



Size $\phi 1 \sim \phi 20$

C-CES4000

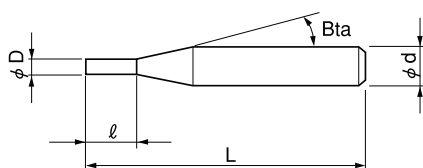


Material Applications (☆ Highly Recommended ○ Recommended ○ Suggested)

| Work Material | | | | | | | | | | | | | | | |
|-------------------------------|---------------------------------|----------------------------------|-----------------|--------|--------|-----------|-----------------|----------|--------|----------|-----------------------|-----------------|-----------------------|------------------|---------------------------------------|
| Carbon Steels S45C S55C | Alloy Steels SK / SCM SUS | Prehardened Steels NAK HPM | Hardened Steels | | | Cast Iron | Aluminum Alloys | Graphite | Copper | Plastics | Glass Filled Plastics | Titanium Alloys | Heat Resistant Alloys | Cemented Carbide | Hard Brittle (Non-Metallic) Materials |
| | | | ~55HRC | ~60HRC | ~70HRC | | | | | | | | | | |
| ○ | ○ | ○ | ○ | | | ○ | | | ○ | | | ○ | ○ | | |

Features

Broad application range from Copper and Carbon Steels up to Hardened Steels (55HRC).
Excellent performance/quality to price ratio.
Refer to page 110 for 2 flute C-CES.



The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Total 46 models

Unit (mm)

| Model Number | Outside Diameter ϕD | Length of Cut ℓ | Shank Taper Angle Bta | Overall Length L | Shank Diameter ϕd | Price ¥ |
|-----------------|---------------------------|----------------------|-----------------------|------------------|-------------------------|---------|
| C-CES 4010 | 1 | 2.5 | 16° | 45 | 4 | 5,160 |
| C-CES 4010-0400 | | 4 | | 45 | | 5,400 |
| C-CES 4015 | 1.5 | 3.75 | 16° | 45 | 4 | 5,160 |
| C-CES 4015-0600 | | 6 | | 45 | | 5,400 |
| C-CES 4020 | 2 | 5 | 16° | 45 | 4 | 3,300 |
| C-CES 4020-0800 | | 8 | | 45 | | 4,440 |
| C-CES 4025 | 2.5 | 6.25 | 16° | 45 | 4 | 3,300 |
| C-CES 4025-1000 | | 10 | | 50 | | 4,440 |
| C-CES 4030-0750 | 3 | 7.5 | 16° | 45 | 6 | 3,420 |
| C-CES 4030 | | 8 | | 45 | | 3,420 |
| C-CES 4030-1200 | | 12 | | 50 | | 4,320 |
| C-CES 4035 | 3.5 | 10 | 16° | 45 | 6 | 7,150 |

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- UDC Series
- Square
 - Long Neck Square
- Radius
 - Long Neck Radius
 - Taper Neck Radius
- Ball / Long Shank Ball
 - Long Neck Ball
 - Taper Neck Ball
- Taper
- Spiral V Cutter
- Drill
- EURO Series
- Technical Data

Unit (mm)

