



Size $\phi 0.1 \sim \phi 20$

C-CES2000



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
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC										
●	●	●	●	○				○			●			○	○		

φ3mm Shank V Series

UDC-PCD Series

CBN Series

Square

Long Neck Square

Radius

Long Neck Radius

Taper Neck Radius

Ball / Long Shank Ball

Long Neck Ball

Taper Neck Ball

Taper

Barrel

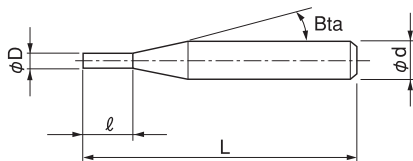
Spiral V Cutter

Drill

Technical Data

Features

Broad application range from Copper and Carbon Steels up to Hardened Steels (55HRC). Excellent performance/quality to price ratio. Refer to page 194 for 4 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 207 models

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle B_{ta}	Overall Length L	Shank Diameter ϕd	Suggested Retail Price \yen
C-CES 2001-0015	0.1	0.15	16°	45	4	7,800
C-CES 2001-0020		0.2		45	4	7,800
C-CES 2001-0030		0.3		45	4	7,800
C-CES 2002-0030	0.2	0.3	16°	45	4	4,680
C-CES 2002		0.4		38	3	4,680
C-CES 2002-0040		0.4		45	4	4,680
C-CES 2002-0050		0.5		45	4	4,680
C-CES 2002-0060		0.6		45	4	4,680
C-CES 2002-0080		0.8		45	4	7,930

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Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 2003-0045	0.3	0.45	16°	45	4	4,080
C-CES 2003		0.6		38	3	4,080
C-CES 2003-0060		0.6		45	4	4,080
C-CES 2003-0075		0.75		45	4	4,080
C-CES 2003-0090		0.9		45	4	4,080
C-CES 2003-0120		1.2		45	4	6,120
C-CES 2004-0060	0.4	0.6	16°	45	4	4,560
C-CES 2004		0.8		38	3	4,560
C-CES 2004-0080		0.8		45	4	4,560
C-CES 2004-0100		1		45	4	4,560
C-CES 2004-0120		1.2		45	4	4,560
C-CES 2004-0160		1.6		45	4	6,120
C-CES 2005-0075	0.5	0.75	16°	45	4	2,280
C-CES 2005		0.8		38	3	2,280
C-CES 2005-0100		1		45	4	2,280
C-CES 2005-0125		1.25		45	4	2,280
C-CES 2005-0150		1.5		45	4	2,280
C-CES 2005-0200		2		45	4	3,840
C-CES 2006-0090	0.6	0.9	16°	45	4	3,480
C-CES 2006		1		38	3	3,480
C-CES 2006-0120		1.2		45	4	3,480
C-CES 2006-0150		1.5		45	4	3,480
C-CES 2006-0180		1.8		45	4	3,480
C-CES 2006-0240		2.4		45	4	3,480
C-CES 2007	0.7	1	16°	38	3	3,840
C-CES 2007-0140		1.4		45	4	3,840
C-CES 2007-0175		1.75		45	4	3,840
C-CES 2007-0210		2.1		45	4	3,840
C-CES 2007-0280		2.8		45	4	3,840
C-CES 2008	0.8	1.2	16°	38	3	2,280
C-CES 2008-0120		1.2		45	4	2,280
C-CES 2008-0160		1.6		45	4	2,280
C-CES 2008-0200		2		45	4	2,280
C-CES 2008-0240		2.4		45	4	2,280
C-CES 2008-0320		3.2		45	4	3,840
C-CES 2009	0.9	1.2	16°	38	3	3,840
C-CES 2009-0180		1.8		45	4	3,840
C-CES 2009-0225		2.25		45	4	3,840
C-CES 2009-0270		2.7		45	4	3,840
C-CES 2009-0360		3.6		45	4	3,840

