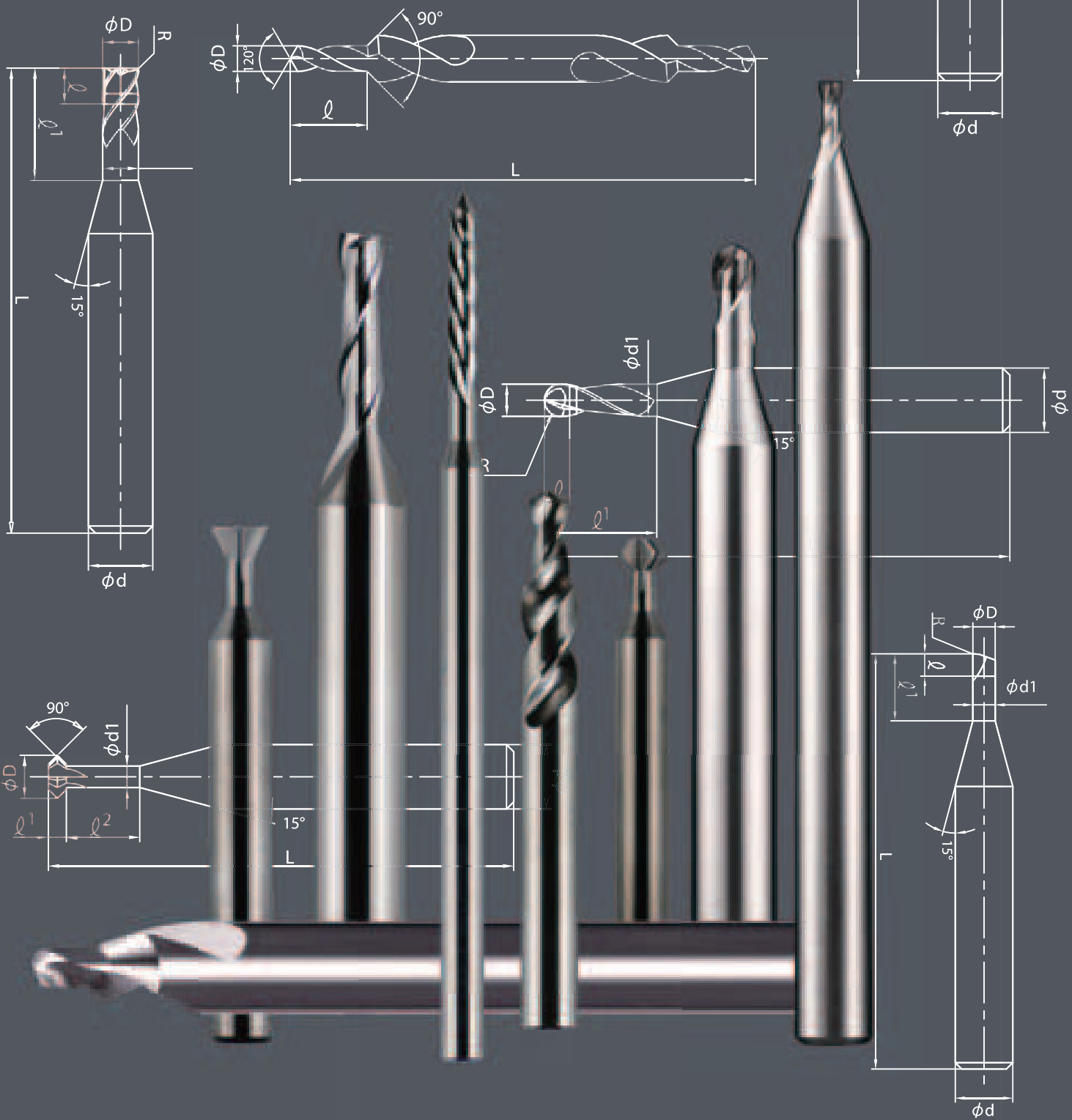




Technology of Micro-Tool For Infinity  
未来に向かってはばたく技術

# 切削工具 Vol.4

PCD  
CBN  
超硬

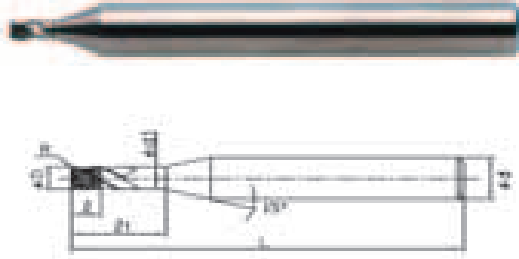


CBN 製品  
Cubic Boron Nitride

# SBRET-4

CBN 4枚刃スパイラル不等分割エンドミル  
CBN 4 Flutes Spiral Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高送りで高効率加工が可能。  
Possible to cut by High Feed and High Efficiency



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角30° Twist Angle 30°

コーナーR許容差 corner R Tolerance  
+0.005~-0.005

●切削条件表はP186に記載

●Cutting conditions are recommended on page186.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

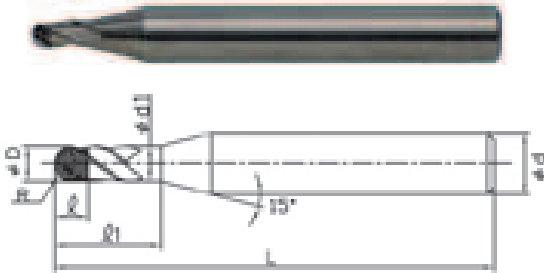
品番 Code No.	刃径 D Flute Diameter	コーナー R Corner R	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首下径 $d_1$ Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBRET-42000106	2	0.1	6	1.5	1.95	2	50	6	35,000
SBRET-42000112	2	0.1	12	1.5	1.95	2	50	6	37,300
SBRET-43000109	3	0.1	9	1.5	2.95	2	50	6	50,600
SBRET-43000118	3	0.1	18	1.5	2.95	2	60	6	52,300
SBRET-43000309	3	0.3	9	1.5	2.95	2	50	6	50,600
SBRET-43000318	3	0.3	18	1.5	2.95	2	60	6	52,300
SBRET-44000112	4	0.1	12	2	3.95	2	60	6	54,800
SBRET-44000124	4	0.1	24	2	3.95	2	70	6	60,900
SBRET-44000312	4	0.3	12	2	3.95	2	60	6	57,800
SBRET-44000324	4	0.3	24	2	3.95	2	70	6	60,900
SBRET-45000120	5	0.1	20	2	4.95	2	70	6	63,900
SBRET-45000320	5	0.3	20	2	4.95	2	70	6	63,900
SBRET-46000125	6	0.1	25	2	5.95	2	70	6	72,800
SBRET-46000325	6	0.3	25	2	5.95	2	70	6	72,800

CBN

# SBBE-3

## CBN 3枚刃スパイラルボールエンドミル CBN 3 Flutes Spiral Ball Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 切込量を多くする事が可能。  
Possible to increase the depth of cut
- 高送りで高能率加工が可能。  
Possible to cut by High Feed and High Efficiency



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

 刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

 ネジレ角30° Twist Angle 30°

 R許容差 R Tolerance  
+0.005~-0.005

●切削条件表はP187に記載

●Cutting conditions are recommended on page 187.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	R	刃径 D Flute Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBBE-3050	R0.5	1	2	1	1	50	6	27,000
SBBE-3075	R0.75	1.5	3	1.5	2	50	6	28,500
SBBE-3100	R1	2	4	1.5	2	50	6	30,000
SBBE-3150	R1.5	3	6	2	2	50	6	47,000

# SBREF-3

CBN 3枚刃スパイラルコーナーR付エンドミル  
CBN 3 Flutes Spiral Corner R Endmill


- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高送りで高能率加工が可能。  
Possible to cut by High Feed and High Efficiency

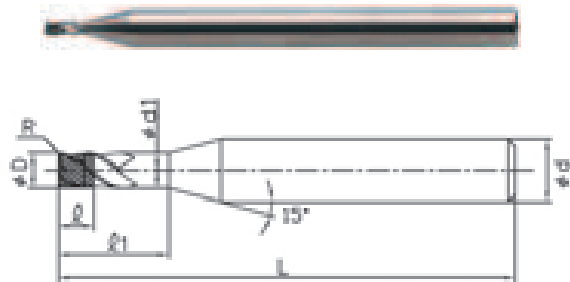
 CBN立方晶窒化ホウ素 Cubic Boron Nitride

 刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

 ネジレ角30° Twist Angle 30°

 コーナーR許容差 corner R Tolerance  
+0.005~-0.005



●切削条件表はP188に記載

●Cutting conditions are recommended on page 188.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

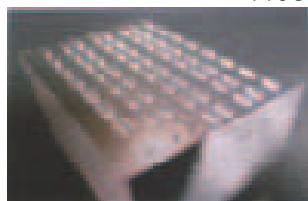
品番 Code No.	刃径 D Flute Diameter	コーナー R Corner R	有効長 l1 Effective Length	刃長 l Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBREF-303002010	0.3	R 0.02	1	0.5	0.26	0.6	50	4	30,000
SBREF-303002020	0.3	R 0.02	2	0.5	0.26	0.6	50	4	30,700
SBREF-303005010	0.3	R 0.05	1	0.5	0.26	0.6	50	4	30,000
SBREF-303005020	0.3	R 0.05	2	0.5	0.26	0.6	50	4	30,700
SBREF-304002012	0.4	R 0.02	1.2	0.5	0.36	0.6	50	4	28,400
SBREF-304002024	0.4	R 0.02	2.4	0.5	0.36	0.6	50	4	29,100
SBREF-304005012	0.4	R 0.05	1.2	0.5	0.36	0.6	50	4	28,400
SBREF-304005024	0.4	R 0.05	2.4	0.5	0.36	0.6	50	4	29,100
SBREF-305002015	0.5	R 0.02	1.5	0.5	0.46	0.6	50	4	27,600
SBREF-305002030	0.5	R 0.02	3	0.5	0.46	0.6	50	4	28,600
SBREF-305010015	0.5	R 0.1	1.5	0.5	0.46	0.6	50	4	27,600
SBREF-305010030	0.5	R 0.1	3	0.5	0.46	0.6	50	4	28,600
SBREF-306002018	0.6	R 0.02	1.8	0.6	0.56	0.6	50	4	27,600
SBREF-306002036	0.6	R 0.02	3.6	0.6	0.56	0.6	50	4	28,600
SBREF-306010018	0.6	R 0.1	1.8	0.6	0.56	0.6	50	4	27,600
SBREF-306010036	0.6	R 0.1	3.6	0.6	0.56	0.6	50	4	28,600
SBREF-307002021	0.7	R 0.02	2.1	0.7	0.66	1	50	4	27,600
SBREF-307002042	0.7	R 0.02	4.2	0.7	0.66	1	50	4	28,600
SBREF-307010021	0.7	R 0.1	2.1	0.7	0.66	1	50	4	27,600
SBREF-307010042	0.7	R 0.1	4.2	0.7	0.66	1	50	4	28,600
SBREF-308002024	0.8	R 0.02	2.4	0.8	0.76	1	50	4	27,000
SBREF-308002048	0.8	R 0.02	4.8	0.8	0.76	1	50	4	28,000
SBREF-308010024	0.8	R 0.1	2.4	0.8	0.76	1	50	4	27,000
SBREF-308010048	0.8	R 0.1	4.8	0.8	0.76	1	50	4	28,000
SBREF-309002027	0.9	R 0.02	2.7	0.9	0.85	1	50	4	27,000
SBREF-309002054	0.9	R 0.02	5.4	0.9	0.85	1	50	4	28,000

