                      | 0.1        | 0.25       | 3,500                                 | 330                      | 0.1        | 0.25       |
|                      | 35                | 14,400                                                                                                   | 1,500                    | 0.1        | 0.3        | 12,000                                | 1,100                    | 0.1        | 0.3        | 3,900                                 | 280                      | 0.1        | 0.25       | 3,500                                 | 240                      | 0.1        | 0.25       | 2,800                                 | 180                      | 0.1        | 0.25       |
|                      | 40                | 12,000                                                                                                   | 1,100                    | 0.1        | 0.2        | 10,800                                | 990                      | 0.1        | 0.2        | 3,600                                 | 260                      | 0.1        | 0.2        | 3,300                                 | 220                      | 0.1        | 0.2        | 2,600                                 | 170                      | 0.1        | 0.2        |
|                      | 45                | 10,800                                                                                                   | 850                      | 0.1        | 0.1        | 9,600                                 | 660                      | 0.1        | 0.1        | 3,600                                 | 200                      | 0.1        | 0.1        | 3,300                                 | 170                      | 0.1        | 0.1        | 2,600                                 | 130                      | 0.1        | 0.1        |
|                      | 50                | 9,000                                                                                                    | 760                      | 0.1        | 0.1        | 8,400                                 | 610                      | 0.1        | 0.1        | 3,400                                 | 190                      | 0.1        | 0.1        | 3,100                                 | 160                      | 0.1        | 0.1        | 2,500                                 | 120                      | 0.1        | 0.1        |
| R3                   | 10                | 26,400                                                                                                   | 5,600                    | 0.3        | 0.5        | 21,600                                | 3,800                    | 0.3        | 0.5        | 18,600                                | 2,800                    | 0.1        | 0.2        | 16,800                                | 2,380                    | 0.1        | 0.2        | 13,400                                | 1,790                    | 0.1        | 0.2        |
|                      | 12                | 24,000                                                                                                   | 5,200                    | 0.3        | 0.5        | 19,200                                | 3,400                    | 0.3        | 0.5        | 16,200                                | 2,500                    | 0.1        | 0.2        | 14,600                                | 2,130                    | 0.1        | 0.2        | 11,700                                | 1,600                    | 0.1        | 0.2        |
|                      | 15                | 22,200                                                                                                   | 4,800                    | 0.3        | 0.5        | 17,400                                | 3,250                    | 0.3        | 0.5        | 14,400                                | 1,850                    | 0.1        | 0.2        | 13,000                                | 1,570                    | 0.1        | 0.2        | 10,400                                | 1,180                    | 0.1        | 0.2        |
|                      | 20                | 19,200                                                                                                   | 3,900                    | 0.3        | 0.5        | 14,400                                | 3,000                    | 0.3        | 0.5        | 9,600                                 | 1,600                    | 0.1        | 0.2        | 8,700                                 | 1,360                    | 0.1        | 0.2        | 7,000                                 | 1,020                    | 0.1        | 0.2        |
|                      | 25                | 14,400                                                                                                   | 3,000                    | 0.3        | 0.5        | 12,000                                | 2,500                    | 0.3        | 0.5        | 7,200                                 | 1,200                    | 0.1        | 0.2        | 6,500                                 | 1,020                    | 0.1        | 0.2        | 5,200                                 | 770                      | 0.1        | 0.2        |
|                      | 30                | 12,000                                                                                                   | 2,400                    | 0.3        | 0.5        | 10,800                                | 2,100                    | 0.3        | 0.5        | 4,800                                 | 740                      | 0.1        | 0.2        | 4,400                                 | 630                      | 0.1        | 0.2        | 3,500                                 | 470                      | 0.1        | 0.2        |
|                      | 35                | 10,800                                                                                                   | 2,100                    | 0.2        | 0.4        | 10,800                                | 2,000                    | 0.2        | 0.4        | 4,200                                 | 620                      | 0.1        | 0.2        | 3,800                                 | 530                      | 0.1        | 0.2        | 3,100                                 | 400                      | 0.1        | 0.2        |
|                      | 40                | 10,800                                                                                                   | 1,900                    | 0.2        | 0.3        | 10,800                                | 1,800                    | 0.2        | 0.3        | 3,600                                 | 480                      | 0.1        | 0.2        | 3,300                                 | 410                      | 0.1        | 0.2        | 2,600                                 | 310                      | 0.1        | 0.2        |
|                      | 45                | 9,600                                                                                                    | 1,700                    | 0.2        | 0.3        | 9,600                                 | 1,600                    | 0.2        | 0.3        | 3,400                                 | 440                      | 0.1        | 0.2        | 3,100                                 | 370                      | 0.1        | 0.2        | 2,500                                 | 280                      | 0.1        | 0.2        |
|                      | 50                | 8,400                                                                                                    | 1,500                    | 0.2        | 0.3        | 8,400                                 | 1,400                    | 0.2        | 0.3        | 3,000                                 | 400                      | 0.1        | 0.2        | 2,700                                 | 340                      | 0.1        | 0.2        | 2,200                                 | 260                      | 0.1        | 0.2        |
|                      | 60                | 7,200                                                                                                    | 1,250                    | 0.2        | 0.3        | 7,200                                 | 1,150                    | 0.2        | 0.3        | 2,800                                 | 350                      | 0.1        | 0.2        | 2,500                                 | 300                      | 0.1        | 0.2        | 2,000                                 | 230                      | 0.1        | 0.2        |
| 切込深さ<br>Depth of Cut |                   |                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |                                       |                          |            |            |

