

# CBN-LRF 4 枚刃にφ3が追加

φ3 has been added to 4 flutes

2023年10月発売  
Launched October 2023

UNION TOOL UNION TOOL CO.

## CBN-LRF4000

追加9型番  
Additional 9 models



CBN-LRF4000

製品紹介



CBN-LRF4000

Introduction



4 枚刃 ハイグレードロングネックラジアスエンドミル  
4 Flute High-grade Long Neck Radius End Mills

φ0.1~φ3



対応被削材表 (★●○の順に推奨) Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

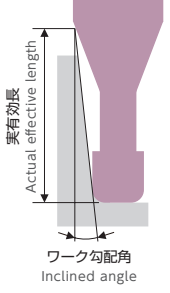
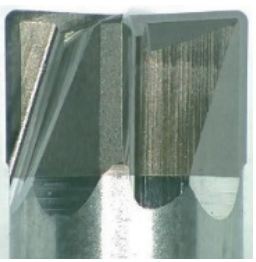
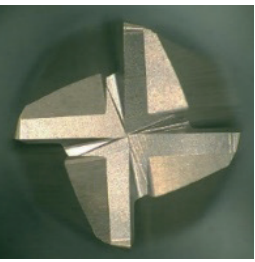
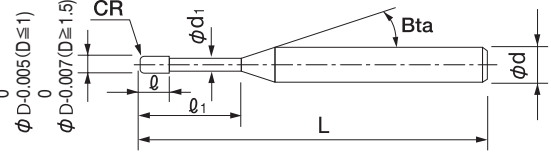
| 被 削 材 Work Material                     |                                           |                                             |                         |             |             |             |             |                 |                             |                    |             |                |                                        |                             |                                      |                             |                                                        |
|-----------------------------------------|-------------------------------------------|---------------------------------------------|-------------------------|-------------|-------------|-------------|-------------|-----------------|-----------------------------|--------------------|-------------|----------------|----------------------------------------|-----------------------------|--------------------------------------|-----------------------------|--------------------------------------------------------|
| 炭素鋼<br>CARBON<br>STEELS<br>S45C<br>S55C | 合金鋼<br>ALLOY<br>STEELS<br>SK / SCM<br>SUS | プリハードン鋼<br>PREHARDENED<br>STEELS<br>NAK HPM | 焼入れ鋼<br>HARDENED STEELS |             |             |             |             | 鋳鉄<br>CAST IRON | アルミ合金<br>ALUMINUM<br>ALLOYS | グラファイト<br>GRAPHITE | 銅<br>COPPER | 樹脂<br>PLASTICS | ガラス入り樹脂<br>GLASS<br>FILLED<br>PLASTICS | チタン合金<br>TITANIUM<br>ALLOYS | 超耐熱合金<br>HEAT<br>RESISTANT<br>ALLOYS | 超硬合金<br>CEMENTED<br>CARBIDE | 硬脆材<br>HARD BRITTLE<br>(NON-<br>METALLIC)<br>MATERIALS |
|                                         |                                           |                                             | ～ 50<br>HRC             | ～ 55<br>HRC | ～ 60<br>HRC | ～ 65<br>HRC | ～ 70<br>HRC |                 |                             |                    |             |                |                                        |                             |                                      |                             |                                                        |
|                                         |                                           | ○                                           | ●                       | ●           | ●           | ●           | ●           |                 |                             |                    |             |                |                                        |                             |                                      |                             |                                                        |

ラベルサンプル Label Sample



#001 φD1.999 R+0.001/0.000

ラベルに実測の外径とコーナーR精度を記載しております。  
高精度加工にお役立てください。  
Diameter and Corner R accuracy measurements are printed on the label to support High Precision milling.



合計71 型番 Total 71 models 注) シャンクテーパ角Btaは参考値です。Shank taper angle Bta is only for reference.

単位 Unit (mm)