# SBREF-3

品番 Code No.	刃径 D Flute Diameter	コーナー R Corner R	有効長 ℓ1 Effective Length	刃長 ℓ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBREF-309010027	0.9	R 0.1	2.7	0.9	0.85	1	50	4	27,000
SBREF-309010054	0.9	R 0.1	5.4	0.9	0.85	1	50	4	28,000
SBREF-310002030	1	R 0.02	3	1	0.95	1	50	4	26,400
SBREF-310002040	1	R 0.02	4	1	0.95	1	50	4	27,400
SBREF-310002050	1	R 0.02	5	1	0.95	1	50	4	27,400
SBREF-310002060	1	R 0.02	6	1	0.95	1	50	4	27,400
SBREF-310002080	1	R 0.02	8	1	0.95	1	50	4	30,200
SBREF-310002100	1	R 0.02	10	1	0.95	1	50	4	31,600
SBREF-310010030	1	R 0.1	3	1	0.95	1	50	4	26,400
SBREF-310010040	1	R 0.1	4	1	0.95	1	50	4	27,400
SBREF-310010050	1	R 0.1	5	1	0.95	1	50	4	27,400
SBREF-310010060	1	R 0.1	6	1	0.95	1	50	4	27,400
SBREF-310010080	1	R 0.1	8	1	0.95	1	50	4	30,200
SBREF-310010100	1	R 0.1	10	1	0.95	1	50	4	31,600
SBREF-315002045	1.5	R 0.02	4.5	1.5	1.45	2	50	4	28,600
SBREF-315002090	1.5	R 0.02	9	1.5	1.45	2	50	4	30,000
SBREF-315010045	1.5	R 0.1	4.5	1.5	1.45	2	50	4	28,600
SBREF-315010090	1.5	R 0.1	9	1.5	1.45	2	50	4	30,000
SBREF-320002060	2	R 0.02	6	1.5	1.95	2	50	4	30,000
SBREF-320002120	2	R 0.02	12	1.5	1.95	2	50	4	31,800
SBREF-320010060	2	R 0.1	6	1.5	1.95	2	50	4	30,000
SBREF-320010120	2	R 0.1	12	1.5	1.95	2	50	4	31,800
SBREF-320020060	2	R 0.2	6	1.5	1.95	2	50	4	30,000
SBREF-320020120	2	R 0.2	12	1.5	1.95	2	50	4	31,800

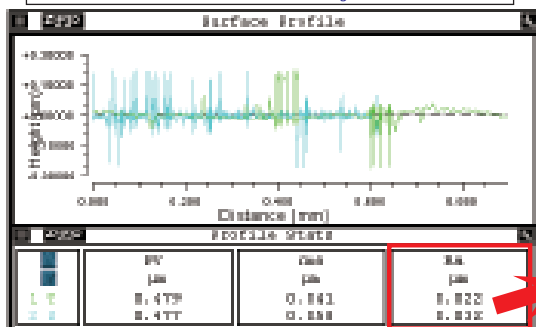
## 加工事例 Processing Example

刃径 φ0.5mm  
Flute Diameter φ0.5mm



仕上げ加工した金型  
(LEDコアピン64ヶ所)  
被削材: ELMAX (HRC60)  
Finishing Processed Die  
(LED Core Pin 64 Places)  
Work Material: ELMAX (HRC60)

面粗度実測値  
Actual Value of Surface Roughness



<テスト結果> <Test Result>

- ・寿命判定基準: 面粗度50nm
- ・LEDコアピン64ヶ所(1個)仕上加工
- ・工具形状: 3枚刃R付きエンドミル[φ0.5mm,R0.02mm]
- ・ Tool Life Judging Standard: Surface Roughness 50nm
- ・ LED Core Pin 64 Places (1 Piece) Finishing Process
- ・ Tool Shape: 3 Flutes Corner R Endmill[φ0.5mm,R0.02mm]

○超硬: コアピン数個で寿命  
○cBN: 連続2個(128コアピン)

- ・ Tungsten Carbide: Damaged in 5 to 6 Places Processing of Core Pin
- ・ cBN: 2 Pieces Continuous Processing (128 Core Pin)

↓

**超硬の数十倍の寿命を実現**  
Realized Dozens Times Tool Life of Tungsten Carbide

切削条件 Cutting Condition

- ・ 切削油: オイルミスト Cutting Oil: Oil Mist
- ・ S=19,000~40,000 r.p.m
- ・ Ad×Rd=0.02×0.002~0.005mm
- ・ F=360~1,500

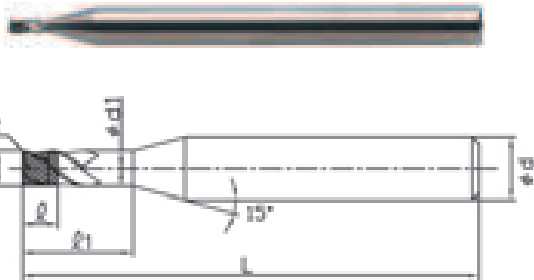
切削時間総計: 5時間30分  
Total Processing Time: 5 hours 30 minutes

手仕上げ研磨に並ぶ20~30nmの  
切削仕上げ面粗度を実現しました  
Realized 20 to 30nm Finishing Surface Roughness equal  
to Hand Finish Polishing

# SBRE-3

## CBN 3枚刃スパイラルコーナーR付エンドミル CBN 3 Flutes Spiral Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高送りで高能率加工が可能。  
Possible to cut by High Feed and High Efficiency



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角30° Twist Angle 30°

コーナーR許容差 coner R Tolerance  
+0.005~-0.005

●切削条件表はP188に記載

●Cutting conditions are recommended on page 188.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

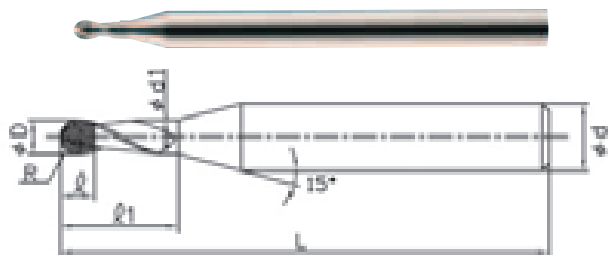
品番 Code No	刃径 D Flute Diameter	コーナー R Corner R	有効長 l1 Effective Length	刃長 l Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBRE-330002090	3	R 0.02	9	1.5	2.95	2	50	6	40,500
SBRE-330002180	3	R 0.02	18	1.5	2.95	2	60	6	42,000
SBRE-330010090	3	R 0.1	9	1.5	2.95	2	50	6	40,500
SBRE-330010180	3	R 0.1	18	1.5	2.95	2	60	6	42,000
SBRE-330020090	3	R 0.2	9	1.5	2.95	2	50	6	40,500
SBRE-330020180	3	R 0.2	18	1.5	2.95	2	60	6	42,000
SBRE-330050090	3	R 0.5	9	1.5	2.95	2	50	6	40,500
SBRE-330050180	3	R 0.5	18	1.5	2.95	2	60	6	42,000
SBRE-340005200	4	R 0.05	20	2	3.95	2	60	6	52,100
SBRE-340010200	4	R 0.1	20	2	3.95	2	60	6	52,100
SBRE-340020200	4	R 0.2	20	2	3.95	2	60	6	52,100
SBRE-340050200	4	R 0.5	20	2	3.95	2	60	6	52,100
SBRE-350005240	5	R 0.05	24	2	4.95	2	70	6	54,700
SBRE-350010240	5	R 0.1	24	2	4.95	2	70	6	54,700
SBRE-350020240	5	R 0.2	24	2	4.95	2	70	6	54,700
SBRE-350050240	5	R 0.5	24	2	4.95	2	70	6	54,700
SBRE-360005300	6	R 0.05	30	2	5.95	2	70	6	62,400
SBRE-360010300	6	R 0.1	30	2	5.95	2	70	6	62,400
SBRE-360020300	6	R 0.2	30	2	5.95	2	70	6	62,400
SBRE-360050300	6	R 0.5	30	2	5.95	2	70	6	62,400

CBN

# SBBEF-2

CBN 2枚刃スパイラルボールエンドミル  
CBN 2 Flutes Spiral Ball Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 切込量を多くする事が可能。  
Possible to increase the depth of cut



-  CBN立方晶窒化ホウ素 Cubic Boron Nitride
-  刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01
-  柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003
-  ネジレ角30° Twist Angle 30°
-  R許容差 R Tolerance  
+0.005~-0.005

●切削条件表はP189に記載

●Cutting conditions are recommended on page 189.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	R	刃径 D Flute Diameter	有効長 l1 Effective Length	刃長 l Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBBEF-2010006	R 0.1	0.2	0.6	0.2	0.18	0.4	50	4	25,000
SBBEF-2010012	R 0.1	0.2	1.2	0.2	0.18	0.4	50	4	25,500
SBBEF-2015009	R 0.15	0.3	0.9	0.3	0.28	0.6	50	4	24,300
SBBEF-2015018	R 0.15	0.3	1.8	0.3	0.28	0.6	50	4	25,000
SBBEF-2020012	R 0.2	0.4	1.2	0.4	0.37	0.6	50	4	23,100
SBBEF-2020024	R 0.2	0.4	2.4	0.4	0.37	0.6	50	4	23,600
SBBEF-2025015	R 0.25	0.5	1.5	0.5	0.46	0.6	50	4	22,400
SBBEF-2025030	R 0.25	0.5	3	0.5	0.46	0.6	50	4	23,100
SBBEF-2030018	R 0.3	0.6	1.8	0.6	0.56	0.6	50	4	21,000
SBBEF-2030036	R 0.3	0.6	3.6	0.6	0.56	0.6	50	4	21,500
SBBEF-2040024	R 0.4	0.8	2.4	0.8	0.76	1	50	4	21,000
SBBEF-2040048	R 0.4	0.8	4.8	0.8	0.76	1	50	4	21,500
SBBEF-2050030	R 0.5	1	3	1	0.95	1	50	4	20,500
SBBEF-2050040	R 0.5	1	4	1	0.95	1	50	4	21,000
SBBEF-2050050	R 0.5	1	5	1	0.95	1	50	4	21,000
SBBEF-2050060	R 0.5	1	6	1	0.95	1	50	4	21,000
SBBEF-2050080	R 0.5	1	8	1	0.95	1	50	4	23,100
SBBEF-2050100	R 0.5	1	10	1	0.95	1	50	4	24,100
SBBEF-2060036	R 0.6	1.2	3.6	1.2	1.15	2	50	4	21,500
SBBEF-2060072	R 0.6	1.2	7.2	1.2	1.15	2	50	4	22,000
SBBEF-2070042	R 0.7	1.4	4.2	1.4	1.35	2	50	4	21,500
SBBEF-2070084	R 0.7	1.4	8.4	1.4	1.35	2	50	4	22,000
SBBEF-2075045	R 0.75	1.5	4.5	1.5	1.45	2	50	4	21,500
SBBEF-2075090	R 0.75	1.5	9	1.5	1.45	2	50	4	22,000
SBBEF-2080048	R 0.8	1.6	4.8	1.5	1.55	2	50	4	22,000