| Model Number | Outside Diameter ϕD | Length of Cut ℓ | Shank Taper Angle Bta | Overall Length L | Shank Diameter ϕd | Price ¥ |
|-----------------|---------------------------|----------------------|-----------------------|------------------|-------------------------|---------|
| C-CES 4040 | 4 | 11 | 16° | 45 | 6 | 3,860 |
| C-CES 4040-1600 | | 16 | | 60 | | 5,160 |
| C-CES 4045 | 4.5 | 11 | 16° | 45 | 6 | 8,400 |
| C-CES 4050-1250 | 5 | 12.5 | 16° | 50 | 6 | 3,970 |
| C-CES 4050 | | 13 | | 50 | | 3,970 |
| C-CES 4050-2000 | | 20 | | 60 | | 5,520 |
| C-CES 4055 | 5.5 | 13 | 16° | 50 | 6 | 8,610 |
| C-CES 4060 | 6 | 13 | — | 50 | 6 | 4,170 |
| C-CES 4060-1500 | | 15 | | 50 | | 4,170 |
| C-CES 4060-2400 | | 24 | | 60 | | 6,000 |
| C-CES 4065 | 6.5 | 16 | 16° | 60 | 8 | 11,660 |
| C-CES 4070 | 7 | 16 | 16° | 60 | 8 | 10,360 |
| C-CES 4075 | 7.5 | 16 | 16° | 60 | 8 | 12,540 |
| C-CES 4080 | 8 | 19 | — | 60 | 8 | 7,090 |
| C-CES 4080-2000 | | 20 | | 60 | | 7,090 |
| C-CES 4080-3200 | | 32 | | 80 | | 15,000 |
| C-CES 4085 | 8.5 | 19 | 16° | 70 | 10 | 15,180 |
| C-CES 4090 | 9 | 19 | 16° | 70 | 10 | 13,650 |
| C-CES 4095 | 9.5 | 19 | 16° | 70 | 10 | 17,160 |
| C-CES 4100 | 10 | 22 | — | 70 | 10 | 9,460 |
| C-CES 4100-2500 | | 25 | | 70 | | 9,460 |
| C-CES 4100-4000 | | 40 | | 90 | | 16,560 |
| C-CES 4105 | 10.5 | 22 | 16° | 75 | 12 | 20,900 |
| C-CES 4110 | 11 | 22 | 16° | 75 | 12 | 20,900 |
| C-CES 4115 | 11.5 | 22 | 16° | 75 | 12 | 22,440 |
| C-CES 4120 | 12 | 26 | — | 75 | 12 | 11,880 |
| C-CES 4120-3000 | | 30 | | 75 | | 11,880 |
| C-CES 4120-3600 | | 36 | | 90 | | 11,880 |
| C-CES 4120-4800 | | 48 | | 100 | | 25,200 |
| C-CES 4120-5000 | | 50 | | 100 | | 25,200 |
| C-CES 4140 | 14 | 26 | — | 80 | 12 | 29,150 |
| C-CES 4160 | 16 | 32 | — | 110 | 16 | 46,200 |
| C-CES 4180 | 18 | 32 | 16° | 110 | 20 | 62,150 |
| C-CES 4200 | 20 | 38 | — | 110 | 20 | 68,200 |

4 Flutes

UDC Series

Square

Square

Long Neck Square

Radius

Radius

Long Neck Radius

Taper Neck Radius

Ball / Long Shank Ball

Ball

Long Neck Ball

Taper Neck Ball

Taper

Taper

Spiral V Cutter

Drill

EURO Series

Technical Data

Milling Conditions for C-CES (4 Flutes)