- 機械、ホルダは剛性のある精度の高いものをご使用下さい。
- 炭素鋼や焼入れ鋼の切削では、MQL (オイルミストクーラント) またはエアブローを推奨いたします。
- 切削油剤は被削材に応じてエアブローまたは発煙性の少ない切削油剤をご使用下さい。
- 上表は等高線加工における負荷の少ない安定した状況を基準としたものです。値は目安ですので実際の加工における切削条件は上表を参考に状況に応じて設定下さい。
- 加工精度、加工形状、加工パスによって条件の調整を行って下さい。
- φ0.5 (R0.25) 未満あるいはL/D (アスペクト比) が10以上では、わずかな負荷の増大で折損することがありますので、切削状況を見て切削条件の調整を行って下さい。
- 回転速度が不足する場合は、回転速度と送り速度を上表に対して同じ比率で下げて下さい。

- Use a rigid and precise machine and holder.
- When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
- Use an air blow or a suitable cutting fluid with high smoke retardant properties.
- The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
- Please adjust conditions based on machining accuracy, machining shape and machining path.
- When using a tool with a diameter of φ 0.5 (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
- When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



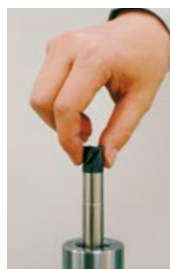
## PXMZ 締付け手順 Tightening procedure



### ① 清掃

Cleaning

ヘッド、シャンク締結部のゴミ、汚れを落とす  
Remove dirt and chips from the connecting thread and shank



### ② 仮締め

Initial Tightening

手締め  
Tighten by hand



隙間あり  
With gap



隙間なし◎  
Without gap

### ③ 本締め

Final Tightening

専用スパナで締める  
Tighten with a spanner wrench

### ④ 確認

Confirmation

隙間が無い事を確認  
Confirm that there is no gap

### 使用上の注意 Cautions during use

- ・ヘッド装着時はPXM専用スパナをご使用下さい  
(市販スパナはご使用できません)。
- ・推奨締付けトルクはp.67を参照下さい。
- ・ヘッドとシャンクホルダの端面が付くまで締め込んで下さい。  
隙間が無い事を確認下さい。
- ・締結部を脱脂すると締付けが固くなり、端面が付かなくなる可能性があります。  
脱脂はしないで下さい。
- ・スパナはヘッドの切欠きに合わせ挿入し、回転方向にゆっくりと回転させてご使用下さい。