# SBBEF-2

品番 Code No.	R	刃径 D Flute Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBBEF-2080096	R 0.8	1.6	9.6	1.5	1.55	2	50	4	22,400
SBBEF-2090054	R 0.9	1.8	5.4	1.5	1.75	2	50	4	22,000
SBBEF-2090108	R 0.9	1.8	10.8	1.5	1.75	2	50	4	22,400
SBBEF-2100060	R 1	2	6	1.5	1.95	2	50	4	22,000
SBBEF-2100120	R 1	2	12	1.5	1.95	2	50	4	22,400
SBBEF-2150090	R 1.5	3	9	2	2.95	2	50	4	35,400
SBBEF-2150180	R 1.5	3	18	2	2.95	2	60	4	36,700

## 加工設定 PROCESS SETTING

使用工具 Tool R1×有効長6 R1×Effective Length ×シャンクφ6 ×Shank Dia 6	(A) cBNスパイラル刃ボールエンドミル(荒・仕上加工) (A) cBN Spiral Flute Ball Endmill (Rough cutting & Finishing) (B) cBNストレート刃ボールエンドミル(仕上加工) (B) cBN Straight Flute Ball Endmill (Finishing) (C) TiAlNコーティング付超硬ボールエンドミル(荒・仕上加工) (A) TC Ball Endmill with TiAlN coating (Rough cutting & Finishing)	
加工物材質 Work Material	SKD11 (HRC62) 60mm×60mm×30mm	
使用機械 Machine	YASDA YBM-950V	
加工工程 Process	荒加工 Rough cutting	仕上加工 Finishing
回転数 Revolution	20,000min <sup>-1</sup>	20,000min <sup>-1</sup>
送り Feed	2,000mm/min	1,800mm/min
XY ピッチ XY Cutting	0.5mm	0.07mm
Z 切込み Z Cutting	0.1mm	0.06mm
加工深さ Cutting Depth	4.98mm	5mm
加工時間 Process Time	36min	11min
切削長さ Cutting Length	37.9m	38.1m

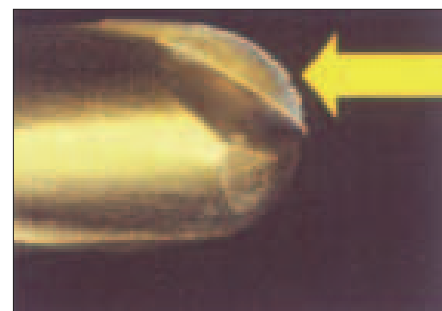
### チッピング発生 Chipping Outbreak



No.1 (A) cBNスパイラル刃エンドミル  
No.1 (A) cBN Spiral Endmill  
(6個加工後)  
(after 6pcs. Cutting)



No.2 (B) cBNストレート刃エンドミル  
No.2 (B) cBN Straight Endmill  
(2個加工後)  
(after 2pcs. Cutting)

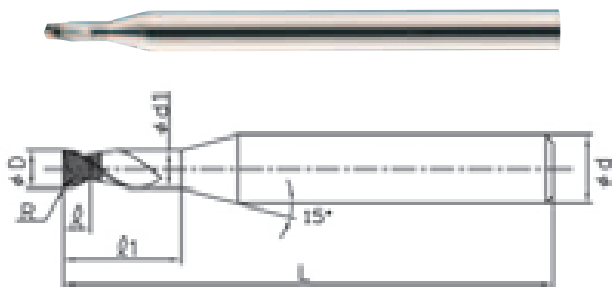


No.3 (C) 超硬エンドミル  
No.3 (C) TC Endmill  
(2個加工後)  
(after 2pcs. Cutting)

# SBREF-2

CBN 2枚刃スパイラルコーナーR付エンドミル  
CBN 2 Flutes Spiral Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 切込量を多くする事が可能。  
Possible to increase the depth of cut



- CBN立方晶窒化ホウ素 Cubic Boron Nitride
- 刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01
- 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003
- ネジレ角30° Twist Angle 30°
- コーナーR許容差 coner R Tolerance  
+0.005~-0.005

●切削条件表はP189に記載

●Cutting conditions are recommended on page 189.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 l1 Effective Length	刃長 l Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBREF-203003009	0.3	R 0.03	0.9	0.3	0.26	0.6	50	4	25,500
SBREF-203003018	0.3	R 0.03	1.8	0.3	0.26	0.6	50	4	26,200
SBREF-203005009	0.3	R 0.05	0.9	0.3	0.26	0.6	50	4	25,500
SBREF-203005018	0.3	R 0.05	1.8	0.3	0.26	0.6	50	4	26,200
SBREF-204003012	0.4	R 0.03	1.2	0.4	0.36	0.6	50	4	24,100
SBREF-204003024	0.4	R 0.03	2.4	0.4	0.36	0.6	50	4	24,800
SBREF-204010012	0.4	R 0.1	1.2	0.4	0.36	0.6	50	4	24,100
SBREF-204010024	0.4	R 0.1	2.4	0.4	0.36	0.6	50	4	24,800
SBREF-205003015	0.5	R 0.03	1.5	0.5	0.46	0.6	50	4	23,600
SBREF-205003030	0.5	R 0.03	3	0.5	0.46	0.6	50	4	24,300
SBREF-205010015	0.5	R 0.1	1.5	0.5	0.46	0.6	50	4	23,600
SBREF-205010030	0.5	R 0.1	3	0.5	0.46	0.6	50	4	24,300
SBREF-210003030	1	R 0.03	3	1	0.95	1	50	4	22,400
SBREF-210003040	1	R 0.03	4	1	0.95	1	50	4	23,400
SBREF-210003050	1	R 0.03	5	1	0.95	1	50	4	23,400
SBREF-210003060	1	R 0.03	6	1	0.95	1	50	4	23,400
SBREF-210003080	1	R 0.03	8	1	0.95	1	50	4	25,800
SBREF-210003100	1	R 0.03	10	1	0.95	1	50	4	27,000
SBREF-210010030	1	R 0.1	3	1	0.95	1	50	4	22,400
SBREF-210010040	1	R 0.1	4	1	0.95	1	50	4	23,400
SBREF-210010050	1	R 0.1	5	1	0.95	1	50	4	23,400
SBREF-210010060	1	R 0.1	6	1	0.95	1	50	4	23,400
SBREF-210010080	1	R 0.1	8	1	0.95	1	50	4	25,800
SBREF-210010100	1	R 0.1	10	1	0.95	1	50	4	27,000
SBREF-210020030	1	R 0.2	3	1	0.95	1	50	4	22,400
SBREF-210020040	1	R 0.2	4	1	0.95	1	50	4	23,400

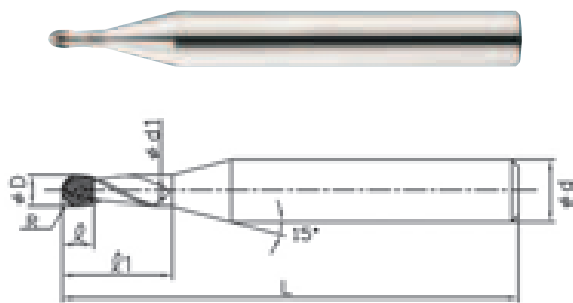
# SBREF-2

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBREF-210020050	1	R 0.2	5	1	0.95	1	50	4	23,400
SBREF-210020060	1	R 0.2	6	1	0.95	1	50	4	23,400
SBREF-210020080	1	R 0.2	8	1	0.95	1	50	4	25,800
SBREF-210020100	1	R 0.2	10	1	0.95	1	50	4	27,000
SBREF-215003045	1.5	R 0.03	4.5	1.5	1.45	2	50	4	24,300
SBREF-215003090	1.5	R 0.03	9	1.5	1.45	2	50	4	25,500
SBREF-215010045	1.5	R 0.1	4.5	1.5	1.45	2	50	4	24,300
SBREF-215010090	1.5	R 0.1	9	1.5	1.45	2	50	4	25,500
SBREF-215020045	1.5	R 0.2	4.5	1.5	1.45	2	50	4	24,300
SBREF-215020090	1.5	R 0.2	9	1.5	1.45	2	50	4	25,500
SBREF-220003060	2	R 0.03	6	1.5	1.95	2	50	4	25,500
SBREF-220003120	2	R 0.03	12	1.5	1.95	2	50	4	27,000
SBREF-220010060	2	R 0.1	6	1.5	1.95	2	50	4	25,500
SBREF-220010120	2	R 0.1	12	1.5	1.95	2	50	4	27,000
SBREF-220020060	2	R 0.2	6	1.5	1.95	2	50	4	25,500
SBREF-220020120	2	R 0.2	12	1.5	1.95	2	50	4	27,000
SBREF-220030060	2	R 0.3	6	1.5	1.95	2	50	4	25,500
SBREF-220030120	2	R 0.3	12	1.5	1.95	2	50	4	27,000
SBREF-230003090	3	R 0.03	9	2	2.95	2	50	4	34,500
SBREF-230003180	3	R 0.03	18	2	2.95	2	60	4	35,800
SBREF-230010090	3	R 0.1	9	2	2.95	2	50	4	34,500
SBREF-230010180	3	R 0.1	18	2	2.95	2	60	4	35,800
SBREF-230020090	3	R 0.2	9	2	2.95	2	50	4	34,500
SBREF-230020180	3	R 0.2	18	2	2.95	2	60	4	35,800
SBREF-230030090	3	R 0.3	9	2	2.95	2	50	4	34,500
SBREF-230030180	3	R 0.3	18	2	2.95	2	60	4	35,800
SBREF-230050090	3	R 0.5	9	2	2.95	2	50	4	34,500
SBREF-230050180	3	R 0.5	18	2	2.95	2	60	4	35,800

# SBBE-2

## CBN 2枚刃スパイラルボールエンドミル CBN 2 Flutes Spiral Ball Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 切込量を多くする事が可能。  
Possible to increase the depth of cut



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角30° Twist Angle 30°

R許容差 R Tolerance  
+0.005~-0.005

●切削条件表はP189に記載

●Cutting conditions are recommended on page 189.