| 型番<br>Model<br>Number | 外径<br>Outside<br>Diameter<br>φD | コーナ半径<br>Corner<br>Radius<br>CR | 有効長<br>Effective<br>Length<br>ℓ <sub>1</sub> | 刃長<br>Length<br>of Cut<br>ℓ | 首径<br>Neck<br>Diameter<br>φd <sub>1</sub> | シャンクテーパ角<br>Shank Taper<br>Angle<br>Bta | 全長<br>Overall<br>Length<br>L | シャンク径<br>Shank<br>Diameter<br>φd | 希望小売価格<br>Suggested<br>Retail Price<br>¥ | ワーク勾配角に対する実有効長<br>Effective Length by<br>Inclined Angles |      |       |      |      |
|-----------------------|---------------------------------|---------------------------------|----------------------------------------------|-----------------------------|-------------------------------------------|-----------------------------------------|------------------------------|----------------------------------|------------------------------------------|----------------------------------------------------------|------|-------|------|------|
|                       |                                 |                                 |                                              |                             |                                           |                                         |                              |                                  |                                          | 30°                                                      | 1°   | 1°30' | 2°   | 3°   |
| CBN-LRF 4001-002002   | 0.1                             | R0.02                           | 0.2                                          | 0.04                        | 0.09                                      | 15°                                     | 50                           | 4                                | 49,200                                   | 0.22                                                     | 0.23 | 0.25  | 0.26 | 0.28 |
| CBN-LRF 4001-002003   |                                 |                                 | 0.3                                          |                             |                                           |                                         | 50                           | 4                                | 49,950                                   | 0.33                                                     | 0.34 | 0.36  | 0.37 | 0.40 |
| CBN-LRF 4001-002005   |                                 |                                 | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 51,000                                   | 0.54                                                     | 0.56 | 0.58  | 0.60 | 0.65 |
| CBN-LRF 40015-002X2   | 0.15                            | R0.02                           | 0.2                                          | 0.06                        | 0.14                                      | 15°                                     | 50                           | 4                                | 49,200                                   | 0.22                                                     | 0.23 | 0.25  | 0.26 | 0.28 |
| CBN-LRF 40015-002X3   |                                 |                                 | 0.3                                          |                             |                                           |                                         | 50                           | 4                                | 49,950                                   | 0.33                                                     | 0.34 | 0.36  | 0.37 | 0.40 |
| CBN-LRF 40015-002X5   |                                 |                                 | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 51,000                                   | 0.54                                                     | 0.56 | 0.58  | 0.60 | 0.65 |
| CBN-LRF 4002-002005   | 0.2                             | R0.02                           | 0.5                                          | 0.08                        | 0.19                                      | 15°                                     | 50                           | 4                                | 40,000                                   | 0.54                                                     | 0.56 | 0.58  | 0.60 | 0.65 |
| CBN-LRF 4002-002X75   |                                 |                                 | 0.75                                         |                             |                                           |                                         | 50                           | 4                                | 40,520                                   | 0.80                                                     | 0.82 | 0.86  | 0.89 | 0.96 |
| CBN-LRF 4002-002010   |                                 |                                 | 1                                            |                             |                                           |                                         | 50                           | 4                                | 40,850                                   | 1.05                                                     | 1.09 | 1.13  | 1.18 | 1.27 |
| CBN-LRF 4002-005005   |                                 | R0.05                           | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 36,300                                   | 0.53                                                     | 0.55 | 0.57  | 0.60 | 0.65 |
| CBN-LRF 4002-005X75   |                                 |                                 | 0.75                                         |                             |                                           |                                         | 50                           | 4                                | 36,820                                   | 0.79                                                     | 0.82 | 0.85  | 0.88 | 0.96 |
| CBN-LRF 4002-005010   |                                 |                                 | 1                                            |                             |                                           |                                         | 50                           | 4                                | 37,150                                   | 1.05                                                     | 1.09 | 1.13  | 1.17 | 1.27 |
| CBN-LRF 4003-002X75   | 0.3                             | R0.02                           | 0.75                                         | 0.13                        | 0.28                                      | 15°                                     | 50                           | 4                                | 40,520                                   | 0.83                                                     | 0.86 | 0.89  | 0.92 | 1.00 |
| CBN-LRF 4003-002010   |                                 |                                 | 1                                            |                             |                                           |                                         | 50                           | 4                                | 40,850                                   | 1.08                                                     | 1.12 | 1.17  | 1.21 | 1.31 |
| CBN-LRF 4003-005005   |                                 | R0.05                           | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 36,300                                   | 0.57                                                     | 0.59 | 0.61  | 0.63 | 0.68 |
| CBN-LRF 4004-002015   | 0.4                             | R0.02                           | 1.5                                          | 0.24                        | 0.38                                      | 15°                                     | 50                           | 4                                | 38,880                                   | 1.54                                                     | 1.59 | 1.65  | 1.71 | 1.86 |
| CBN-LRF 4004-003005   |                                 | R0.03                           | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 34,320                                   | 0.51                                                     | 0.53 | 0.55  | 0.57 | 0.62 |
| CBN-LRF 4004-005005   |                                 | R0.05                           | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 34,320                                   | 0.51                                                     | 0.53 | 0.55  | 0.57 | 0.62 |
| CBN-LRF 4004-005015   |                                 |                                 | 1.5                                          |                             |                                           |                                         | 50                           | 4                                | 34,560                                   | 1.54                                                     | 1.59 | 1.65  | 1.71 | 1.85 |
| CBN-LRF 4004-010005   |                                 | R0.1                            | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 34,320                                   | 0.51                                                     | 0.53 | 0.54  | 0.56 | 0.61 |
| CBN-LRF 4004-010010   |                                 |                                 | 1                                            |                             |                                           |                                         | 50                           | 4                                | 34,560                                   | 1.03                                                     | 1.06 | 1.10  | 1.14 | 1.23 |