- ・ Only use the spanner wrenches that are designed specifically for the PXM (p.67) for attaching PXM heads.
- ・ Please do not use alternative spanner wrenches sold on the market as a replacement.
- ・ Please refer to p.67 for tightening torque.
- ・ Please tighten until the head and the shank holder faces meet. Confirm that there is no gap.
- ・ Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- ・ Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

## PXMC 取付け手順 Mounting Procedure



### ① 仮締め(BT30)

Initial Tightening

コレットホルダの締結部分を清掃し、差し込む。  
プルスタッドを回し、仮締めする。

※ BT30以外は下記をご参照下さい。

Make sure the fastening portion of the collet is clean then insert it into the holder. Turn the pull stud to tighten.

\*For models other than BT30 please refer to the instructions below.

### ② 本締め

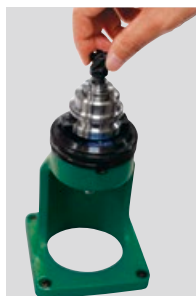
Final Tightening

スパナで締める。  
Tighten with a spanner wrench

### ③ 清掃

Cleaning

ヘッド、コレット締結部のゴミ、汚れを落とす。  
Remove dirt and chips from the connecting thread and collet



### ④ ヘッド装着

Mounting the Head

手締めをした後、PXM専用スパナで締める。  
After screwing the head in by hand, use the PXM spanner wrench to tighten.

### 使用上の注意 Cautions during use

- ・ヘッド装着時はPXM専用スパナをご使用下さい  
(市販スパナはご使用できません)。
- ・推奨締付けトルクはp.67を参照下さい。
- ・ヘッドとコレットの端面が付くまで締め込んで下さい。  
隙間が無い事を確認下さい。
- ・締結部を脱脂すると締付けが固くなり、端面が付かなくなる可能性があります。  
脱脂はしないで下さい。
- ・スパナはヘッドの切欠きに合わせ挿入し、ゆっくりと回転させてご使用下さい。

- ・ Only use the spanner wrenches that are designed specifically for the PXM (p.67) for attaching PXM heads.
- ・ Please do not use alternative spanner wrenches sold on the market as a replacement.
- ・ Please refer to p.67 for tightening torque.
- ・ Please tighten until the head and the collet faces meet. Confirm that there is no gap.
- ・ Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- ・ Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

### ※ BT30以外の取付け手順 Mounting procedure for holders other than BT30

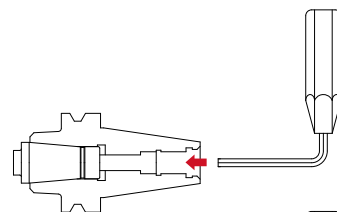
#### ① 引きねじ六角部に六角レンチを

しっかりと挿入する。

※ 穴付きプルスタッド(φ6以上)の場合、  
プルスタッドを付けたままで操作可能。

Insert the hexagon socket wrench into the pull screw hexagonal section.

\*For pull studs with holes (φ6 or above), it is operational with the stud being attached.

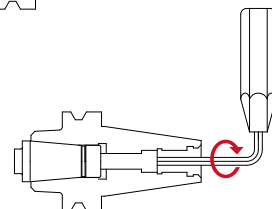


#### ② コレットが回転しないよう、コレット先端部を手でサポートし、レンチを締付側(右回転)へ回転させ、所定のトルクで締め付ける。

※ 推奨締付けトルク: 18N・m

To prevent the collet from rotating, support the tip of the collet by hand, tighten with the wrench by turning to the right, then fastening to the required torque.

\*Recommended tightening torque: 18N・m



### 使用上の注意 Cautions during use

- ・ヘッド装着時はPXM専用スパナをご使用下さい  
(市販スパナはご使用できません)。
- ・推奨締付けトルクはp.67を参照下さい。
- ・ヘッドとコレットの端面が付くまで締め込んで下さい。  
隙間が無い事を確認下さい。
- ・締結部を脱脂すると締付けが固くなり、端面が付かなくなる可能性があります。  
脱脂はしないで下さい。
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- ・ Only use the spanner wrenches that are designed specifically for the PXM (p.67) for attaching PXM heads.
- ・ Please do not use alternative spanner wrenches sold on the market as a replacement.
- ・ Please refer to p.67 for tightening torque.
- ・ Please tighten until the head and the collet faces meet. Confirm that there is no gap.
- ・ Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- ・ Please make sure that the spanner wrench is inserted properly and turn it slowly during use.