$\phi 3\text{mm}$ Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

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Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle $B\alpha$	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 2010-0150	1	1.5	16°	45	4	2,040
C-CES 2010-0200		2		45	4	2,040
C-CES 2010		2.5		45	4	2,040
C-CES 2010-0300		3		45	4	2,040
C-CES 2010-0400		4		45	4	3,480
C-CES 2011	1.1	2.5	16°	45	4	4,320
C-CES 2012-0180	1.2	1.8	16°	45	4	2,280
C-CES 2012-0240		2.4		45	4	2,280
C-CES 2012-0300		3		45	4	2,280
C-CES 2012-0360		3.6		45	4	2,280
C-CES 2012		4		45	4	2,280
C-CES 2012-0480		4.8		45	4	3,480
C-CES 2013	1.3	4	16°	45	4	4,320
C-CES 2014	1.4	4	16°	45	4	4,320
C-CES 2015-0225	1.5	2.25	16°	45	4	2,040
C-CES 2015-0300		3		45	4	2,040
C-CES 2015-0375		3.75		45	4	2,040
C-CES 2015		4		45	4	2,040
C-CES 2015-0450		4.5		45	4	2,040
C-CES 2015-0600		6		45	4	3,480
C-CES 2016	1.6	5	16°	45	4	4,320
C-CES 2017	1.7	5	16°	45	4	4,320
C-CES 2018-0270	1.8	2.7	16°	45	4	2,280
C-CES 2018-0360		3.6		45	4	2,280
C-CES 2018-0450		4.5		45	4	2,280
C-CES 2018		5		45	4	2,280
C-CES 2018-0540		5.4		45	4	2,280
C-CES 2018-0720		7.2		45	4	4,200
C-CES 2019	1.9	5	16°	45	4	4,440
C-CES 2020-0300	2	3	16°	45	4	2,040
C-CES 2020-0400		4		45	4	2,040
C-CES 2020-0500		5		45	4	2,040
C-CES 2020		6		45	4	2,040
C-CES 2020-0800		8		45	4	3,480
C-CES 2021	2.1	6	16°	45	4	4,320
C-CES 2022	2.2	6	16°	45	4	4,320
C-CES 2023	2.3	6	16°	45	4	4,320
C-CES 2024	2.4	8	16°	45	4	4,320

φ3mm Shank V Series

UDC-PCD Series

CBN Series

Square
Long Neck Square

Radius

Radius
Long Neck Radius

Radius
Taper Neck Radius

Ball / Long Shank Ball

Ball
Long Neck Ball

Ball
Taper Neck Ball

Taper

Barrel

Spiral V Cutter

Drill

Technical Data

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 2025-0375	2.5	3.75	16°	45	4	2,040
C-CES 2025-0500		5		45	4	2,040
C-CES 2025-0625		6.25		45	4	2,040
C-CES 2025-0750		7.5		45	4	2,040
C-CES 2025		8		45	4	2,040
C-CES 2025-1000		10		50	4	3,480
C-CES 2026	2.6	8	16°	45	6	5,520
C-CES 2027	2.7	8	16°	45	6	5,520
C-CES 2028	2.8	8	16°	45	6	5,520
C-CES 2029	2.9	8	16°	45	6	5,520
C-CES 2030-0450	3	4.5	16°	45	6	2,640
C-CES 2030-0600		6		45	6	2,640
C-CES 2030-0750		7.5		45	6	2,640
C-CES 2030		8		45	6	2,640
C-CES 2030-0900		9		45	6	2,640
C-CES 2030-1200		12		50	6	4,320
C-CES 2031	3.1	10	16°	45	6	5,760
C-CES 2032	3.2	10	16°	45	6	5,760
C-CES 2033	3.3	10	16°	45	6	5,760
C-CES 2034	3.4	10	16°	45	6	5,760
C-CES 2035	3.5	10	16°	45	6	4,680
C-CES 2036	3.6	10	16°	45	6	5,760
C-CES 2037	3.7	10	16°	45	6	5,760
C-CES 2038	3.8	11	16°	45	6	5,760
C-CES 2039	3.9	11	16°	45	6	5,760
C-CES 2040-0600	4	6	16°	50	6	2,880
C-CES 2040-0800		8		50	6	2,880
C-CES 2040-1000		10		50	6	2,880
C-CES 2040		11		45	6	2,880
C-CES 2040-1200		12		50	6	2,880
C-CES 2040-1600		16		60	6	4,680
C-CES 2041	4.1	11	16°	45	6	5,760
C-CES 2042	4.2	11	16°	45	6	5,760
C-CES 2043	4.3	11	16°	45	6	5,760
C-CES 2044	4.4	11	16°	45	6	5,760
C-CES 2045	4.5	11	16°	45	6	5,400
C-CES 2046	4.6	11	16°	45	6	6,600
C-CES 2047	4.7	11	16°	45	6	6,600
C-CES 2048	4.8	13	16°	50	6	6,600
C-CES 2049	4.9	13	16°	50	6	6,600