単位[寸法:mm/価格:円]

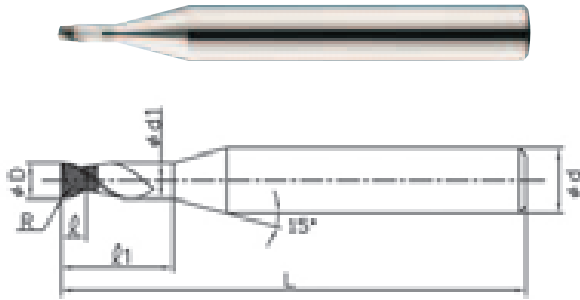
Unit [size:mm/Retail Price:JPY]

品番 Code No.	R	刃径 D Flute Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBBE-2010	R 0.1	0.2	0.6	0.2	0.18	0.4	50	6	25,500
SBBE-2015	R 0.15	0.3	0.9	0.3	0.28	0.6	50	6	25,000
SBBE-2020	R 0.2	0.4	1.2	0.4	0.37	0.6	50	6	23,600
SBBE-2025	R 0.25	0.5	1.5	0.5	0.46	0.6	50	6	23,100
SBBE-2030	R 0.3	0.6	1.8	0.6	0.56	0.6	50	6	21,500
SBBE-2040	R 0.4	0.8	2.4	0.8	0.76	1	50	6	21,500
SBBE-2050	R 0.5	1	3	1	0.95	1	50	6	21,000
SBBE-2060	R 0.6	1.2	3.6	1.2	1.15	2	50	6	22,100
SBBE-2070	R 0.7	1.4	4.2	1.4	1.35	2	50	6	22,100
SBBE-2075	R 0.75	1.5	4.5	1.5	1.45	2	50	6	22,100
SBBE-2080	R 0.8	1.6	4.8	1.5	1.55	2	50	6	22,700
SBBE-2090	R 0.9	1.8	5.4	1.5	1.75	2	50	6	22,700
SBBE-2100	R 1	2	6	1.5	1.95	2	50	6	22,700
SBBE-2150	R 1.5	3	9	2	2.95	2	50	6	36,700
SBBE-2200	R 2	4	12	2.5	3.95	2.5	50	6	54,300
SBBE-2250	R 2.5	5	15	3	4.95	3.5	60	6	65,500
SBBE-2300	R 3	6	20	3.5	5.95	3.5	60	6	72,900

# SBRE-2

## CBN 2枚刃スパイラルコーナーR付エンドミル CBN 2 Flutes Spiral Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 切込量を多くする事が可能。  
Possible to increase the depth of cut



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角30° Twist Angle 30°

コーナーR許容差 Corner R Tolerance  
+0.005~-0.005

●切削条件表はP189に記載

●Cutting conditions are recommended on page 189.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

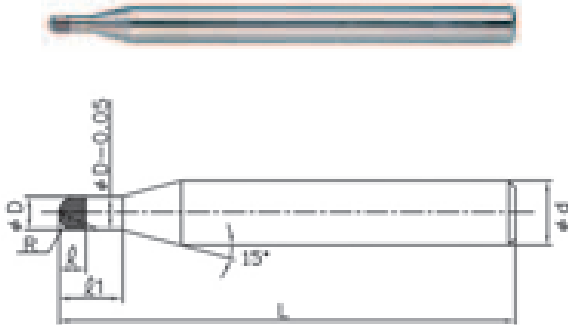
品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 ℓ1 Effective Length	刃長 ℓ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
SBRE-203005	0.3	R 0.05	0.9	0.3	0.26	0.6	50	6	26,200
SBRE-204005	0.4	R 0.05	1.2	0.4	0.36	0.6	50	6	24,800
SBRE-205010	0.5	R 0.1	1.5	0.5	0.46	0.6	50	6	24,300
SBRE-210010	1	R 0.1	3	1	0.95	1	50	6	23,400
SBRE-210020	1	R 0.2	3	1	0.95	1	50	6	23,400
SBRE-215010	1.5	R 0.1	4.5	1.5	1.45	2	50	6	25,500
SBRE-215020	1.5	R 0.2	4.5	1.5	1.45	2	50	6	25,500
SBRE-220020	2	R 0.2	6	1.5	1.95	2	50	6	27,000
SBRE-220030	2	R 0.3	6	1.5	1.95	2	50	6	27,000
SBRE-230020	3	R 0.2	9	2	2.95	2	50	6	35,800
SBRE-230030	3	R 0.3	9	2	2.95	2	50	6	35,800
SBRE-230050	3	R 0.5	9	2	2.95	2	50	6	35,800
SBRE-240003	4	R 0.03	12	2	3.95	2	50	6	44,300
SBRE-240010	4	R 0.1	12	2	3.95	2	50	6	44,300
SBRE-240020	4	R 0.2	12	2	3.95	2	50	6	44,300
SBRE-240030	4	R 0.3	12	2	3.95	2	50	6	44,300
SBRE-240050	4	R 0.5	12	2	3.95	2	50	6	44,300
SBRE-250003	5	R 0.03	15	2	4.95	2	60	6	46,500
SBRE-250010	5	R 0.1	15	2	4.95	2	60	6	46,500
SBRE-250020	5	R 0.2	15	2	4.95	2	60	6	46,500
SBRE-250030	5	R 0.3	15	2	4.95	2	60	6	46,500
SBRE-250050	5	R 0.5	15	2	4.95	2	60	6	46,500
SBRE-260003	6	R 0.03	20	2	5.95	2	60	6	53,100
SBRE-260010	6	R 0.1	20	2	5.95	2	60	6	53,100
SBRE-260020	6	R 0.2	20	2	5.95	2	60	6	53,100
SBRE-260030	6	R 0.3	20	2	5.95	2	60	6	53,100
SBRE-260050	6	R 0.5	20	2	5.95	2	60	6	53,100

CBN

# BSB-2

## CBN 2枚刃ボールエンドミル CBN 2 Flutes Ball Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life.




**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

 刃径の許容差 Flute Diameter Tolerance  
D 0~-0.02

 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.006

 ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

 R許容差 R Tolerance  
+0.01~-0.01

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

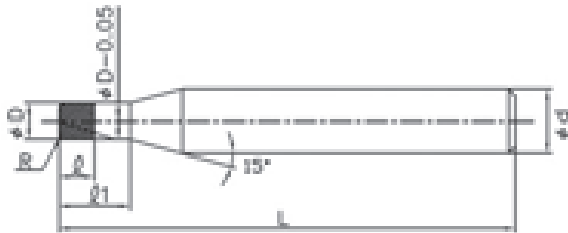
Unit [size:mm/Retail Price:JPY]

品番 Code No.	R	刃径 D Flute Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BSB-2020008	R 0.2	0.4	0.8	0.5	0.6	40	3	25,000
BSB-2025010	R 0.25	0.5	1	0.5	0.6	40	3	25,000
BSB-2030012	R 0.3	0.6	1.2	0.6	0.6	40	3	25,000
BSB-2040016	R 0.4	0.8	1.6	0.8	1	40	3	25,000
BSB-2050020	R 0.5	1	2	1	1	50	4	19,200
BSB-2060024	R 0.6	1.2	2.4	1.2	2	50	4	28,000
BSB-2070028	R 0.7	1.4	2.8	1.2	2	50	4	28,000
BSB-2075030	R 0.75	1.5	3	1.2	2	50	4	28,000
BSB-2080032	R 0.8	1.6	3.2	1.2	2	50	4	28,000
BSB-2090036	R 0.9	1.8	3.6	1.5	2	50	4	28,000
BSB-2100040	R 1	2	4	1.5	2	50	4	21,500

# BSR-2

## CBN 2枚刃コーナーR付エンドミル CBN 2 Flutes Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life.



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.02

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.006

ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

コーナーR許容差 corner R Tolerance  
+0.02~-0.02

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

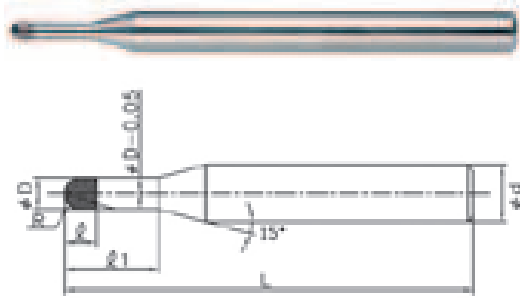
品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 l1 Effective Length	刃長 l Flute Length	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BSR-20501001	0.5	R 0.1	1	0.5	0.6	40	3	20,000
BSR-20501002	0.5	R 0.2	1	0.5	0.6	40	3	22,700
BSR-20601201	0.6	R 0.1	1.2	0.6	0.6	40	3	22,700
BSR-20601202	0.6	R 0.2	1.2	0.6	0.6	40	3	22,700
BSR-20701401	0.7	R 0.1	1.4	0.7	1	40	3	22,700
BSR-20701402	0.7	R 0.2	1.4	0.7	1	40	3	22,700
BSR-20801601	0.8	R 0.1	1.6	0.8	1	40	3	22,700
BSR-20801602	0.8	R 0.2	1.6	0.8	1	40	3	22,700
BSR-20901801	0.9	R 0.1	1.8	0.9	1	40	3	22,700
BSR-20901802	0.9	R 0.2	1.8	0.9	1	40	3	22,700
BSR-21002001	1	R 0.1	2	1	1	50	4	18,000
BSR-21002002	1	R 0.2	2	1	1	50	4	21,000
BSR-21002003	1	R 0.3	2	1	1	50	4	21,000
BSR-21503001	1.5	R 0.1	3	1.5	2	50	4	21,000
BSR-21503002	1.5	R 0.2	3	1.5	2	50	4	23,800
BSR-21503003	1.5	R 0.3	3	1.5	2	50	4	23,800
BSR-22004001	2	R 0.1	4	1.5	2	50	4	26,300
BSR-22004002	2	R 0.2	4	1.5	2	50	4	22,200
BSR-22004003	2	R 0.3	4	1.5	2	50	4	26,300
BSR-22004004	2	R 0.4	4	1.5	2	50	4	26,300
BSR-22004005	2	R 0.5	4	1.5	2	50	4	26,300

CBN


# BRB-2

## CBN 2枚刃リブ用ボールエンドミル CBN 2 Flutes Ball Endmill for Deep Rib

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 深い加工用に首下を長くとりました。  
Lengthened neck for deep processing