# DUROCESS

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## DURO

高硬度アプリケーションにおいて

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## PROCESS

あらゆる工具・工程で

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## SUCCESS

成功に向けたトータルソリューションを提案します

# オーエスジーは環境に優しい取り組みを推進しています

OSG's Environmental Initiatives

## 再研磨・再コーティング

### Tool Reconditioning

使用できなくなった工具を蘇らせ再利用することは、省資源化と地球環境の保護活動への貢献につながります。

Tool reconditioning contributes to resource conservation by bringing worn cutting tools back to life, which is environmentally friendly and sustainable.



## 超硬リサイクル

### Carbide Recycling

再研磨できなくなった超硬工具は日本ハードメタルで「超硬リサイクル」することが可能です。

超硬リサイクルは、希少金属のレアメタルを多く含む超硬材料の使用量を減らすことができ、環境保護に役立ちます。

Carbide tools that can no longer be reground can be recycled through Nihon Hard Metal's carbide recycling program. Cemented carbide materials contain a large amount of rare metals. Carbide recycling reduces material consumption and contributes to environmental preservation.

### 日本ハードメタル「超硬リサイクル」の特長 Highlights of Nihon Hard Metal's "Carbide Recycling" Program

超硬工具であれば、  
エンドミル・ドリル・リーマ・  
チップ等の分別は不要

As long as the tool has been hardened, it doesn't have to be separated into categories such as end mills, drills, reamers, and tips.

多少の異材質工具が混入もOK

(サーメット、セラミック、  
または鋼材シャンク付きのものは選別)

Tools that contain a small amount of different materials are accepted (tools with cermet, ceramic and steel shanks are separated)

1回あたりの回収量: 20kg~

(送料は日本ハードメタルにて負担・  
宅配便等着払い)

Amount of material that can be sent for recycling: 20kg and over (shipping costs are paid by Nihon Hard Metal Co., Ltd.)

リサイクル料金:  
振り込みにて対応

Recycling payment:  
by direct bank deposit





shaping your dreams

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BIZrium名古屋 4階 TEL(052)589-8320

西部営業部  
〒550-0013 大阪府大阪市西区新町2-4-2 405号 TEL(06)6538-3880

〈工具の技術的なご相談は…〉コミュニケーションダイヤル

よい 工 具 は 一 番  
**0120-41-5981** 土日祝日、  
会社休日を除く

コミュニケーション FAX 0533-82-1134 コミュニケーション E-mail hp-info@osg.co.jp

|     |                    |     |                    |
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| 安 城 | TEL (0566) 62-8286 |     |                    |

### ⚠ 安全にお使いいただくために

- ・ 工具を使用する時は、破損する危険があるので、必ずカバー・保護眼鏡・安全靴等を使用して下さい。
- ・ 切れ刃は素手で触らないで下さい。
- ・ 切りくずは素手で触らないで下さい。
- ・ 工具の切れ味が悪くなったら使用を中止して下さい。
- ・ 異常音・異常振動が発生したら、直ちに使用を中止して下さい。
- ・ 工具には手を加えないで下さい。
- ・ 加工前に工具の寸法確認を行って下さい。

### ⚠ Safe use of cutting tools

- ・ Use safety cover, safety glasses and safety shoes during operation.
- ・ Do not touch cutting edges with bare hands.
- ・ Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- ・ Stop cutting when the tool becomes dull.
- ・ Stop cutting operation immediately if you hear any abnormal cutting sounds.
- ・ Do not modify tools.
- ・ Please use appropriate tools for the operation. Check dimensions to ensure proper selection.

### OSG代理店

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- ・ 本書掲載内容の無断転載・複製を禁じます。

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