$\phi 3\text{mm}$ Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

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Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 2050-0750	5	7.5	16°	50	6	3,120
C-CES 2050-1000		10		50	6	3,120
C-CES 2050-1250		12.5		50	6	3,120
C-CES 2050		13		50	6	3,120
C-CES 2050-1500		15		50	6	3,120
C-CES 2050-2000		20		60	6	5,280
C-CES 2051	5.1	13	16°	50	6	6,600
C-CES 2052	5.2	13	16°	50	6	6,600
C-CES 2053	5.3	13	16°	50	6	6,600
C-CES 2054	5.4	13	16°	50	6	6,600
C-CES 2055	5.5	13	16°	50	6	5,640
C-CES 2056	5.6	13	16°	50	6	5,640
C-CES 2057	5.7	13	16°	50	6	5,640
C-CES 2058	5.8	13	16°	50	6	5,640
C-CES 2059	5.9	13	16°	50	6	5,640
C-CES 2060-0900	6	9	—	50	6	3,360
C-CES 2060-1200		12		50	6	3,360
C-CES 2060		13		50	6	3,360
C-CES 2060-1500		15		50	6	3,360
C-CES 2060-1800		18		50	6	3,360
C-CES 2060-2400		24		60	6	5,400
C-CES 2061	6.1	16	16°	60	8	10,340
C-CES 2062	6.2	16	16°	60	8	10,340
C-CES 2063	6.3	16	16°	60	8	10,340
C-CES 2064	6.4	16	16°	60	8	10,340
C-CES 2065	6.5	16	16°	60	8	9,280
C-CES 2066	6.6	16	16°	60	8	10,340
C-CES 2067	6.7	16	16°	60	8	10,340
C-CES 2068	6.8	16	16°	60	8	10,340
C-CES 2069	6.9	16	16°	60	8	10,340
C-CES 2070	7	16	16°	60	8	8,700
C-CES 2071	7.1	16	16°	60	8	10,340
C-CES 2072	7.2	16	16°	60	8	10,340
C-CES 2073	7.3	16	16°	60	8	10,340
C-CES 2074	7.4	16	16°	60	8	10,340
C-CES 2075	7.5	16	16°	60	8	10,360
C-CES 2076	7.6	19	16°	60	8	11,550
C-CES 2077	7.7	19	16°	60	8	11,550
C-CES 2078	7.8	19	16°	60	8	11,550
C-CES 2079	7.9	19	16°	60	8	11,550