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

 刃径の許容差 Flute Diameter Tolerance  
D 0~-0.02

 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.006

 ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

 R許容差 R Tolerance  
+0.01~-0.01

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

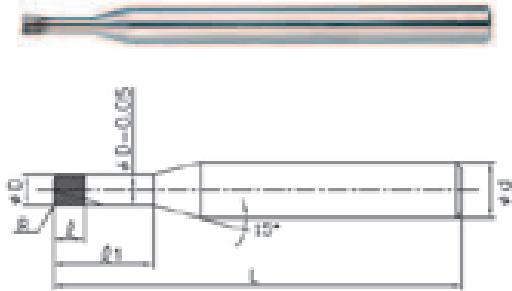
品番 Code No.	R	刃径 D Flute Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	CBN 層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BRB-2020020	R 0.2	0.4	2	0.5	0.6	40	3	27,500
BRB-2020040	R 0.2	0.4	4	0.5	0.6	40	3	31,000
BRB-2025020	R 0.25	0.5	2	0.5	0.6	40	3	27,500
BRB-2025040	R 0.25	0.5	4	0.5	0.6	40	3	31,000
BRB-2030020	R 0.3	0.6	2	0.6	0.6	40	3	27,500
BRB-2030040	R 0.3	0.6	4	0.6	0.6	40	3	31,000
BRB-2040040	R 0.4	0.8	4	0.8	1	40	3	27,500
BRB-2040060	R 0.4	0.8	6	0.8	1	40	3	31,000
BRB-2050040	R 0.5	1	4	1	1	50	4	21,000
BRB-2050060	R 0.5	1	6	1	1	50	4	22,900
BRB-2050080	R 0.5	1	8	1	1	50	4	25,000
BRB-2050100	R 0.5	1	10	1	1	50	4	26,200
BRB-2060050	R 0.6	1.2	5	1.2	2	50	4	30,500
BRB-2060080	R 0.6	1.2	8	1.2	2	50	4	35,800
BRB-2070050	R 0.7	1.4	5	1.2	2	50	4	30,500
BRB-2070080	R 0.7	1.4	8	1.2	2	50	4	35,800
BRB-2080050	R 0.8	1.6	5	1.2	2	50	4	30,500
BRB-2080080	R 0.8	1.6	8	1.2	2	50	4	35,800
BRB-2090050	R 0.9	1.8	5	1.5	2	50	4	30,500
BRB-2090080	R 0.9	1.8	8	1.5	2	50	4	35,800
BRB-2100060	R 1	2	6	1.5	2	50	4	23,800
BRB-2100080	R 1	2	8	1.5	2	50	4	25,000
BRB-2100100	R 1	2	10	1.5	2	50	4	26,500



# BRR-2

## CBN 2枚刃リブ用コーナーR付エンドミル CBN 2 Flutes Corner R Endmill for Deep Rib

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 深い加工用に首下を長くとりました。  
Lengthened neck for deep processing



- CBN立方晶窒化ホウ素 Cubic Boron Nitride
- 刃径の許容差 Flute Diameter Tolerance  
D 0~-0.02
- 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.006
- ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)
- コーナーR許容差 corner R Tolerance  
+0.02~-0.02

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 l1 Effective Length	刃長 l Flute Length	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BRR-20502001	0.5	R 0.1	2	0.5	0.6	40	3	25,000
BRR-20504001	0.5	R 0.1	4	0.5	0.6	40	3	29,800
BRR-20502002	0.5	R 0.2	2	0.5	0.6	40	3	25,000
BRR-20504002	0.5	R 0.2	4	0.5	0.6	40	3	29,800
BRR-20602001	0.6	R 0.1	2	0.6	0.6	40	3	25,000
BRR-20604001	0.6	R 0.1	4	0.6	0.6	40	3	29,800
BRR-20602002	0.6	R 0.2	2	0.6	0.6	40	3	25,000
BRR-20604002	0.6	R 0.2	4	0.6	0.6	40	3	29,800
BRR-20702001	0.7	R 0.1	2	0.7	1	40	3	25,000
BRR-20704001	0.7	R 0.1	4	0.7	1	40	3	29,800
BRR-20702002	0.7	R 0.2	2	0.7	1	40	3	25,000
BRR-20704002	0.7	R 0.2	4	0.7	1	40	3	29,800
BRR-20804001	0.8	R 0.1	4	0.8	1	40	3	28,700
BRR-20806001	0.8	R 0.1	6	0.8	1	40	3	33,000
BRR-20804002	0.8	R 0.2	4	0.8	1	40	3	28,700
BRR-20806002	0.8	R 0.2	6	0.8	1	40	3	33,000
BRR-20904001	0.9	R 0.1	4	0.9	1	40	3	28,700
BRR-20906001	0.9	R 0.1	6	0.9	1	40	3	33,000
BRR-20904002	0.9	R 0.2	4	0.9	1	40	3	28,700
BRR-20906002	0.9	R 0.2	6	0.9	1	40	3	33,000
BRR-21004001	1	R 0.1	4	1	1	50	4	20,500
BRR-21006001	1	R 0.1	6	1	1	50	4	23,800
BRR-21008001	1	R 0.1	8	1	1	50	4	28,700
BRR-21010001	1	R 0.1	10	1	1	50	4	35,800
BRR-21004002	1	R 0.2	4	1	1	50	4	20,500
BRR-21006002	1	R 0.2	6	1	1	50	4	23,800

CBN

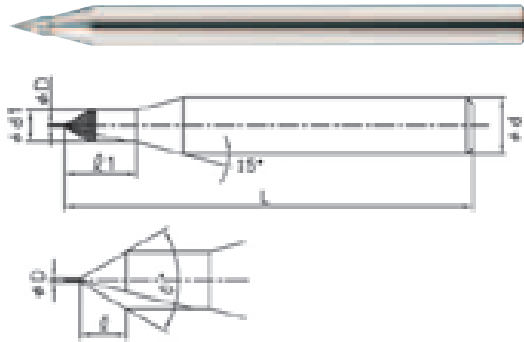
# BRR-2

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BRR-21008002	1	R 0.2	8	1	1	50	4	28,700
BRR-21010002	1	R 0.2	10	1	1	50	4	35,800
BRR-21004003	1	R 0.3	4	1	1	50	4	20,500
BRR-21006003	1	R 0.3	6	1	1	50	4	23,800
BRR-21008003	1	R 0.3	8	1	1	50	4	28,700
BRR-21010003	1	R 0.3	10	1	1	50	4	35,800
BRR-21505001	1.5	R 0.1	5	1.5	2	50	4	28,700
BRR-21508001	1.5	R 0.1	8	1.5	2	50	4	34,700
BRR-21505002	1.5	R 0.2	5	1.5	2	50	4	28,700
BRR-21508002	1.5	R 0.2	8	1.5	2	50	4	34,700
BRR-21505003	1.5	R 0.3	5	1.5	2	50	4	28,700
BRR-21508003	1.5	R 0.3	8	1.5	2	50	4	34,700
BRR-22006001	2	R 0.1	6	1.5	2	50	4	25,000
BRR-22008001	2	R 0.1	8	1.5	2	50	4	28,700
BRR-22010001	2	R 0.1	10	1.5	2	50	4	30,000
BRR-22006002	2	R 0.2	6	1.5	2	50	4	25,000
BRR-22008002	2	R 0.2	8	1.5	2	50	4	28,700
BRR-22010002	2	R 0.2	10	1.5	2	50	4	30,000
BRR-22006003	2	R 0.3	6	1.5	2	50	4	25,000
BRR-22008003	2	R 0.3	8	1.5	2	50	4	28,700
BRR-22010003	2	R 0.3	10	1.5	2	50	4	30,000
BRR-22006004	2	R 0.4	6	1.5	2	50	4	25,000
BRR-22008004	2	R 0.4	8	1.5	2	50	4	28,700
BRR-22010004	2	R 0.4	10	1.5	2	50	4	30,000
BRR-22006005	2	R 0.5	6	1.5	2	50	4	25,000
BRR-22008005	2	R 0.5	8	1.5	2	50	4	28,700
BRR-22010005	2	R 0.5	10	1.5	2	50	4	30,000


# BVEF-2

## CBN V形エンドミル CBN 2 Flutes V type Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- V溝、文字彫加工に最適。  
Most suitable for V groove and engraving processing




**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

 刃径の許容差 Flute Diameter Tolerance  
D +0.02~-0.02

 柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

 ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

 先端角度 Edge Angle  
+15' ~-15'

●切削条件表はP191に記載

●Cutting conditions are recommended on page 191.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

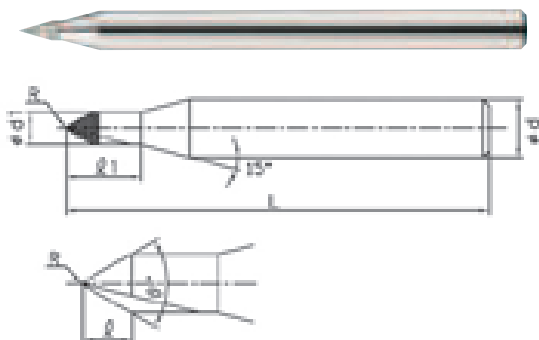
品番 Code No.	先端角 $\theta$ Edge Angle	先端径 D Edge Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BVEF-2030005	30°	0.05	6	3.64	2	2	50	4	28,600
BVEF-2030010	30°	0.1	6	3.54	2	2	50	4	28,600
BVEF-2040005	40°	0.05	4	2.68	2	2	50	4	28,600
BVEF-2040010	40°	0.1	4	2.61	2	2	50	4	28,600
BVEF-2060005	60°	0.05	4	1.69	2	2	50	4	26,000
BVEF-2060010	60°	0.1	4	1.65	2	2	50	4	26,000
BVEF-2090005	90°	0.05	4	0.975	2	2	50	4	26,000
BVEF-2090010	90°	0.1	4	0.95	2	2	50	4	26,000

# BVREF-2

CBN V形R付エンドミル  
CBN 2 Flutes R type Endmill

■高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel

■V溝、文字彫加工に最適。  
Most suitable for V groove and engraving processing



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

先端角度 Edge Angle  
+15' ~-15'

R許容差 R Tolerance  
+0.02~-0.02

●切削条件表はP191に記載

●Cutting conditions are recommended on page 191.

単位[寸法:mm/価格:円]

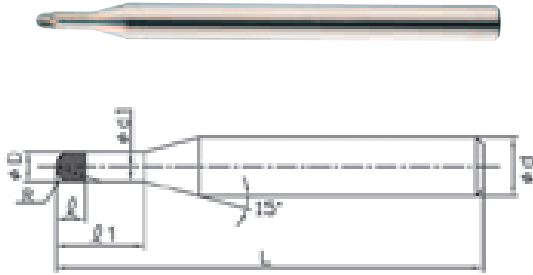
Unit [size:mm/Retail Price:JPY]

品番 Code No.	先端角 $\theta$ Edge Angle	先端 R Edge R	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BVREF-2030010	30°	R 0.1	6	3.64	2	2	50	4	34,100
BVREF-2030020	30°	R 0.2	6	3.54	2	2	50	4	34,100
BVREF-2040010	40°	R 0.1	4	2.68	2	2	50	4	34,100
BVREF-2040020	40°	R 0.2	4	2.61	2	2	50	4	34,100
BVREF-2060010	60°	R 0.1	4	1.69	2	2	50	4	31,000
BVREF-2060020	60°	R 0.2	4	1.65	2	2	50	4	31,000
BVREF-2090010	90°	R 0.1	4	0.975	2	2	50	4	31,000
BVREF-2090020	90°	R 0.2	4	0.95	2	2	50	4	31,000

# BBEF-2

## CBN 2枚刃ボールエンドミル CBN 2 Flutes Ball Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

R許容差 R Tolerance  
+0.005~-0.005

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

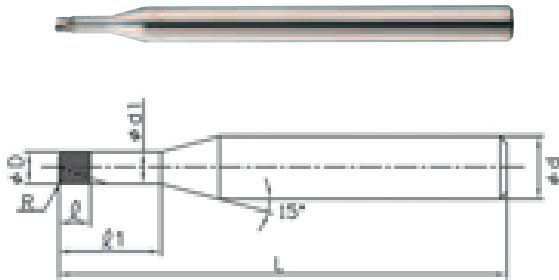
Unit [size:mm/Retail Price:JPY]