4 枚刃 ハイグレードロングネックラジアスエンドミル  
4 Flute High-grade Long Neck Radius End Mills

| 型番<br>Model<br>Number | 外径<br>Outside<br>Diameter<br>φD | コーナ半径<br>Corner<br>Radius<br>CR | 有効長<br>Effective<br>Length<br>ℓ <sub>1</sub> | 刃長<br>Length<br>of Cut<br>ℓ | 首径<br>Neck<br>Diameter<br>φd <sub>1</sub> | シャンクテーパ角<br>Shank Taper<br>Angle<br>Bta | 全長<br>Overall<br>Length<br>L | シャンク径<br>Shank<br>Diameter<br>φd | 希望小売価格<br>Suggested<br>Retail Price<br>¥ | ワーク勾配角に対する実有効長<br>Effective Length by<br>Inclined Angles |       |       |       |       |
|-----------------------|---------------------------------|---------------------------------|----------------------------------------------|-----------------------------|-------------------------------------------|-----------------------------------------|------------------------------|----------------------------------|------------------------------------------|----------------------------------------------------------|-------|-------|-------|-------|
|                       |                                 |                                 |                                              |                             |                                           |                                         |                              |                                  |                                          | 30°                                                      | 1°    | 1°30' | 2°    | 3°    |
| CBN-LRF 4005-002010   | 0.5                             | R0.02                           | 1                                            | 0.3                         | 0.48                                      | 15°                                     | 50                           | 4                                | 31,750                                   | 1.03                                                     | 1.07  | 1.11  | 1.15  | 1.25  |
| CBN-LRF 4005-005005   |                                 | R0.05                           | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,310                                   | 0.51                                                     | 0.53  | 0.55  | 0.57  | 0.62  |
| CBN-LRF 4005-005010   |                                 |                                 | 1                                            |                             |                                           |                                         | 50                           | 4                                | 28,530                                   | 1.03                                                     | 1.07  | 1.10  | 1.15  | 1.24  |
| CBN-LRF 4005-005015   |                                 | R0.1                            | 1.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,860                                   | 1.54                                                     | 1.59  | 1.65  | 1.71  | 1.85  |
| CBN-LRF 4005-010005   |                                 |                                 | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,310                                   | 0.51                                                     | 0.53  | 0.54  | 0.56  | 0.61  |
| CBN-LRF 4005-010015   |                                 | R0.15                           | 1.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,860                                   | 1.53                                                     | 1.59  | 1.64  | 1.70  | 1.84  |
| CBN-LRF 4005-015005   |                                 |                                 | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,310                                   | 0.51                                                     | 0.52  | 0.54  | 0.56  | 0.59  |
| CBN-LRF 4005-015015   |                                 |                                 | 1.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,860                                   | 1.53                                                     | 1.58  | 1.64  | 1.69  | 1.83  |
| CBN-LRF 4006-005005   | 0.6                             | R0.05                           | 0.5                                          | 0.3                         | 0.58                                      | 15°                                     | 50                           | 4                                | 28,200                                   | 0.51                                                     | 0.53  | 0.55  | 0.57  | 0.62  |
| CBN-LRF 4006-010005   |                                 | R0.1                            | 0.5                                          |                             |                                           |                                         | 50                           | 4                                | 28,200                                   | 0.51                                                     | 0.53  | 0.54  | 0.56  | 0.61  |
| CBN-LRF 4006-010010   |                                 |                                 | 1                                            |                             |                                           |                                         | 50                           | 4                                | 28,440                                   | 1.03                                                     | 1.06  | 1.10  | 1.14  | 1.23  |
| CBN-LRF 4008-005010   | 0.8                             | R0.05                           | 1                                            | 0.56                        | 0.78                                      | 15°                                     | 50                           | 4                                | 28,680                                   | 1.03                                                     | 1.07  | 1.10  | 1.15  | 1.24  |
| CBN-LRF 4008-010010   |                                 | R0.1                            | 1                                            |                             |                                           |                                         | 50                           | 4                                | 28,680                                   | 1.03                                                     | 1.06  | 1.10  | 1.14  | 1.23  |
| CBN-LRF 4008-010020   |                                 |                                 | 2                                            |                             |                                           |                                         | 50                           | 4                                | 28,680                                   | 2.05                                                     | 2.12  | 2.20  | 2.28  | 2.46  |
| CBN-LRF 4008-010050   |                                 |                                 | 5                                            |                             |                                           |                                         | 50                           | 4                                | 32,520                                   | 5.15                                                     | 5.33  | 5.52  | 5.73  | 6.19  |
| CBN-LRF 4008-020010   |                                 | R0.2                            | 1                                            |                             |                                           |                                         | 50                           | 4                                | 28,680                                   | 1.02                                                     | 1.05  | 1.09  | 1.12  | 1.20  |
| CBN-LRF 4010-002010   | 1                               | R0.02                           | 1                                            | 0.7                         | 0.98                                      | 15°                                     | 50                           | 4                                | 29,300                                   | 1.03                                                     | 1.07  | 1.11  | 1.15  | 1.25  |
| CBN-LRF 4010-002030   |                                 |                                 | 3                                            |                             |                                           |                                         | 50                           | 4                                | 29,300                                   | 3.10                                                     | 3.21  | 3.33  | 3.45  | 3.73  |
| CBN-LRF 4010-005010   |                                 | R0.05                           | 1                                            |                             |                                           |                                         | 50                           | 4                                | 26,420                                   | 1.03                                                     | 1.07  | 1.11  | 1.15  | 1.24  |
| CBN-LRF 4010-005020   |                                 |                                 | 2                                            |                             |                                           |                                         | 50                           | 4                                | 26,420                                   | 2.06                                                     | 2.14  | 2.21  | 2.30  | 2.48  |
| CBN-LRF 4010-010010   |                                 | R0.1                            | 1                                            |                             |                                           |                                         | 50                           | 4                                | 26,420                                   | 1.03                                                     | 1.06  | 1.10  | 1.14  | 1.23  |
| CBN-LRF 4010-010020   |                                 |                                 | 2                                            |                             |                                           |                                         | 50                           | 4                                | 26,420                                   | 2.06                                                     | 2.13  | 2.21  | 2.29  | 2.47  |
| CBN-LRF 4010-010030   |                                 |                                 | 3                                            |                             |                                           |                                         | 50                           | 4                                | 26,420                                   | 3.10                                                     | 3.20  | 3.32  | 3.44  | 3.72  |