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Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 2080-1600	8	16	—	60	8	6,320
C-CES 2080		19		60	8	6,320
C-CES 2080-2000		20		60	8	6,320
C-CES 2080-2400		24		80	8	6,320
C-CES 2080-3200		32		80	8	11,520
C-CES 2081	8.1	19	16°	70	10	13,860
C-CES 2082	8.2	19	16°	70	10	13,860
C-CES 2083	8.3	19	16°	70	10	13,860
C-CES 2084	8.4	19	16°	70	10	13,860
C-CES 2085	8.5	19	16°	70	10	12,420
C-CES 2086	8.6	19	16°	70	10	13,860
C-CES 2087	8.7	19	16°	70	10	13,860
C-CES 2088	8.8	19	16°	70	10	13,860
C-CES 2089	8.9	19	16°	70	10	13,860
C-CES 2090	9	19	16°	70	10	12,420
C-CES 2091	9.1	19	16°	70	10	13,860
C-CES 2092	9.2	19	16°	70	10	13,860
C-CES 2093	9.3	19	16°	70	10	13,860
C-CES 2094	9.4	19	16°	70	10	13,860
C-CES 2095	9.5	19	16°	70	10	12,870
C-CES 2096	9.6	22	16°	70	10	14,300
C-CES 2097	9.7	22	16°	70	10	14,300
C-CES 2098	9.8	22	16°	70	10	14,300
C-CES 2099	9.9	22	16°	70	10	14,300
C-CES 2100-2000	10	20	—	70	10	7,580
C-CES 2100		22		70	10	7,580
C-CES 2100-2500		25		70	10	7,580
C-CES 2100-3000		30		80	10	7,580
C-CES 2100-4000		40		90	10	12,600
C-CES 2105	10.5	22	16°	75	12	18,920
C-CES 2110	11	22	16°	75	12	17,160
C-CES 2115	11.5	22	16°	75	12	19,580
C-CES 2120-2400	12	24	—	75	12	11,170
C-CES 2120		26		75	12	11,170
C-CES 2120-3000		30		75	12	11,170
C-CES 2120-3600		36		90	12	11,170
C-CES 2120-4800		48		100	12	22,490
C-CES 2160	16	32	—	110	16	35,530
C-CES 2180	18	32	16°	110	20	55,880
C-CES 2200	20	38	—	110	20	60,500

$\phi 3$ mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

Milling Conditions for C-CES (2 Flutes)