品番 Code No.	R	刃径 D Flute Diameter	有効長 l1 Effective Length	刃長 l Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BBEF-2010006	R 0.1	0.2	0.6	0.2	0.18	0.4	50	4	20,800
BBEF-2010012	R 0.1	0.2	1.2	0.2	0.18	0.4	50	4	21,200
BBEF-2015009	R 0.15	0.3	0.9	0.3	0.28	0.6	50	4	20,300
BBEF-2015018	R 0.15	0.3	1.8	0.3	0.28	0.6	50	4	20,800
BBEF-2020012	R 0.2	0.4	1.2	0.4	0.37	0.6	50	4	19,100
BBEF-2020024	R 0.2	0.4	2.4	0.4	0.37	0.6	50	4	19,600
BBEF-2025015	R 0.25	0.5	1.5	0.5	0.46	0.6	50	4	18,700
BBEF-2025030	R 0.25	0.5	3	0.5	0.46	0.6	50	4	19,100
BBEF-2030018	R 0.3	0.6	1.8	0.6	0.56	0.6	50	4	17,400
BBEF-2030036	R 0.3	0.6	3.6	0.6	0.56	0.6	50	4	17,900
BBEF-2040024	R 0.4	0.8	2.4	0.8	0.76	1	50	4	17,400
BBEF-2040048	R 0.4	0.8	4.8	0.8	0.76	1	50	4	17,900
BBEF-2050030	R 0.5	1	3	1	0.95	1	50	4	17,000
BBEF-2050060	R 0.5	1	6	1	0.95	1	50	4	17,400
BBEF-2060036	R 0.6	1.2	3.6	1.2	1.15	2	50	4	17,900
BBEF-2060072	R 0.6	1.2	7.2	1.2	1.15	2	50	4	18,400
BBEF-2070042	R 0.7	1.4	4.2	1.4	1.35	2	50	4	17,900
BBEF-2070084	R 0.7	1.4	8.4	1.4	1.35	2	50	4	18,400
BBEF-2075045	R 0.75	1.5	4.5	1.5	1.45	2	50	4	17,900
BBEF-2075090	R 0.75	1.5	9	1.5	1.45	2	50	4	18,400
BBEF-2080048	R 0.8	1.6	4.8	1.5	1.55	2	50	4	18,400
BBEF-2080096	R 0.8	1.6	9.6	1.5	1.55	2	50	4	18,700
BBEF-2090054	R 0.9	1.8	5.4	1.5	1.75	2	50	4	18,400
BBEF-2090108	R 0.9	1.8	10.8	1.5	1.75	2	50	4	18,700
BBEF-2100060	R 1	2	6	1.5	1.95	2	50	4	18,400
BBEF-2100120	R 1	2	12	1.5	1.95	2	50	4	18,700
BBEF-2150090	R 1.5	3	9	2	2.95	2	50	4	29,500
BBEF-2150180	R 1.5	3	18	2	2.95	2	60	4	30,600

# BREF-2

## CBN 2枚刃コーナーR付エンドミル CBN 2 Flutes Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

コーナーR許容差 corner R Tolerance  
+0.005~-0.005

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 l1 Effective Length	刃長 l Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BREF-203003005	0.3	R 0.03	0.5	0.3	0.26	0.6	50	4	21,500
BREF-203003009	0.3	R 0.03	0.9	0.3	0.26	0.6	50	4	21,500
BREF-203003018	0.3	R 0.03	1.8	0.3	0.26	0.6	50	4	22,000
BREF-203005005	0.3	R 0.05	0.5	0.3	0.26	0.6	50	4	21,500
BREF-203005009	0.3	R 0.05	0.9	0.3	0.26	0.6	50	4	21,500
BREF-203005018	0.3	R 0.05	1.8	0.3	0.26	0.6	50	4	22,000
BREF-204003005	0.4	R 0.03	0.5	0.4	0.36	0.6	50	4	20,000
BREF-204003012	0.4	R 0.03	1.2	0.4	0.36	0.6	50	4	20,000
BREF-204003024	0.4	R 0.03	2.4	0.4	0.36	0.6	50	4	20,600
BREF-204005005	0.4	R 0.05	0.5	0.4	0.36	0.6	50	4	20,000
BREF-204005012	0.4	R 0.05	1.2	0.4	0.36	0.6	50	4	20,000
BREF-204005024	0.4	R 0.05	2.4	0.4	0.36	0.6	50	4	20,600
BREF-204010005	0.4	R 0.1	0.5	0.4	0.36	0.6	50	4	20,000
BREF-204010012	0.4	R 0.1	1.2	0.4	0.36	0.6	50	4	20,000
BREF-204010024	0.4	R 0.1	2.4	0.4	0.36	0.6	50	4	20,600
BREF-205003005	0.5	R 0.03	0.5	0.5	-	0.6	50	4	19,100
BREF-205003010	0.5	R 0.03	1	0.5	0.46	0.6	50	4	19,600
BREF-205003015	0.5	R 0.03	1.5	0.5	0.46	0.6	50	4	19,600
BREF-205003020	0.5	R 0.03	2	0.5	0.46	0.6	50	4	20,300
BREF-205003030	0.5	R 0.03	3	0.5	0.46	0.6	50	4	20,300
BREF-205005005	0.5	R 0.05	0.5	0.5	-	0.6	50	4	19,100
BREF-205005010	0.5	R 0.05	1	0.5	0.46	0.6	50	4	19,600
BREF-205005015	0.5	R 0.05	1.5	0.5	0.46	0.6	50	4	19,600
BREF-205005020	0.5	R 0.05	2	0.5	0.46	0.6	50	4	20,300
BREF-205005030	0.5	R 0.05	3	0.5	0.46	0.6	50	4	20,300
BREF-205010005	0.5	R 0.1	0.5	0.5	-	0.6	50	4	19,100

# BREF-2

CBN

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 ℓ1 Effective Length	刃長 ℓ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BREF-205010010	0.5	R0.1	1	0.5	0.46	0.6	50	4	19,600
BREF-205010015	0.5	R0.1	1.5	0.5	0.46	0.6	50	4	19,600
BREF-205010020	0.5	R0.1	2	0.5	0.46	0.6	50	4	20,300
BREF-205010030	0.5	R0.1	3	0.5	0.46	0.6	50	4	20,300
BREF-210003020	1	R0.03	2	1	0.95	1	50	4	18,700
BREF-210003030	1	R0.03	3	1	0.95	1	50	4	18,700
BREF-210003040	1	R0.03	4	1	0.95	1	50	4	19,600
BREF-210003050	1	R0.03	5	1	0.95	1	50	4	19,600
BREF-210003060	1	R0.03	6	1	0.95	1	50	4	19,600
BREF-210003080	1	R0.03	8	1	0.95	1	50	4	21,500
BREF-210003100	1	R0.03	10	1	0.95	1	50	4	22,400
BREF-210005020	1	R0.05	2	1	0.95	1	50	4	18,700
BREF-210005030	1	R0.05	3	1	0.95	1	50	4	18,700
BREF-210005040	1	R0.05	4	1	0.95	1	50	4	19,600
BREF-210005050	1	R0.05	5	1	0.95	1	50	4	19,600
BREF-210005060	1	R0.05	6	1	0.95	1	50	4	19,600
BREF-210005080	1	R0.05	8	1	0.95	1	50	4	21,500
BREF-210005100	1	R0.05	10	1	0.95	1	50	4	22,400
BREF-210010020	1	R0.1	2	1	0.95	1	50	4	18,700
BREF-210010030	1	R0.1	3	1	0.95	1	50	4	18,700
BREF-210010040	1	R0.1	4	1	0.95	1	50	4	19,600
BREF-210010050	1	R0.1	5	1	0.95	1	50	4	19,600
BREF-210010060	1	R0.1	6	1	0.95	1	50	4	19,600
BREF-210010080	1	R0.1	8	1	0.95	1	50	4	21,500
BREF-210010100	1	R0.1	10	1	0.95	1	50	4	22,400
BREF-210020020	1	R0.2	2	1	0.95	1	50	4	18,700
BREF-210020030	1	R0.2	3	1	0.95	1	50	4	18,700
BREF-210020040	1	R0.2	4	1	0.95	1	50	4	19,600
BREF-210020050	1	R0.2	5	1	0.95	1	50	4	19,600
BREF-210020060	1	R0.2	6	1	0.95	1	50	4	19,600
BREF-210020080	1	R0.2	8	1	0.95	1	50	4	21,500
BREF-210020100	1	R0.2	10	1	0.95	1	50	4	22,400
BREF-215003045	1.5	R0.03	4.5	1.5	1.45	2	50	4	20,300
BREF-215003090	1.5	R0.03	9	1.5	1.45	2	50	4	21,200
BREF-215005045	1.5	R0.05	4.5	1.5	1.45	2	50	4	20,300
BREF-215005090	1.5	R0.05	9	1.5	1.45	2	50	4	21,200
BREF-215010045	1.5	R0.1	4.5	1.5	1.45	2	50	4	20,300
BREF-215010090	1.5	R0.1	9	1.5	1.45	2	50	4	21,200
BREF-215020045	1.5	R0.2	4.5	1.5	1.45	2	50	4	20,300
BREF-215020090	1.5	R0.2	9	1.5	1.45	2	50	4	21,200
BREF-220003060	2	R0.03	6	1.5	1.95	2	50	4	21,200
BREF-220003120	2	R0.03	12	1.5	1.95	2	50	4	22,700

# BREF-2

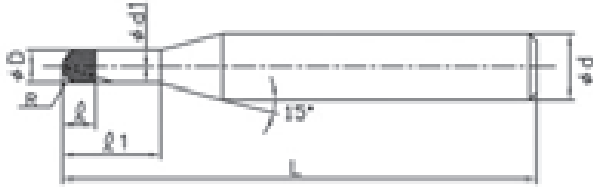
品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 ℓ1 Effective Length	刃長 ℓ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BREF-220005060	2	R 0.05	6	1.5	1.95	2	50	4	21,200
BREF-220005120	2	R 0.05	12	1.5	1.95	2	50	4	22,700
BREF-220010060	2	R 0.1	6	1.5	1.95	2	50	4	21,200
BREF-220010120	2	R 0.1	12	1.5	1.95	2	50	4	22,700
BREF-220020060	2	R 0.2	6	1.5	1.95	2	50	4	21,200
BREF-220020120	2	R 0.2	12	1.5	1.95	2	50	4	22,700
BREF-220030060	2	R 0.3	6	1.5	1.95	2	50	4	21,200
BREF-220030120	2	R 0.3	12	1.5	1.95	2	50	4	22,700
BREF-230003090	3	R 0.03	9	2	2.95	2	50	4	28,600
BREF-230003180	3	R 0.03	18	2	2.95	2	60	4	29,900
BREF-230005090	3	R 0.05	9	2	2.95	2	50	4	28,600
BREF-230005180	3	R 0.05	18	2	2.95	2	60	4	29,900
BREF-230010090	3	R 0.1	9	2	2.95	2	50	4	28,600
BREF-230010180	3	R 0.1	18	2	2.95	2	60	4	29,900
BREF-230020090	3	R 0.2	9	2	2.95	2	50	4	28,600
BREF-230020180	3	R 0.2	18	2	2.95	2	60	4	29,900
BREF-230030090	3	R 0.3	9	2	2.95	2	50	4	28,600
BREF-230030180	3	R 0.3	18	2	2.95	2	60	4	29,900
BREF-230050090	3	R 0.5	9	2	2.95	2	50	4	28,600
BREF-230050180	3	R 0.5	18	2	2.95	2	60	4	29,900