| CBN-LRF 4010-020020   |                                 | R0.2                            | 2                                            |                             |                                           |                                         | 50                           | 4                                | 26,420                                   | 2.06                                                     | 2.13  | 2.20  | 2.28  | 2.45  |
| CBN-LRF 4015-002030   | 1.5                             | R0.02                           | 3                                            | 1                           | 1.46                                      | 15°                                     | 50                           | 4                                | 34,520                                   | 3.13                                                     | 3.24  | 3.36  | 3.49  | 3.78  |
| CBN-LRF 4015-010030   |                                 | R0.1                            | 3                                            |                             |                                           |                                         | 50                           | 4                                | 31,080                                   | 3.13                                                     | 3.24  | 3.35  | 3.48  | 3.76  |
| CBN-LRF 4015-030030   |                                 | R0.3                            | 3                                            |                             |                                           |                                         | 50                           | 4                                | 31,080                                   | 3.12                                                     | 3.23  | 3.33  | 3.45  | 3.71  |
| CBN-LRF 4015-050030   |                                 | R0.5                            | 3                                            |                             |                                           |                                         | 50                           | 4                                | 31,080                                   | 3.12                                                     | 3.21  | 3.31  | 3.42  | 3.66  |
| CBN-LRF 4020-002040   | 2                               | R0.02                           | 4                                            | 1.2                         | 1.97                                      | 15°                                     | 50                           | 4                                | 35,630                                   | 4.15                                                     | 4.29  | 4.45  | 4.62  | 5.00  |
| CBN-LRF 4020-002060   |                                 |                                 | 6                                            |                             |                                           |                                         | 50                           | 4                                | 35,630                                   | 6.22                                                     | 6.43  | 6.67  | 6.92  | 7.48  |
| CBN-LRF 4020-002100   |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 4                                | 38,650                                   | 10.35                                                    | 10.71 | 11.10 | 11.52 | 12.46 |
| CBN-LRF 4020-005060   |                                 | R0.05                           | 6                                            |                             |                                           |                                         | 50                           | 4                                | 31,970                                   | 6.21                                                     | 6.43  | 6.66  | 6.91  | 7.48  |
| CBN-LRF 4020-005100   |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 4                                | 34,800                                   | 10.35                                                    | 10.71 | 11.10 | 11.51 | 12.45 |
| CBN-LRF 4020-010040   |                                 | R0.1                            | 4                                            |                             |                                           |                                         | 50                           | 4                                | 31,970                                   | 4.15                                                     | 4.29  | 4.44  | 4.61  | 4.98  |
| CBN-LRF 4020-010060   |                                 |                                 | 6                                            |                             |                                           |                                         | 50                           | 4                                | 31,970                                   | 6.21                                                     | 6.43  | 6.66  | 6.91  | 7.46  |
| CBN-LRF 4020-010100   |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 4                                | 34,800                                   | 10.35                                                    | 10.71 | 11.09 | 11.51 | 12.44 |
| CBN-LRF 4020-020040   |                                 | R0.2                            | 4                                            |                             |                                           |                                         | 50                           | 4                                | 31,970                                   | 4.14                                                     | 4.28  | 4.43  | 4.59  | 4.95  |
| CBN-LRF 4020-020060   |                                 |                                 | 6                                            |                             |                                           |                                         | 50                           | 4                                | 31,970                                   | 6.21                                                     | 6.42  | 6.65  | 6.89  | 7.44  |
| CBN-LRF 4020-020100   |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 4                                | 34,800                                   | 10.34                                                    | 10.70 | 11.08 | 11.49 | 12.41 |
| CBN-LRF 4020-050060   |                                 | R0.5                            | 6                                            |                             |                                           |                                         | 50                           | 4                                | 31,970                                   | 6.20                                                     | 6.40  | 6.62  | 6.85  | 7.37  |
| CBN-LRF 4020-050100   |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 4                                | 34,800                                   | 10.33                                                    | 10.68 | 11.05 | 11.45 | 12.34 |
| ※ CBN-LRF 4030-005060 | 3                               | R0.05                           | 6                                            | 0.7                         | 2.94                                      | 15°                                     | 50                           | 6                                | 41,300                                   | 6.27                                                     | 6.49  | 6.73  | 6.98  | 7.55  |
| ※ CBN-LRF 4030-005100 |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 6                                | 42,200                                   | 10.41                                                    | 10.77 | 11.16 | 11.58 | 12.52 |
| ※ CBN-LRF 4030-005150 |                                 |                                 | 15                                           |                             |                                           |                                         | 50                           | 6                                | 44,000                                   | 15.58                                                    | 16.12 | 16.70 | 17.33 | 18.73 |
| ※ CBN-LRF 4030-010060 |                                 | R0.1                            | 6                                            |                             |                                           |                                         | 50                           | 6                                | 41,300                                   | 6.27                                                     | 6.49  | 6.72  | 6.97  | 7.53  |
| ※ CBN-LRF 4030-010100 |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 6                                | 42,200                                   | 10.41                                                    | 10.77 | 11.15 | 11.57 | 12.51 |
| ※ CBN-LRF 4030-010150 |                                 |                                 | 15                                           |                             |                                           |                                         | 50                           | 6                                | 44,000                                   | 15.57                                                    | 16.12 | 16.70 | 17.32 | 18.72 |
| ※ CBN-LRF 4030-020060 |                                 | R0.2                            | 6                                            |                             |                                           |                                         | 50                           | 6                                | 41,300                                   | 6.27                                                     | 6.48  | 6.71  | 6.96  | 7.51  |
| ※ CBN-LRF 4030-020100 |                                 |                                 | 10                                           |                             |                                           |                                         | 50                           | 6                                | 42,200                                   | 10.40                                                    | 10.76 | 11.14 | 11.56 | 12.48 |
| ※ CBN-LRF 4030-020150 |                                 |                                 | 15                                           |                             |                                           |                                         | 50                           | 6                                | 44,000                                   | 15.57                                                    | 16.11 | 16.68 | 17.31 | 18.70 |