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)					ALLOY STEELS SK / SCM / SUS (225~325HB)						
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling		Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling	
					a _p (mm)	a _e (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _e (mm)		
2001	0.1	0.15	30,000	30	0.01	0.15	0.01	30,000	30	0.01	0.15	0.01	0.15	0.01
		0.2	30,000	30	0.01	0.15	0.01	30,000	30	0.01	0.15	0.01	0.15	0.01
		0.3	30,000	30	0.005	0.25	0.005	30,000	30	0.005	0.25	0.005	0.25	0.005
2002	0.2	0.3	30,000	85	0.02	0.3	0.02	30,000	85	0.02	0.3	0.02	0.3	0.02
		0.4	30,000	85	0.02	0.3	0.02	30,000	85	0.02	0.3	0.02	0.3	0.02
		0.5	30,000	85	0.014	0.4	0.014	30,000	85	0.014	0.4	0.014	0.4	0.014
		0.6	30,000	85	0.01	0.5	0.01	30,000	85	0.01	0.5	0.01	0.5	0.01
		0.8	30,000	85	0.004	0.7	0.004	30,000	85	0.004	0.7	0.004	0.7	0.004
2003	0.3	0.45	30,000	110	0.03	0.45	0.03	30,000	110	0.03	0.45	0.03	0.45	0.03
		0.6	30,000	110	0.03	0.45	0.03	30,000	110	0.03	0.45	0.03	0.45	0.03
		0.75	30,000	110	0.021	0.6	0.021	30,000	110	0.021	0.6	0.021	0.6	0.021
		0.9	30,000	110	0.015	0.75	0.015	30,000	110	0.015	0.75	0.015	0.75	0.015
2004	0.4	1.2	30,000	110	0.006	1.05	0.006	30,000	110	0.006	1.05	0.006	1.05	0.006
		0.6	30,000	120	0.04	0.6	0.04	30,000	120	0.04	0.6	0.04	0.6	0.04
		0.8	30,000	120	0.04	0.6	0.04	30,000	120	0.04	0.6	0.04	0.6	0.04
		1	30,000	120	0.028	0.8	0.028	30,000	120	0.028	0.8	0.028	0.8	0.028
		1.2	30,000	120	0.02	1	0.02	30,000	120	0.02	1	0.02	1	0.02
2005	0.5	1.6	30,000	120	0.008	1.4	0.008	30,000	120	0.008	1.4	0.008	1.4	0.008
		0.75	30,000	120	0.05	0.75	0.05	29,000	120	0.05	0.75	0.05	0.75	0.05
		0.8	30,000	120	0.05	0.75	0.05	29,000	120	0.05	0.75	0.05	0.75	0.05
		1	30,000	120	0.05	0.75	0.05	29,000	120	0.05	0.75	0.05	0.75	0.05
2006	0.6	1.25	30,000	120	0.035	1	0.035	29,000	120	0.035	1	0.035	1	0.035
		1.5	30,000	120	0.025	1.25	0.025	29,000	120	0.025	1.25	0.025	1.25	0.025
		2	30,000	120	0.01	1.75	0.01	29,000	120	0.01	1.75	0.01	1.75	0.01
		0.9	30,000	120	0.06	0.9	0.06	24,000	120	0.06	0.9	0.06	0.9	0.06
		1	30,000	120	0.06	0.9	0.06	24,000	120	0.06	0.9	0.06	0.9	0.06
2007	0.7	1.2	30,000	120	0.06	0.9	0.06	24,000	120	0.06	0.9	0.06	0.9	0.06
		1.5	30,000	120	0.042	1.2	0.042	24,000	120	0.042	1.2	0.042	1.2	0.042
		1.8	30,000	120	0.03	1.5	0.03	24,000	120	0.03	1.5	0.03	1.5	0.03
		2.4	30,000	120	0.012	2.1	0.012	24,000	120	0.012	2.1	0.012	2.1	0.012
		1	27,500	120	0.07	1.05	0.07	21,000	120	0.07	1.05	0.07	1.05	0.07
2008	0.8	1.4	27,500	120	0.07	1.05	0.07	21,000	120	0.07	1.05	0.07	1.05	0.07
		1.75	27,500	120	0.049	1.4	0.049	21,000	120	0.049	1.4	0.049	1.4	0.049
		2.1	27,500	120	0.035	1.75	0.035	21,000	120	0.035	1.75	0.035	1.75	0.035
		2.8	27,500	120	0.014	2.45	0.014	21,000	120	0.014	2.45	0.014	2.45	0.014
2009	0.9	1.2	24,000	120	0.08	1.2	0.08	19,000	120	0.08	1.2	0.08	1.2	0.08
		1.6	24,000	120	0.08	1.2	0.08	19,000	120	0.08	1.2	0.08	1.2	0.08
		2	24,000	120	0.056	1.6	0.056	19,000	120	0.056	1.6	0.056	1.6	0.056
		2.4	24,000	120	0.04	2	0.04	19,000	120	0.04	2	0.04	2	0.04
		3.2	24,000	120	0.016	2.8	0.016	19,000	120	0.016	2.8	0.016	2.8	0.016
2010	1	1.2	21,500	125	0.09	1.35	0.09	16,500	120	0.09	1.35	0.09	1.35	0.09
		1.8	21,500	125	0.09	1.35	0.09	16,500	120	0.09	1.35	0.09	1.35	0.09
		2.25	21,500	125	0.063	1.8	0.063	16,500	120	0.063	1.8	0.063	1.8	0.063
		2.7	21,500	125	0.045	2.25	0.045	16,500	120	0.045	2.25	0.045	2.25	0.045
		3.6	21,500	125	0.018	3.15	0.018	16,500	120	0.018	3.15	0.018	3.15	0.018
2011	1	1.5	20,000	125	0.25	1.5	0.1	15,000	120	0.25	1.5	0.1	1.5	0.1
		2	20,000	125	0.25	1.5	0.1	15,000	120	0.25	1.5	0.1	1.5	0.1
		2.5	20,000	125	0.2	2	0.07	15,000	120	0.2	2	0.07	2	0.07
		3	20,000	125	0.125	2.5	0.05	15,000	120	0.125	2.5	0.05	2.5	0.05
2012	1.2	4	20,000	125	0.075	3.5	0.02	15,000	120	0.075	3.5	0.02	3.5	0.02
		1.8	16,700	130	0.3	1.8	0.12	12,500	120	0.3	1.8	0.12	1.8	0.12
		2.4	16,700	130	0.3	1.8	0.12	12,500	120	0.3	1.8	0.12	1.8	0.12
		3	16,700	130	0.24	2.4	0.084	12,500	120	0.24	2.4	0.084	2.4	0.084
		3.6	16,700	130	0.15	3	0.06	12,500	120	0.15	3	0.06	3	0.06
		4	16,700	130	0.09	4	0.024	12,500	120	0.09	4	0.024	4	0.024
		4.8	16,700	130	0.09	4.2	0.024	12,500	120	0.09	4.2	0.024	4.2	0.024
2015	1.5	2.25	13,500	130	0.375	2.25	0.15	10,000	120	0.375	2.25	0.15	2.25	0.15
		3	13,500	130	0.375	2.25	0.15	10,000	120	0.375	2.25	0.15	2.25	0.15
		3.75	13,500	130	0.3	3	0.105	10,000	120	0.3	3	0.105	3	0.105
		4	13,500	130	0.1875	3.75	0.075	10,000	120	0.1875	3.75	0.075	3.75	0.075
		4.5	13,500	130	0.1875	3.75	0.075	10,000	120	0.1875	3.75	0.075	3.75	0.075
		6	13,500	130	0.1125	5.25	0.03	10,000	120	0.1125	5.25	0.03	5.25	0.03