| WORK MATERIAL | | | | CARBON STEELS S45C / S50C (~225HB) | | | | | ALLOY STEELS SK / SCM / SUS (225~325HB) | | | | |
|---------------|-----------------------|--------------------|------|---------------------------------------|------------------|--------------------|---------------------|---------------------|--|------------------|--------------------|---------------------|---------------------|
| | | | | Side Milling | | | | | Side Milling | | | | |
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | L/D | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) |
| 4010 | 1 | 2.5 | 2.5 | 20,000 | 65 | 240 | 2 | 0.07 | 15,000 | 45 | 215 | 2 | 0.07 |
| | | 4 | 4 | | | | 3.5 | 0.02 | | | | 3.5 | 0.02 |
| 4015 | 1.5 | 3.75 | 2.5 | 13,500 | 65 | 245 | 3 | 0.105 | 10,000 | 45 | 215 | 3 | 0.105 |
| | | 6 | 4 | | | | 5.25 | 0.03 | | | | 5.25 | 0.03 |
| 4020 | 2 | 5 | 2.5 | 11,000 | 65 | 245 | 4 | 0.14 | 8,500 | 45 | 215 | 4 | 0.14 |
| | | 8 | 4 | | | | 7 | 0.04 | | | | 7 | 0.04 |
| 4025 | 2.5 | 6.25 | 2.5 | 8,800 | 65 | 370 | 5 | 0.175 | 7,000 | 45 | 245 | 5 | 0.175 |
| | | 10 | 4 | | | | 8.75 | 0.05 | | | | 8.75 | 0.05 |
| 4030 | 3 | 7.5 | 2.5 | 7,400 | 65 | 370 | 6 | 0.21 | 6,400 | 45 | 260 | 6 | 0.21 |
| | | 8 | 2.7 | | | | 7.5 | 0.15 | | | | 7.5 | 0.15 |
| | | 12 | 4 | | | | 10.5 | 0.06 | | | | 10.5 | 0.06 |
| 4040 | 4 | 11 | 2.75 | 5,900 | 65 | 435 | 10 | 0.2 | 5,000 | 45 | 340 | 10 | 0.2 |
| | | 16 | 4 | | | | 14 | 0.08 | | | | 14 | 0.08 |
| 4050 | 5 | 12.5 | 2.5 | 5,300 | 65 | 590 | 10 | 0.35 | 4,200 | 45 | 415 | 10 | 0.35 |
| | | 13 | 2.6 | | | | 12.5 | 0.25 | | | | 12.5 | 0.25 |
| | | 20 | 4 | | | | 17.5 | 0.1 | | | | 17.5 | 0.1 |
| 4060 | 6 | 13 | 2.2 | 4,400 | 70~85 | 580 | 12 | 0.42 | 3,500 | 55~65 | 415 | 12 | 0.42 |
| | | 15 | 2.5 | | | | 12 | 0.42 | | | | 12 | 0.42 |
| | | 24 | 4 | | | | 21 | 0.12 | | | | 21 | 0.12 |
| 4080 | 8 | 19 | 2.4 | 3,300 | 70~85 | 550 | 16 | 0.56 | 2,600 | 55~65 | 415 | 16 | 0.56 |
| | | 20 | 2.5 | | | | 16 | 0.56 | | | | 16 | 0.56 |
| | | 32 | 4 | | | | 28 | 0.16 | | | | 28 | 0.16 |
| 4100 | 10 | 22 | 2.2 | 2,600 | 70~85 | 525 | 20 | 0.7 | 2,100 | 55~65 | 405 | 20 | 0.7 |
| | | 25 | 2.5 | | | | 20 | 0.7 | | | | 20 | 0.7 |
| | | 40 | 4 | | | | 35 | 0.2 | | | | 35 | 0.2 |
| 4120 | 12 | 26 | 2.2 | 2,200 | 70~85 | 525 | 24 | 0.84 | 1,750 | 55~65 | 405 | 24 | 0.84 |
| | | 30 | 2.5 | | | | 24 | 0.84 | | | | 24 | 0.84 |
| | | 36 | 3 | | | | 42 | 0.24 | | | | 42 | 0.24 |
| | | 48 | 4 | | | | 42 | 0.24 | | | | 42 | 0.24 |
| | | 50 | 4.2 | | | | 42 | 0.24 | | | | 42 | 0.24 |

- UDC Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Spiral V Cutter
- Drill
- EURO Series
- Technical Data