※追加型番 Additional model

※φ3は刃長0.7 mmまでCBN層となっております。

For φ3, 0.7 mm of the tool tip is made of CBN material.

CBN-LRF 4 枚刃 切削条件表 Milling Conditions for CBN-LRF (4 Flutes)

| 被削材<br>WORK MATERIAL  |                                   |                                   |                                    | 調質鋼 / 焼入れ鋼<br>HEAT-TREATED STEELS / HARDENED STEELS<br>STAVAX<br>(~52HRC) |                                  |                                          |                                           | 焼入れ鋼<br>HARDENED STEELS<br>SKD11<br>(~62HRC)     |                                  |                                          |                                           | 焼入れ鋼<br>HARDENED STEELS<br>HAP10 / HAP72<br>(~70HRC) |                                  |                                          |                                           |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------|---------------------------------------------------------------------------|----------------------------------|------------------------------------------|-------------------------------------------|--------------------------------------------------|----------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------------------|----------------------------------|------------------------------------------|-------------------------------------------|
| 型番<br>Model<br>Number | 外径<br>Outside<br>Diameter<br>(mm) | コーナ半径<br>Corner<br>Radius<br>(mm) | 有効長<br>Effective<br>Length<br>(mm) | 回転速度<br>Spindle<br>Speed<br>(min <sup>-1</sup> )                          | 送り速度<br>Feed<br>Rate<br>(mm/min) | a <sub>p</sub><br>Axial<br>Depth<br>(mm) | a <sub>e</sub><br>Radial<br>Depth<br>(mm) | 回転速度<br>Spindle<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>Rate<br>(mm/min) | a <sub>p</sub><br>Axial<br>Depth<br>(mm) | a <sub>e</sub><br>Radial<br>Depth<br>(mm) | 回転速度<br>Spindle<br>Speed<br>(min <sup>-1</sup> )     | 送り速度<br>Feed<br>Rate<br>(mm/min) | a <sub>p</sub><br>Axial<br>Depth<br>(mm) | a <sub>e</sub><br>Radial<br>Depth<br>(mm) |
| 4001-002002           | 0.1                               | R0.02                             | 0.2                                | 60,000                                                                    | 360                              | 0.002                                    | 0.02                                      | 55,000                                           | 280                              | 0.002                                    | 0.015                                     | 50,000                                               | 200                              | 0.002                                    | 0.01                                      |
| 4001-002003           |                                   |                                   | 0.3                                | 60,000                                                                    | 360                              | 0.002                                    | 0.02                                      | 55,000                                           | 280                              | 0.002                                    | 0.015                                     | 50,000                                               | 200                              | 0.002                                    | 0.01                                      |
| 4001-002005           |                                   |                                   | 0.5                                | 60,000                                                                    | 360                              | 0.002                                    | 0.02                                      | 55,000                                           | 280                              | 0.002                                    | 0.015                                     | 50,000                                               | 200                              | 0.002                                    | 0.01                                      |
| 40015-002X2           | 0.15                              | R0.02                             | 0.2                                | 60,000                                                                    | 480                              | 0.003                                    | 0.03                                      | 55,000                                           | 340                              | 0.003                                    | 0.025                                     | 50,000                                               | 250                              | 0.002                                    | 0.015                                     |
| 40015-002X3           |                                   |                                   | 0.3                                | 60,000                                                                    | 480                              | 0.003                                    | 0.03                                      | 55,000                                           | 340                              | 0.003                                    | 0.025                                     | 50,000                                               | 250                              | 0.002                                    | 0.015                                     |
| 40015-002X5           |                                   |                                   | 0.5                                | 60,000                                                                    | 480                              | 0.003                                    | 0.03                                      | 55,000                                           | 340                              | 0.003                                    | 0.025                                     | 50,000                                               | 250                              | 0.002                                    | 0.015                                     |
| 4002-002005           | 0.2                               | R0.02                             | 0.5                                | 60,000                                                                    | 560                              | 0.003                                    | 0.04                                      | 55,000                                           | 430                              | 0.003                                    | 0.03                                      | 50,000                                               | 300                              | 0.003                                    | 0.02                                      |
| 4002-002X75           |                                   |                                   | 0.75                               | 60,000                                                                    | 560                              | 0.003                                    | 0.04                                      | 55,000                                           | 430                              | 0.003                                    | 0.03                                      | 50,000                                               | 300                              | 0.003                                    | 0.02                                      |
| 4002-002010           |                                   |                                   | 1                                  | 60,000                                                                    | 560                              | 0.003                                    | 0.04                                      | 55,000                                           | 430                              | 0.003                                    | 0.03                                      | 50,000                                               | 300                              | 0.003                                    | 0.02                                      |
| 4002-005005           |                                   | R0.05                             | 0.5                                | 60,000                                                                    | 700                              | 0.003                                    | 0.04                                      | 55,000                                           | 550                              | 0.003                                    | 0.03                                      | 50,000                                               | 410                              | 0.003                                    | 0.02                                      |
| 4002-005X75           |                                   |                                   | 0.75                               | 60,000                                                                    | 700                              | 0.003                                    | 0.04                                      | 55,000                                           | 550                              | 0.003                                    | 0.03                                      | 50,000                                               | 410                              | 0.003                                    | 0.02                                      |
| 4002-005010           |                                   |                                   | 1                                  | 60,000                                                                    | 700                              | 0.003                                    | 0.04                                      | 55,000                                           | 550                              | 0.003                                    | 0.03                                      | 50,000                                               | 410                              | 0.003                                    | 0.02                                      |
| 4003-002X75           | 0.3                               | R0.02                             | 0.75                               | 60,000                                                                    | 750                              | 0.003                                    | 0.08                                      | 55,000                                           | 580                              | 0.003                                    | 0.06                                      | 50,000                                               | 400                              | 0.003                                    | 0.03                                      |
| 4003-002010           |                                   |                                   | 1                                  | 60,000                                                                    | 750                              | 0.003                                    | 0.08                                      | 55,000                                           | 580                              | 0.003                                    | 0.06                                      | 50,000                                               | 400                              | 0.003                                    | 0.03                                      |
| 4003-005005           |                                   | R0.05                             | 0.5                                | 60,000                                                                    | 950                              | 0.005                                    | 0.08                                      | 55,000                                           | 750                              | 0.005                                    | 0.06                                      | 50,000                                               | 550                              | 0.004                                    | 0.03                                      |
| 4004-002015           | 0.4                               | R0.02                             | 1.5                                | 55,000                                                                    | 850                              | 0.005                                    | 0.1                                       | 53,000                                           | 700                              | 0.005                                    | 0.08                                      | 50,000                                               | 550                              | 0.004                                    | 0.05                                      |
| 4004-003005           |                                   | R0.03                             | 0.5                                | 55,000                                                                    | 1,000                            | 0.006                                    | 0.1                                       | 53,000                                           | 800                              | 0.006                                    | 0.08                                      | 50,000                                               | 600                              | 0.004                                    | 0.05                                      |
| 4004-005005           |                                   | R0.05                             | 0.5                                | 55,000                                                                    | 1,200                            | 0.01                                     | 0.1                                       | 53,000                                           | 1,000                            | 0.01                                     | 0.08                                      | 50,000                                               | 730                              | 0.007                                    | 0.05                                      |
| 4004-005015           |                                   |                                   | 1.5                                | 55,000                                                                    | 1,200                            | 0.01                                     | 0.1                                       | 53,000                                           | 1,000                            | 0.01                                     | 0.08                                      | 50,000                                               | 730                              | 0.007                                    | 0.05                                      |
| 4004-010005           |                                   | R0.1                              | 0.5                                | 55,000                                                                    | 1,500                            | 0.01                                     | 0.1                                       | 53,000                                           | 1,300                            | 0.01                                     | 0.08                                      | 50,000                                               | 1,000                            | 0.008                                    | 0.05                                      |
| 4004-010010           |                                   |                                   | 1                                  | 55,000                                                                    | 1,500                            | 0.01                                     | 0.1                                       | 53,000                                           | 1,300                            | 0.01                                     | 0.08                                      | 50,000                                               | 1,000                            | 0.008                                    | 0.05                                      |
| 4005-002010           | 0.5                               | R0.02                             | 1                                  | 50,000                                                                    | 950                              | 0.005                                    | 0.15                                      | 50,000                                           | 900                              | 0.005                                    | 0.12                                      | 50,000                                               | 700                              | 0.005                                    | 0.08                                      |
| 4005-005005           |                                   | R0.05                             | 0.5                                | 50,000                                                                    | 1,500                            | 0.01                                     | 0.15                                      | 50,000                                           | 1,300                            | 0.01                                     | 0.12                                      | 50,000                                               | 1,000                            | 0.01                                     | 0.08                                      |