# BBE-2

## CBN 2枚刃ボールエンドミル CBN 2 Flutes Ball Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life



CBN立方晶窒化ホウ素 Cubic Boron Nitride



刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01



柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003



ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)



R許容差 R Tolerance  
+0.005~-0.005

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

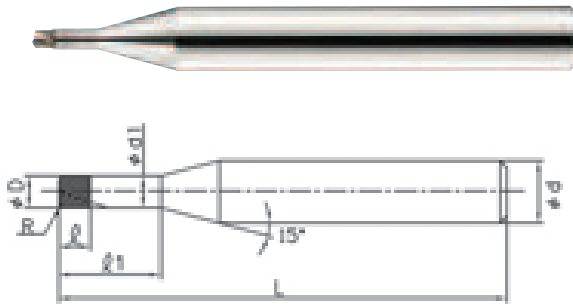
品番 Code No.	R	刃径 D Flute Diameter	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BBE-2010S	R0.1	0.2	0.6	0.2	0.18	0.4	50	6	21,200
BBE-2015S	R0.15	0.3	0.9	0.3	0.28	0.6	50	6	20,800
BBE-2020S	R0.2	0.4	1.2	0.4	0.37	0.6	50	6	19,600
BBE-2025S	R0.25	0.5	1.5	0.5	0.46	0.6	50	6	19,300
BBE-2030S	R0.3	0.6	1.8	0.6	0.56	0.6	50	6	17,900
BBE-2040S	R0.4	0.8	2.4	0.8	0.76	1	50	6	17,900
BBE-2050S	R0.5	1	3	1	0.95	1	50	6	17,400
BBE-2060S	R0.6	1.2	3.6	1.2	1.15	2	50	6	18,400
BBE-2070S	R0.7	1.4	4.2	1.4	1.35	2	50	6	18,400
BBE-2075S	R0.75	1.5	4.5	1.5	1.45	2	50	6	18,400
BBE-2080S	R0.8	1.6	4.8	1.5	1.55	2	50	6	18,700
BBE-2090S	R0.9	1.8	5.4	1.5	1.75	2	50	6	18,700
BBE-2100S	R1	2	6	1.5	1.95	2	50	6	18,700
BBE-2150S	R1.5	3	9	2	2.95	2	50	6	30,800
BBE-2200S	R2	4	12	2.5	3.95	2.5	50	6	45,300
BBE-2250S	R2.5	5	15	3	4.95	3.5	60	6	54,300
BBE-2300S	R3	6	20	3.5	5.95	3.5	60	6	60,800

※ R0.1 のみ 1 枚刃仕様となります。 One Flute only for R0.1

# BRE-2

## CBN 2枚刃コーナーR付エンドミル CBN 2 Flutes Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2 Flutes Straight Endmill)

コーナーR許容差 corner R Tolerance  
+0.005~-0.005

●切削条件表はP190に記載

●Cutting conditions are recommended on page 190.

単位[寸法:mm/価格:円]

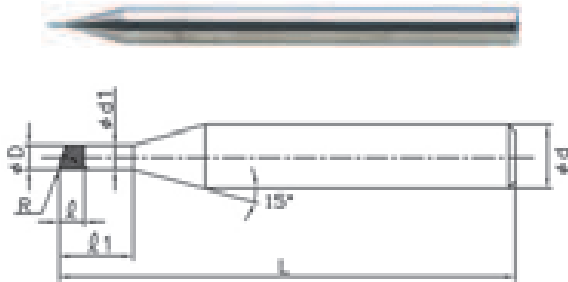
Unit [size:mm/Retail Price:JPY]

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 ℓ1 Effective Length	刃長 ℓ Flute Length	首下径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BRE-203005S	0.3	R 0.05	0.9	0.3	0.26	0.6	50	6	22,000
BRE-204005S	0.4	R 0.05	1.2	0.4	0.36	0.6	50	6	20,800
BRE-205010S	0.5	R 0.1	1.5	0.5	0.46	0.6	50	6	20,300
BRE-210010S	1	R 0.1	3	1	0.95	1	50	6	19,600
BRE-210020S	1	R 0.2	3	1	0.95	1	50	6	19,600
BRE-215010S	1.5	R 0.1	4.5	1.5	1.45	2	50	6	21,400
BRE-215020S	1.5	R 0.2	4.5	1.5	1.45	2	50	6	21,400
BRE-220020S	2	R 0.2	6	1.5	1.95	2	50	6	22,500
BRE-220030S	2	R 0.3	6	1.5	1.95	2	50	6	22,500
BRE-230020S	3	R 0.2	9	2	2.95	2	50	6	29,800
BRE-230030S	3	R 0.3	9	2	2.95	2	50	6	29,800
BRE-230050S	3	R 0.5	9	2	2.95	2	50	6	29,800
BRE-240003S	4	R 0.03	12	2	3.95	2	50	6	37,000
BRE-240020S	4	R 0.2	12	2	3.95	2	50	6	37,000
BRE-240030S	4	R 0.3	12	2	3.95	2	50	6	37,000
BRE-240050S	4	R 0.5	12	2	3.95	2	50	6	37,000
BRE-250003S	5	R 0.03	15	2	4.95	2	60	6	38,900
BRE-250020S	5	R 0.2	15	2	4.95	2	60	6	38,900
BRE-250030S	5	R 0.3	15	2	4.95	2	60	6	38,900
BRE-250050S	5	R 0.5	15	2	4.95	2	60	6	38,900
BRE-260003S	6	R 0.03	20	2	5.95	2	60	6	44,100
BRE-260020S	6	R 0.2	20	2	5.95	2	60	6	44,100
BRE-260030S	6	R 0.3	20	2	5.95	2	60	6	44,100
BRE-260050S	6	R 0.5	20	2	5.95	2	60	6	44,100

# BREF-1

## CBN 1枚刃コーナーR付エンドミル CBN 1 Flutes Corner R Endmill

- 高硬度材・焼入れ鋼の直彫り加工。  
Direct cutting for Highly hardened material and Quenching steel
- 高精度・高品位・長寿命加工が可能。  
Possible to process with high accuracy, high quality and long tool life



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D 0~-0.01

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角0° Twist Angle 0°  
(直刃1枚刃) (1 Flutes Straight Endmill)

コーナーR許容差 corner R Tolerance  
+0.005~-0.005

●切削条件表はP192に記載

●Cutting conditions are recommended on page 192.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	刃径 D Flute Diameter	コーナーR Corner R	有効長 $l_1$ Effective Length	刃長 $l$ Flute Length	首径 d1 Neck Diameter	CBN層 CBN Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BREF-101001003	0.1	R 0.01	0.3	0.1	0.09	0.25	50	4	40,500
BREF-101001005	0.1	R 0.01	0.5	0.1	0.09	0.25	50	4	41,000
BREF-102001006	0.2	R 0.01	0.6	0.2	0.18	0.4	50	4	38,000
BREF-102001012	0.2	R 0.01	1.2	0.2	0.18	0.4	50	4	38,500
BREF-102002006	0.2	R 0.02	0.6	0.2	0.18	0.4	50	4	37,000
BREF-102002012	0.2	R 0.02	1.2	0.2	0.18	0.4	50	4	37,500
BREF-103001009	0.3	R 0.01	0.9	0.3	0.28	0.6	50	4	36,000
BREF-103001018	0.3	R 0.01	1.8	0.3	0.28	0.6	50	4	36,500
BREF-103002009	0.3	R 0.02	0.9	0.3	0.28	0.6	50	4	34,000
BREF-103002018	0.3	R 0.02	1.8	0.3	0.28	0.6	50	4	34,500
BREF-104001012	0.4	R 0.01	1.2	0.4	0.37	0.6	50	4	29,000
BREF-104001024	0.4	R 0.01	2.4	0.4	0.37	0.6	50	4	29,500
BREF-104002012	0.4	R 0.02	1.2	0.4	0.37	0.6	50	4	27,000
BREF-104002024	0.4	R 0.02	2.4	0.4	0.37	0.6	50	4	27,500
BREF-105001015	0.5	R 0.01	1.5	0.5	0.46	0.6	50	4	26,000
BREF-105001030	0.5	R 0.01	3	0.5	0.46	0.6	50	4	26,500
BREF-105002015	0.5	R 0.02	1.5	0.5	0.46	0.6	50	4	25,000
BREF-105002030	0.5	R 0.02	3	0.5	0.46	0.6	50	4	25,500
BREF-110001030	1	R 0.01	3	1	0.95	1	50	4	24,000
BREF-110001060	1	R 0.01	6	1	0.95	1	50	4	25,000
BREF-110002030	1	R 0.02	3	1	0.95	1	50	4	24,000
BREF-110002060	1	R 0.02	6	1	0.95	1	50	4	25,000

# BHR-4

CBN 4枚刃リーマー  
CBN 4 Flutes Reamer

■高精度・高品位・長寿命加工が可能

Possible to process with high accuracy, high quality and long tool life



\*底刃は付いておりません。  
\* Bottom flute is not given.



CBN立方晶窒化ホウ素 Cubic Boron Nitride



刃径の許容差 Flute Diameter Tolerance  
D +0.004~0



柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003



ネジレ角20° Twist Angle 20°



喰付寸法 Chamfer Size

R0.2 φ1.5~φ2.03  
R0.3 φ2.1~φ3.99  
R0.4 φ4.0~φ4.99  
R0.5 φ5.0~φ6.03

●切削条件表はP192に記載

●Cutting conditions are recommended on page 192.