Milling Conditions for C-CES (4 Flutes)

| WORK MATERIAL | | | | PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC) | | | | | HARDENED STEELS SKD11 / 61 / SKT (45~55HRC) | | | | | | |
|---------------|-----------------------|--------------------|------|--|------------------|--------------------|---------------------|---------------------|--|------------------|--------------------|---------------------|---------------------|---|------|
| | | | | Side Milling | | | | | Side Milling | | | | | | |
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | L/D | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) | | |
| 4010 | 1 | 2.5 | 2.5 | 11,000 | 35 | 85 | 2 | 0.07 | 7,100 | 20 | 40 | 1.5 | 0.03 | | |
| | | 4 | 4 | | | | 3.5 | 0.02 | | | | 3 | 0.01 | | |
| 4015 | 1.5 | 3.75 | 2.5 | 8,000 | | 90 | 3 | 0.105 | 5,100 | | 50 | 2.25 | 0.045 | | |
| | | 6 | 4 | | | | 5.25 | 0.03 | | | | 4.5 | 0.015 | | |
| 4020 | 2 | 5 | 2.5 | 6,400 | | 40~45 | 90 | 4 | 0.14 | | 4,000 | 25~30 | 55 | 3 | 0.06 |
| | | 8 | 4 | | | | | 7 | 0.04 | | | | | 6 | 0.02 |
| 4025 | 2.5 | 6.25 | 2.5 | 5,000 | 90 | | 5 | 0.175 | 3,200 | 55 | 3.75 | | 0.075 | | |
| | | 10 | 4 | | | | 8.75 | 0.05 | | | 7.5 | | 0.025 | | |
| 4030 | 3 | 7.5 | 2.5 | 4,500 | 105 | | 6 | 0.21 | 2,800 | 65 | 4.5 | | 0.09 | | |
| | | 8 | 2.7 | | | | 7.5 | 0.15 | | | 6 | | 0.06 | | |
| | | 12 | 4 | | | 10.5 | 0.06 | 9 | | | 0.03 | | | | |
| 4040 | 4 | 11 | 2.75 | 3,500 | 120 | 10 | 0.2 | 2,150 | 70 | 8 | 0.08 | | | | |
| | | 16 | 4 | | | 14 | 0.08 | | | 12 | 0.04 | | | | |
| 4050 | 5 | 12.5 | 2.5 | 2,950 | | 120 | 10 | 0.35 | | 1,850 | 75 | 7.5 | 0.15 | | |
| | | 13 | 2.6 | | 12.5 | | 0.25 | 10 | 0.1 | | | | | | |
| | | 20 | 4 | | 17.5 | | 0.1 | 15 | 0.05 | | | | | | |
| 4060 | 6 | 13 | 2.2 | 2,450 | 130 | 12 | 0.42 | 1,500 | 70 | 9 | 0.18 | | | | |
| | | 15 | 2.5 | | | 12 | 0.42 | | | 9 | 0.18 | | | | |
| | | 24 | 4 | | | 21 | 0.12 | | | 18 | 0.06 | | | | |
| 4080 | 8 | 19 | 2.4 | 1,850 | 125 | 16 | 0.56 | 1,200 | 70 | 12 | 0.24 | | | | |
| | | 20 | 2.5 | | | 16 | 0.56 | | | 12 | 0.24 | | | | |
| | | 32 | 4 | | | 28 | 0.16 | | | 24 | 0.08 | | | | |
| 4100 | 10 | 22 | 2.2 | 1,450 | 125 | 20 | 0.7 | 950 | 65 | 15 | 0.3 | | | | |
| | | 25 | 2.5 | | | 20 | 0.7 | | | 15 | 0.3 | | | | |
| | | 40 | 4 | | | 35 | 0.2 | | | 30 | 0.1 | | | | |
| 4120 | 12 | 26 | 2.2 | 1,200 | 120 | 24 | 0.84 | 800 | 60 | 18 | 0.36 | | | | |
| | | 30 | 2.5 | | | 24 | 0.84 | | | 18 | 0.36 | | | | |
| | | 36 | 3 | | | 42 | 0.24 | | | 36 | 0.12 | | | | |
| | | 48 | 4 | | | 42 | 0.24 | | | 36 | 0.12 | | | | |
| | | 50 | 4.2 | | | 42 | 0.24 | | | 36 | 0.12 | | | | |