| 4005-005010           |                                   |                                   | 1                                  | 50,000                                                                    | 1,500                            | 0.01                                     | 0.15                                      | 50,000                                           | 1,300                            | 0.01                                     | 0.12                                      | 50,000                                               | 1,000                            | 0.01                                     | 0.08                                      |
| 4005-005015           |                                   |                                   | 1.5                                | 50,000                                                                    | 1,500                            | 0.01                                     | 0.15                                      | 50,000                                           | 1,300                            | 0.01                                     | 0.12                                      | 50,000                                               | 1,000                            | 0.01                                     | 0.08                                      |
| 4005-010005           |                                   | R0.1                              | 0.5                                | 50,000                                                                    | 1,900                            | 0.02                                     | 0.15                                      | 50,000                                           | 1,700                            | 0.02                                     | 0.12                                      | 50,000                                               | 1,400                            | 0.01                                     | 0.08                                      |
| 4005-010015           |                                   |                                   | 1.5                                | 50,000                                                                    | 1,900                            | 0.02                                     | 0.15                                      | 50,000                                           | 1,700                            | 0.02                                     | 0.12                                      | 50,000                                               | 1,400                            | 0.01                                     | 0.08                                      |
| 4005-015005           |                                   | R0.15                             | 0.5                                | 50,000                                                                    | 2,200                            | 0.03                                     | 0.15                                      | 50,000                                           | 2,000                            | 0.03                                     | 0.12                                      | 50,000                                               | 1,800                            | 0.01                                     | 0.08                                      |
| 4005-015015           |                                   |                                   | 1.5                                | 50,000                                                                    | 2,200                            | 0.03                                     | 0.15                                      | 50,000                                           | 2,000                            | 0.03                                     | 0.12                                      | 50,000                                               | 1,800                            | 0.01                                     | 0.08                                      |
| 4006-005005           | 0.6                               | R0.05                             | 0.5                                | 50,000                                                                    | 1,700                            | 0.01                                     | 0.2                                       | 50,000                                           | 1,500                            | 0.01                                     | 0.15                                      | 50,000                                               | 1,200                            | 0.01                                     | 0.1                                       |
| 4006-010005           |                                   | R0.1                              | 0.5                                | 50,000                                                                    | 2,300                            | 0.02                                     | 0.2                                       | 50,000                                           | 2,000                            | 0.02                                     | 0.15                                      | 50,000                                               | 1,700                            | 0.012                                    | 0.1                                       |
| 4006-010010           |                                   |                                   | 1                                  | 50,000                                                                    | 2,300                            | 0.02                                     | 0.2                                       | 50,000                                           | 2,000                            | 0.02                                     | 0.15                                      | 50,000                                               | 1,700                            | 0.012                                    | 0.1                                       |
| 4008-005010           | 0.8                               | R0.05                             | 1                                  | 45,000                                                                    | 1,800                            | 0.01                                     | 0.28                                      | 44,000                                           | 1,600                            | 0.01                                     | 0.21                                      | 42,000                                               | 1,300                            | 0.01                                     | 0.13                                      |
| 4008-010010           |                                   | R0.1                              | 1                                  | 45,000                                                                    | 2,400                            | 0.02                                     | 0.28                                      | 44,000                                           | 2,000                            | 0.02                                     | 0.21                                      | 42,000                                               | 1,600                            | 0.015                                    | 0.13                                      |
| 4008-010020           |                                   |                                   | 2                                  | 45,000                                                                    | 2,400                            | 0.02                                     | 0.28                                      | 44,000                                           | 2,000                            | 0.02                                     | 0.21                                      | 42,000                                               | 1,600                            | 0.015                                    | 0.13                                      |
| 4008-010050           |                                   |                                   | 5                                  | 45,000                                                                    | 1,700                            | 0.02                                     | 0.14                                      | 44,000                                           | 1,400                            | 0.02                                     | 0.11                                      | 42,000                                               | 1,100                            | 0.015                                    | 0.07                                      |
| 4008-020010           |                                   | R0.2                              | 1                                  | 45,000                                                                    | 2,400                            | 0.04                                     | 0.28                                      | 44,000                                           | 2,100                            | 0.04                                     | 0.21                                      | 42,000                                               | 1,800                            | 0.015                                    | 0.13                                      |
| 4010-002010           | 1                                 | R0.02                             | 1                                  | 40,000                                                                    | 1,300                            | 0.006                                    | 0.35                                      | 37,000                                           | 1,100                            | 0.006                                    | 0.3                                       | 34,000                                               | 900                              | 0.005                                    | 0.2                                       |
| 4010-002030           |                                   |                                   | 3                                  | 40,000                                                                    | 1,300                            | 0.006                                    | 0.35                                      | 37,000                                           | 1,100                            | 0.006                                    | 0.3                                       | 34,000                                               | 900                              | 0.005                                    | 0.2                                       |
| 4010-005010           |                                   | R0.05                             | 1                                  | 40,000                                                                    | 1,900                            | 0.015                                    | 0.35                                      | 37,000                                           | 1,600                            | 0.015                                    | 0.3                                       | 34,000                                               | 1,200                            | 0.01                                     | 0.2                                       |
| 4010-005020           |                                   |                                   | 2                                  | 40,000                                                                    | 1,900                            | 0.015                                    | 0.35                                      | 37,000                                           | 1,600                            | 0.015                                    | 0.3                                       | 34,000                                               | 1,200                            | 0.01                                     | 0.2                                       |
| 4010-010010           |                                   | R0.1                              | 1                                  | 40,000                                                                    | 2,600                            | 0.03                                     | 0.35                                      | 37,000                                           | 2,000                            | 0.03                                     | 0.3                                       | 34,000                                               | 1,400                            | 0.015                                    | 0.2                                       |
| 4010-010020           |                                   |                                   | 2                                  | 40,000                                                                    | 2,600                            | 0.03                                     | 0.35                                      | 37,000                                           | 2,000                            | 0.03                                     | 0.3                                       | 34,000                                               | 1,400                            | 0.015                                    | 0.2                                       |
| 4010-010030           |                                   |                                   | 3                                  | 40,000                                                                    | 2,600                            | 0.03                                     | 0.35                                      | 37,000                                           | 2,000                            | 0.03                                     | 0.3                                       | 34,000                                               | 1,400                            | 0.015                                    | 0.2                                       |
| 4010-020020           |                                   | R0.2                              | 2                                  | 40,000                                                                    | 2,600                            | 0.05                                     | 0.35                                      | 37,000                                           | 2,200                            | 0.05                                     | 0.3                                       | 34,000                                               | 1,800                            | 0.015                                    | 0.2                                       |
| 4015-002030           | 1.5                               | R0.02                             | 3                                  | 30,000                                                                    | 1,500                            | 0.01                                     | 0.55                                      | 27,000                                           | 1,300                            | 0.01                                     | 0.5                                       | 23,000                                               | 1,100                            | 0.005                                    | 0.3                                       |
| 4015-010030           |                                   | R0.1                              | 3                                  | 30,000                                                                    | 3,000                            | 0.05                                     | 0.55                                      | 27,000                                           | 2,200                            | 0.05                                     | 0.5                                       | 23,000                                               | 1,400                            | 0.02                                     | 0.3                                       |
| 4015-030030           |                                   | R0.3                              | 3                                  | 30,000                                                                    | 3,000                            | 0.07                                     | 0.55                                      | 27,000                                           | 2,400                            | 0.07                                     | 0.5                                       | 23,000                                               | 1,700                            | 0.02                                     | 0.3                                       |
| 4015-050030           |                                   | R0.5                              | 3                                  | 30,000                                                                    | 3,000                            | 0.1                                      | 0.45                                      | 27,000                                           | 2,500                            | 0.1                                      | 0.4                                       | 23,000                                               | 2,000                            | 0.02                                     | 0.3                                       |