単位[寸法: mm/価格: 円]

Unit [size: mm/Retail Price: JPY]

品番 Code No.	刃径 D Flute Diameter	溝長 l Groov Length	有効長 l1 Effective Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BHR-4150	1.5	8	10	50	3	24,000
BHR-4160	1.6	8	10	50	3	24,000
BHR-4170	1.7	8	10	50	3	24,000
BHR-4180	1.8	8	10	50	3	24,000
BHR-4190	1.9	8	10	50	3	24,000
BHR-4198	1.98	13	15	50	3	26,000
BHR-4199	1.99	13	15	50	3	26,000
BHR-4200	2.00	13	15	50	3	26,000
BHR-4201	2.01	13	15	50	3	26,000
BHR-4202	2.02	13	15	50	3	26,000
BHR-4203	2.03	13	15	50	3	26,000
BHR-4210	2.1	13	15	50	3	26,000
BHR-4220	2.2	13	15	50	3	26,000
BHR-4230	2.3	13	15	50	3	26,000
BHR-4240	2.4	13	15	50	3	26,000
BHR-4250	2.5	13	15	50	3	26,700
BHR-4260	2.6	13	15	50	3	26,700
BHR-4270	2.7	13	15	50	3	26,700
BHR-4280	2.8	13	15	50	3	26,700
BHR-4290	2.9	13	15	50	3	26,700
BHR-4298	2.98	18	20	60	3	33,400
BHR-4299	2.99	18	20	60	3	33,400
BHR-4300	3.00	18	20	60	3	33,400
BHR-4301	3.01	18	20	60	3	33,400
BHR-4302	3.02	18	20	60	3	33,400
BHR-4303	3.03	18	20	60	3	33,400
BHR-4310	3.1	18	20	60	4	33,400

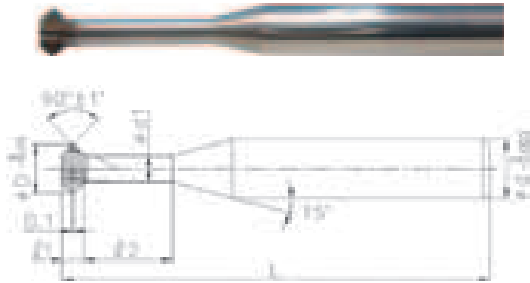
# BHR-4

品番 Code No.	刃径 D Flute Diameter	溝長 $l$ Groov Length	有効長 $l_1$ Effective Length	全長 L Total Length	柄径 d Shank Diameter	標準価格 Retail Price
BHR-4320	3.2	18	20	60	4	33,400
BHR-4330	3.3	18	20	60	4	33,400
BHR-4340	3.4	18	20	60	4	33,400
BHR-4350	3.5	18	20	60	4	35,200
BHR-4360	3.6	18	20	60	4	35,200
BHR-4370	3.7	18	20	60	4	35,200
BHR-4380	3.8	18	20	60	4	35,200
BHR-4390	3.9	18	20	60	4	35,200
BHR-4398	3.98	23	25	60	4	40,000
BHR-4399	3.99	23	25	60	4	40,000
BHR-4400	4.00	23	25	60	4	40,000
BHR-4401	4.01	23	25	60	4	40,000
BHR-4402	4.02	23	25	60	4	40,000
BHR-4403	4.03	23	25	60	4	40,000
BHR-4410	4.1	23	25	60	6	40,000
BHR-4420	4.2	23	25	60	6	40,000
BHR-4430	4.3	23	25	60	6	40,000
BHR-4440	4.4	23	25	60	6	40,000
BHR-4450	4.5	23	25	60	6	42,200
BHR-4460	4.6	23	25	60	6	42,200
BHR-4470	4.7	23	25	60	6	42,200
BHR-4480	4.8	23	25	60	6	42,200
BHR-4490	4.9	23	25	60	6	42,200
BHR-4498	4.98	28	30	70	6	44,100
BHR-4499	4.99	28	30	70	6	44,100
BHR-4500	5.00	28	30	70	6	44,100
BHR-4501	5.01	28	30	70	6	44,100
BHR-4502	5.02	28	30	70	6	44,100
BHR-4503	5.03	28	30	70	6	44,100
BHR-4510	5.1	28	30	70	6	44,100
BHR-4520	5.2	28	30	70	6	44,100
BHR-4530	5.3	28	30	70	6	44,100
BHR-4540	5.4	28	30	70	6	44,100
BHR-4550	5.5	28	30	70	6	46,500
BHR-4560	5.6	28	30	70	6	46,500
BHR-4570	5.7	28	30	70	6	46,500
BHR-4580	5.8	28	30	70	6	46,500
BHR-4590	5.9	28	30	70	6	46,500
BHR-4598	5.98	28	30	70	6	50,000
BHR-4599	5.99	28	30	70	6	50,000
BHR-4600	6.00	28	30	70	6	50,000
BHR-4601	6.01	28	30	70	6	50,000
BHR-4602	6.02	28	30	70	6	50,000
BHR-4603	6.03	28	30	70	6	50,000

# BUMW-4

## CBN裏面取りカッター ダブル CBN Backside Cutter Double

■高硬度材・焼入れ鋼の直彫り加工に。  
Direct cutting for Highly hardened material and quenchingsteel



CBN立方晶窒化ホウ素 Cubic Boron Nitride



刃径の許容差 Flute Diameter Tolerance  
D +0~-0.05



柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003



ネジレ角0° Twist Angle 0°  
(直刃4枚刃) (3 Flutes Straight Endmill)  
面取角度90° (両角) ±1°

●切削条件表はP193に記載

●Cutting conditions are recommended on page 193.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

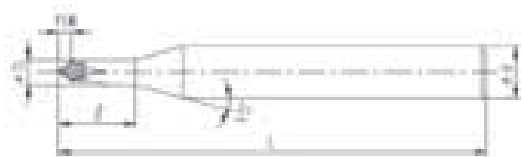
品番 Code No.	外径D Outer Diameter	刃厚 l Blade Thickness	首下長 l2 Under Head	首径 d1 First Trail	全長 L Total Length	シャンク径 d Shank Diameter	標準価格 Retail Price
BUMW-401504	1.5	0.4	4	1	50	4	34,400
BUMW-401508	1.5	0.4	8	1	50	4	36,300
BUMW-402005	2.0	0.8	5	1.1	50	4	36,300
BUMW-402010	2.0	0.8	10	1.1	50	4	38,400
BUMW-402506	2.5	1	6	1.4	50	4	42,100
BUMW-402512	2.5	1	12	1.4	50	4	44,000
BUMW-403008	3.0	1.2	8	1.7	50	4	48,600
BUMW-403016	3.0	1.2	16	1.7	50	4	50,400
BUMW-403509	3.5	1.4	9	2.0	50	4	60,300
BUMW-403518	3.5	1.4	18	2.0	50	4	63,500
BUMW-404010	4.0	1.6	10	2.3	50	4	60,300
BUMW-404020	4.0	1.6	20	2.3	60	4	63,500
BUMW-404512	4.5	2	12	2.4	50	6	71,000
BUMW-404524	4.5	2	24	2.4	60	6	74,700
BUMW-405012	5.0	2.2	12	2.7	50	6	71,000
BUMW-405024	5.0	2.2	24	2.7	60	6	74,700
BUMW-405515	5.5	2.4	15	3.0	60	6	84,500
BUMW-405530	5.5	2.4	30	3.0	70	6	89,100
BUMW-406015	6.0	3	15	2.9	60	6	84,500
BUMW-406030	6.0	3	30	2.9	70	6	89,100

# BMC-3

## CBN3枚刃面取りカッター CBN3 Flutes V Type Endmill

■高硬度材・焼入れ鋼の直彫り加工に。

Direct cutting for Highly hardened material and quenchingsteel



CBN立方晶窒化ホウ素 Cubic Boron Nitride



刃径の許容差 Flute Diameter Tolerance  
D +0~-0.01



柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003



ネジレ角0° Twist Angle 0°  
(直刃3枚刃) (3 Flutes Straight Endmill)



先端角度 Edge Angle  
90° ±30'

●切削条件表はP191に記載

●Cutting conditions are recommended on page 191.

単位[寸法:mm/価格:円]

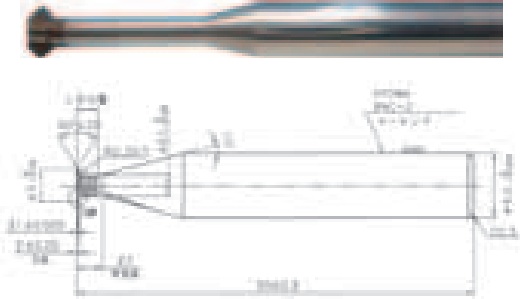
Unit [size:mm/Retail Price:JPY]

品番 Code No.	刃径 D Flute Diameter	有効長 <i>l</i> Effective Length	全長 L Total Length	柄径 d Shank Diameter	先端フラット径 Edge Diameter	標準価格 Retail Price
BMC-305015	0.5	1.5	50	4	0.08	27,700
BMC-305050	0.5	5	50	4	0.08	28,800
BMC-310030	1	3	50	4	0.1	26,700
BMC-310080	1	8	50	4	0.1	27,700
BMC-312040	1.2	4	50	4	0.1	28,800
BMC-312100	1.2	10	50	4	0.1	30,400
BMC-315040	1.5	4	50	4	0.15	28,800
BMC-315100	1.5	10	50	4	0.15	30,400
BMC-320050	2	5	50	4	0.2	30,400
BMC-320100	2	10	50	4	0.2	30,400
BMC-320150	2	15	60	4	0.2	32,000
BMC-325060	2.5	6	50	4	0.2	35,200
BMC-325150	2.5	15	60	4	0.2	36,800
BMC-325200	2.5	20	60	4	0.2	36,800
BMC-330060	3	6	50	4	0.2	40,500
BMC-330150	3	15	60	4	0.2	42,100
BMC-330200	3	20	60	4	0.2	42,100
BMC-340100	4	10	50	4	0.3	51,200
BMC-340200	4	20	60	4	0.3	52,800
BMC-350150	5	15	60	6	0.3	61,000
BMC-350300	5	30	70	6	0.3	62,700
BMC-360150	6	15	60	6	0.3	72,500
BMC-360300	6	30	70	6	0.3	74,200

# BNC-2

## CBNネジ切りカッター CBN 2 Flutes Thread Cutter

■高硬度材・焼入れ鋼の直彫り加工に。  
Direct cutting for Highly hardened material and quenchingsteel



**CBN** CBN立方晶窒化ホウ素 Cubic Boron Nitride

刃径の許容差 Flute Diameter Tolerance  
D +0~-0.02

柄径の許容差 Shank Diameter Tolerance  
d 0~-0.003

ネジレ角0° Twist Angle 0°  
(直刃2枚刃) (2Flutes Straight Endmill)

●切削条件表はP194に記載

●Cutting conditions are recommended on page 194.

単位[寸法:mm/価格:円]

Unit [size:mm/Retail Price:JPY]

品番 Code No.	角度 Edge Angle	刃径D Flute Diameter	首下長 $l_3$ Effective Length	刃厚 $l$ Flute Length	フラット巾 $l_1$ Flat Diameter	首径D1 Neck Diameter	全長L Total Length	シャンク径 Shank Diameter	標準価格 Retail Price
BNC-2602005	60°	2	5	0.3	0.05	1.4	50	6	37,800
BNC-2603006	60°	3	6	0.4	0.05	2	50	6	50,600
BNC-2603508	60°	3.5	8	0.5	0.05	2.5	50	6	62,800
BNC-2604012	60°	4	12	0.72	0.06	3	50	6	66,200
BNC-2605015	60°	5	15	0.8	0.07	3.4	50	6	77,800
BNC-2606018	60°	6	18	1	0.08	3.8	50	6	88,000