UDC Series

Square
Square

Long Neck Square

Radius

Radius
Long Neck Radius

Taper Neck Radius

Ball / Long Shank Ball

Ball
Long Neck Ball

Taper Neck Ball

Taper
Taper

Spiral V Cutter

Drill

EURO Series

Technical Data

Milling Conditions for C-CES (4 Flutes)

◆High speed milling

| WORK MATERIAL | | | | CARBON STEELS S45C / S50C (~225HB) | | | | | ALLOY STEELS SK / SCM / SUS(225~325HB) | | | | |
|---------------|-----------------------|--------------------|------|---------------------------------------|------------------|--------------------|---------------------|---------------------|---|------------------|--------------------|---------------------|---------------------|
| | | | | Side Milling | | | | | Side Milling | | | | |
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | L/D | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) |
| 4030 | 3 | 7.5 | 2.5 | 30,000 | 300 | 1,500 | 6 | 0.21 | 26,500 | 250 | 1,075 | 6 | 0.21 |
| | | 8 | 2.7 | | | | 7.5 | 0.15 | | | | 7.5 | 0.15 |
| | | 12 | 4 | | | | 10.5 | 0.06 | | | | 10.5 | 0.06 |
| 4040 | 4 | 11 | 2.75 | 23,800 | | 1,755 | 10 | 0.2 | 19,800 | | 1,345 | 10 | 0.2 |
| | | 16 | 4 | | | | 14 | 0.08 | | | | 14 | 0.08 |
| 4050 | 5 | 12.5 | 2.5 | 19,000 | | 2,115 | 10 | 0.35 | 15,800 | | 1,560 | 10 | 0.35 |
| | | 13 | 2.6 | | | | 12.5 | 0.25 | | | | 12.5 | 0.25 |
| | | 20 | 4 | | | | 17.5 | 0.1 | | | | 17.5 | 0.1 |
| 4060 | 6 | 13 | 2.2 | 15,900 | | 2,095 | 12 | 0.42 | 13,200 | | 1,565 | 12 | 0.42 |
| | | 15 | 2.5 | | | | 12 | 0.42 | | | | 12 | 0.42 |
| | | 24 | 4 | | | | 21 | 0.12 | | | | 21 | 0.12 |
| 4080 | 8 | 19 | 2.4 | 11,900 | | 1,985 | 16 | 0.56 | 9,900 | | 1,580 | 16 | 0.56 |
| | | 20 | 2.5 | | | | 16 | 0.56 | | | | 16 | 0.56 |
| | | 32 | 4 | | | | 28 | 0.16 | | | | 28 | 0.16 |
| 4100 | 10 | 22 | 2.2 | 9,500 | | 1,920 | 20 | 0.7 | 7,900 | | 1,525 | 20 | 0.7 |
| | | 25 | 2.5 | | 20 | | 0.7 | 20 | | 0.7 | | | |
| | | 40 | 4 | | 35 | | 0.2 | 35 | | 0.2 | | | |
| 4120 | 12 | 26 | 2.2 | 7,900 | 1,885 | 24 | 0.84 | 6,600 | 1,525 | 24 | 0.84 | | |
| | | 30 | 2.5 | | | 24 | 0.84 | | | 24 | 0.84 | | |
| | | 36 | 3 | | | 42 | 0.24 | | | 42 | 0.24 | | |
| | | 48 | 4 | | | 42 | 0.24 | | | 42 | 0.24 | | |
| | | 50 | 4.2 | | | 42 | 0.24 | | | 42 | 0.24 | | |

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- Square
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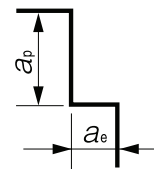
Milling Conditions for C-CES (4 Flutes)