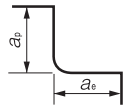
| 被削材<br>WORK MATERIAL  |                                   |                                   |                                    | 調質鋼 / 焼入れ鋼<br>HEAT-TREATED STEELS / HARDENED STEELS<br>STAVAX<br>(~52HRC) |                                  |                                          |                                           | 焼入れ鋼<br>HARDENED STEELS<br>SKD11<br>(~62HRC)     |                                  |                                          |                                           | 焼入れ鋼<br>HARDENED STEELS<br>HAP10 / HAP72<br>(~70HRC) |                                  |                                          |                                           |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------|---------------------------------------------------------------------------|----------------------------------|------------------------------------------|-------------------------------------------|--------------------------------------------------|----------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------------------|----------------------------------|------------------------------------------|-------------------------------------------|
| 型番<br>Model<br>Number | 外径<br>Outside<br>Diameter<br>(mm) | コーナ半径<br>Corner<br>Radius<br>(mm) | 有効長<br>Effective<br>Length<br>(mm) | 回転速度<br>Spindle<br>Speed<br>(min <sup>-1</sup> )                          | 送り速度<br>Feed<br>Rate<br>(mm/min) | a <sub>p</sub><br>Axial<br>Depth<br>(mm) | a <sub>e</sub><br>Radial<br>Depth<br>(mm) | 回転速度<br>Spindle<br>Speed<br>(min <sup>-1</sup> ) | 送り速度<br>Feed<br>Rate<br>(mm/min) | a <sub>p</sub><br>Axial<br>Depth<br>(mm) | a <sub>e</sub><br>Radial<br>Depth<br>(mm) | 回転速度<br>Spindle<br>Speed<br>(min <sup>-1</sup> )     | 送り速度<br>Feed<br>Rate<br>(mm/min) | a <sub>p</sub><br>Axial<br>Depth<br>(mm) | a <sub>e</sub><br>Radial<br>Depth<br>(mm) |
| 4020-002040           | 2                                 | R0.02                             | 4                                  | 28,000                                                                    | 1,700                            | 0.01                                     | 0.7                                       | 23,000                                           | 1,500                            | 0.01                                     | 0.6                                       | 18,000                                               | 1,200                            | 0.005                                    | 0.4                                       |
| 4020-002060           |                                   |                                   | 6                                  | 28,000                                                                    | 1,700                            | 0.01                                     | 0.7                                       | 23,000                                           | 1,500                            | 0.01                                     | 0.6                                       | 18,000                                               | 1,200                            | 0.005                                    | 0.4                                       |
| 4020-002100           |                                   |                                   | 10                                 | 28,000                                                                    | 1,700                            | 0.01                                     | 0.7                                       | 23,000                                           | 1,500                            | 0.01                                     | 0.6                                       | 18,000                                               | 1,200                            | 0.005                                    | 0.4                                       |
| 4020-005060           |                                   | R0.05                             | 6                                  | 28,000                                                                    | 2,500                            | 0.025                                    | 0.7                                       | 23,000                                           | 1,900                            | 0.025                                    | 0.6                                       | 18,000                                               | 1,300                            | 0.015                                    | 0.4                                       |
| 4020-005100           |                                   |                                   | 10                                 | 28,000                                                                    | 2,500                            | 0.025                                    | 0.7                                       | 23,000                                           | 1,900                            | 0.025                                    | 0.6                                       | 18,000                                               | 1,300                            | 0.015                                    | 0.4                                       |
| 4020-010040           |                                   | R0.1                              | 4                                  | 28,000                                                                    | 3,300                            | 0.05                                     | 0.7                                       | 23,000                                           | 2,400                            | 0.05                                     | 0.6                                       | 18,000                                               | 1,500                            | 0.03                                     | 0.4                                       |
| 4020-010060           |                                   |                                   | 6                                  | 28,000                                                                    | 3,300                            | 0.05                                     | 0.7                                       | 23,000                                           | 2,400                            | 0.05                                     | 0.6                                       | 18,000                                               | 1,500                            | 0.03                                     | 0.4                                       |
| 4020-010100           |                                   |                                   | 10                                 | 28,000                                                                    | 3,300                            | 0.05                                     | 0.7                                       | 23,000                                           | 2,400                            | 0.05                                     | 0.6                                       | 18,000                                               | 1,500                            | 0.03                                     | 0.4                                       |
| 4020-020040           |                                   | R0.2                              | 4                                  | 28,000                                                                    | 3,300                            | 0.07                                     | 0.7                                       | 23,000                                           | 2,500                            | 0.07                                     | 0.6                                       | 18,000                                               | 1,600                            | 0.03                                     | 0.4                                       |
| 4020-020060           |                                   |                                   | 6                                  | 28,000                                                                    | 3,300                            | 0.07                                     | 0.7                                       | 23,000                                           | 2,500                            | 0.07                                     | 0.6                                       | 18,000                                               | 1,600                            | 0.03                                     | 0.4                                       |
| 4020-020100           |                                   |                                   | 10                                 | 28,000                                                                    | 3,300                            | 0.07                                     | 0.7                                       | 23,000                                           | 2,500                            | 0.07                                     | 0.6                                       | 18,000                                               | 1,600                            | 0.03                                     | 0.4                                       |
| 4020-050060           |                                   | R0.5                              | 6                                  | 28,000                                                                    | 3,300                            | 0.1                                      | 0.7                                       | 23,000                                           | 2,600                            | 0.1                                      | 0.6                                       | 18,000                                               | 1,800                            | 0.03                                     | 0.4                                       |
| 4020-050100           |                                   |                                   | 10                                 | 28,000                                                                    | 3,300                            | 0.1                                      | 0.7                                       | 23,000                                           | 2,600                            | 0.1                                      | 0.6                                       | 18,000                                               | 1,800                            | 0.03                                     | 0.4                                       |
| 4030-005060           | 3                                 | R0.05                             | 6                                  | 23,000                                                                    | 3,000                            | 0.025                                    | 1.1                                       | 18,000                                           | 2,200                            | 0.025                                    | 0.9                                       | 13,000                                               | 1,300                            | 0.015                                    | 0.6                                       |
| 4030-005100           |                                   |                                   | 10                                 | 23,000                                                                    | 3,000                            | 0.025                                    | 1.1                                       | 18,000                                           | 2,200                            | 0.025                                    | 0.9                                       | 13,000                                               | 1,300                            | 0.015                                    | 0.6                                       |
| 4030-005150           |                                   |                                   | 15                                 | 23,000                                                                    | 2,100                            | 0.02                                     | 1.1                                       | 18,000                                           | 1,700                            | 0.02                                     | 0.9                                       | 13,000                                               | 1,200                            | 0.01                                     | 0.6                                       |
| 4030-010060           |                                   | R0.1                              | 6                                  | 23,000                                                                    | 3,700                            | 0.05                                     | 1.1                                       | 19,000                                           | 2,600                            | 0.05                                     | 0.9                                       | 15,000                                               | 1,500                            | 0.03                                     | 0.6                                       |
| 4030-010100           |                                   |                                   | 10                                 | 23,000                                                                    | 3,700                            | 0.05                                     | 1.1                                       | 19,000                                           | 2,600                            | 0.05                                     | 0.9                                       | 15,000                                               | 1,500                            | 0.03                                     | 0.6                                       |
| 4030-010150           |                                   |                                   | 15                                 | 23,000                                                                    | 2,600                            | 0.03                                     | 1.1                                       | 19,000                                           | 1,900                            | 0.03                                     | 0.9                                       | 15,000                                               | 1,200                            | 0.02                                     | 0.6                                       |
| 4030-020060           |                                   | R0.2                              | 6                                  | 23,000                                                                    | 3,700                            | 0.07                                     | 1.1                                       | 20,000                                           | 2,700                            | 0.07                                     | 0.9                                       | 16,000                                               | 1,600                            | 0.03                                     | 0.6                                       |
| 4030-020100           |                                   |                                   | 10                                 | 23,000                                                                    | 3,700                            | 0.07                                     | 1.1                                       | 20,000                                           | 2,700                            | 0.07                                     | 0.9                                       | 16,000                                               | 1,600                            | 0.03                                     | 0.6                                       |
| 4030-020150           |                                   |                                   | 15                                 | 23,000                                                                    | 2,600                            | 0.03                                     | 1.1                                       | 20,000                                           | 1,900                            | 0.03                                     | 0.9                                       | 16,000                                               | 1,200                            | 0.02                                     | 0.6                                       |

備考:

- ・機械の回転速度が足りない場合は、回転速度と送り速度を同じ比率で下げてください。
- ・工具損傷を抑えるため、オイルミストを推奨致します。

Note:

- ・Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
- ・Recommend oil mist to avoid tool damage.



## エンドミル取扱上の注意

CAUTION

エンドミルをご使用いただく際には、切削条件の不適合、切りくずの巻き付きや堆積、工具の摩耗などにより発熱や発火、加工物の損傷など重大な事故を招くことがありますので、十分ご注意ください。超硬エンドミルは鋭利な刃物ですから、取扱に際しては十分ご注意ください。

- 切刃に直接触れると怪我をすることがありますので、ケースから抜き取る際は十分ご注意ください。
- エンドミルを落としたりした場合、飛散した刃先で怪我をすることがありますので、取扱にご注意ください。
- 工具への衝撃的負荷や工具損傷により切削抵抗が増し、工具が飛散することがありますので、安全カバーや保護めがね等の保護具をご使用ください。
- 切削条件表は切削条件の目安を示すものです。実際の加工では被削材の材質、加工形状、機械剛性、主軸などの加工環境により、加工条件の最適化が必要となる場合があります。
- 振れの小さい剛性の高い機械をご使用ください。小径工具（φ1以下）においては振れ管理値：5μm以下を推奨致します。
- 発火性の高い切削油の使用は避けてください。

### エンドミル再研磨時の注意

- 超硬合金の研磨塵が目に入らないよう必ず保護めがねを着用してください。研磨塵を吸い込まないよう必ずマスクを着用してください。



## Advisory for Safe Use of End Mills

CAUTION

Correct application and operation is strongly advised to avoid clogging, abrasion, etc., that could cause serious accidents or injuries. Ignition or sparks generated during milling could lead to fire or extreme damage to the work piece.

End Mills are made with very sharp cutting edges and must be handled with extra care.

- Never touch the cutting edge with your bare hands, as this could cause serious injury. Special caution is required when opening the package.
- Dropping the tool could cause breakage or flying debris, leading to serious injury.
- During milling, unexpected impact or shock on the tool could cause breakage or flying debris. Ensure to use protective items such as safety glasses and a face guard.
- For best results, fine parameter adjustment may be required, depending on the materials; milling shape and strategy; machine rigidity and spindle capability.
- Use a machine that has high rigidity and generates a low level of vibration. Recommend setting the runout control value at 5μm or below for the small diameter tools φ1 or below.
- Do not use flammable cutting oils.

### Advisory for Regrinding End Mills

- Never regrind the tool without wearing safety glasses and a face guard.



ユニオンツール 株式会社

<https://www.uniontool.co.jp>

エンドミルの技術的なお問い合わせは下記まで



0120-60-2620

受付時間: 9:30~12:00, 13:00~16:30 (土曜、日曜、祝日、弊社休日を除く)

本カタログ品の仕様は、予告なしに変更することがありますのでご了承ください。

Price & Specifications are subject to change without notice.