4 Flutes

| WORK MATERIAL | | | | PREHARDENED STEELS / HARDENED STEELS NAK / SKD(30~45HRC) | | | | | HARDENED STEELS SKD11 / 61 / SKT(45~55HRC) | | | | |
|---------------|-----------------------|--------------------|------|---|------------------|--------------------|---------------------|---------------------|---|------------------|--------------------|---------------------|---------------------|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | L/D | Side Milling | | | | | Side Milling | | | | |
| | | | | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) | Spindle Speed (min ⁻¹) | Velocity (m/min) | Feed Rate (mm/min) | a _p (mm) | a _e (mm) |
| 4030 | 3 | 7.5 | 2.5 | 21,200 | 200 | 495 | 6 | 0.21 | 15,800 | 365 | 4.5 | 0.09 | |
| | | 8 | 2.7 | | | | 7.5 | 0.15 | | | 6 | 0.06 | |
| | | 12 | 4 | | | | 10.5 | 0.06 | | | 9 | 0.03 | |
| 4040 | 4 | 11 | 2.75 | 15,800 | 200 | 540 | 10 | 0.2 | 11,900 | 385 | 8 | 0.08 | |
| | | 16 | 4 | | | | 14 | 0.08 | | | 12 | 0.04 | |
| 4050 | 5 | 12.5 | 2.5 | 12,700 | 200 | 515 | 10 | 0.35 | 9,500 | 385 | 7.5 | 0.15 | |
| | | 13 | 2.6 | | | | 12.5 | 0.25 | | | 10 | 0.1 | |
| | | 20 | 4 | | | | 17.5 | 0.1 | | | 15 | 0.05 | |
| 4060 | 6 | 13 | 2.2 | 10,600 | 200 | 560 | 12 | 0.42 | 7,900 | 370 | 9 | 0.18 | |
| | | 15 | 2.5 | | | | 12 | 0.42 | | | 9 | 0.18 | |
| | | 24 | 4 | | | | 21 | 0.12 | | | 18 | 0.06 | |
| 4080 | 8 | 19 | 2.4 | 7,900 | 200 | 535 | 16 | 0.56 | 5,900 | 345 | 12 | 0.24 | |
| | | 20 | 2.5 | | | | 16 | 0.56 | | | 12 | 0.24 | |
| | | 32 | 4 | | | | 28 | 0.16 | | | 24 | 0.08 | |
| 4100 | 10 | 22 | 2.2 | 6,300 | 200 | 545 | 20 | 0.7 | 4,700 | 320 | 15 | 0.3 | |
| | | 25 | 2.5 | | | | 20 | 0.7 | | | 15 | 0.3 | |
| | | 40 | 4 | | | | 35 | 0.2 | | | 30 | 0.1 | |
| 4120 | 12 | 26 | 2.2 | 5,300 | 200 | 530 | 24 | 0.84 | 3,900 | 295 | 18 | 0.36 | |
| | | 30 | 2.5 | | | | 24 | 0.84 | | | 18 | 0.36 | |
| | | 36 | 3 | | | | 42 | 0.24 | | | 36 | 0.12 | |
| | | 48 | 4 | | | | 42 | 0.24 | | | 36 | 0.12 | |
| | | 50 | 4.2 | | | | 42 | 0.24 | | | 36 | 0.12 | |

Milling amount for side milling (mm)

| Work Material | Length of Cut | 2.5D or below | Below 3D | 3D or above |
|----------------|----------------|---|---|---|
| | 45HRC or below | | a _e =0.07D a _p =2D | a _e =0.05D a _p =2.5D |
| 45HRC or above | | a _e =0.03D a _p =1.5D | a _e =0.02D a _p =2D | a _e =0.01D a _p =3D |



D : Outside Diameter (mm)

Ex.) 2D or below : Flute Length = Diameter × 2 or below

a_p : Axial Depth (mm)

a_e : Radial Depth (mm)

Note:

- Recommend water soluble or oil coolant.
- Recommend oil coolant for Titanium Alloys and Heat Resistant Alloys.

UDC Series

Square

Long Neck Square

Radius

Radius

Long Neck Radius

Taper Neck Radius

Ball / Long Shank Ball

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