φ3mm Shank V Series

UDC-PCD Series

CBN Series

Square
Long Neck Square

Radius

Radius
Long Neck Radius
Taper Neck Radius

Ball / Long Shank Ball

Ball
Long Neck Ball
Taper Neck Ball

Taper

Barrel

Spiral V Cutter

Drill

Technical Data

Milling Conditions for C-CES (2 Flutes)

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC)					HARDENED STEELS SKD / SKT (45~55HRC)				
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting			Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Side Milling		
					a _p (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _p (mm)	a _e (mm)
2001	0.1	0.15	30,000	15	0.01	0.15	0.01	30,000	10	0.002	0.1	0.005
		0.2	30,000	15	0.01	0.15	0.01	30,000	10	0.002	0.1	0.005
		0.3	30,000	15	0.005	0.25	0.005	30,000	10	0.001	0.2	0.002
2002	0.2	0.3	30,000	30	0.02	0.3	0.02	30,000	25	0.004	0.2	0.01
		0.4	30,000	30	0.02	0.3	0.02	30,000	25	0.004	0.2	0.01
		0.5	30,000	30	0.014	0.4	0.014	30,000	25	0.004	0.3	0.006
		0.6	30,000	30	0.01	0.5	0.01	30,000	25	0.002	0.4	0.004
		0.8	30,000	30	0.004	0.7	0.004	30,000	25	0.002	0.6	0.002
2003	0.3	0.45	30,000	55	0.03	0.45	0.03	22,000	25	0.006	0.3	0.015
		0.6	30,000	55	0.03	0.45	0.03	22,000	25	0.006	0.3	0.015
		0.75	30,000	55	0.021	0.6	0.021	22,000	25	0.006	0.45	0.009
		0.9	30,000	55	0.015	0.75	0.015	22,000	25	0.003	0.6	0.006
		1.2	30,000	55	0.006	1.05	0.006	22,000	25	0.003	0.9	0.003
2004	0.4	0.6	27,000	60	0.04	0.6	0.04	17,000	25	0.008	0.4	0.02
		0.8	27,000	60	0.04	0.6	0.04	17,000	25	0.008	0.4	0.02
		1	27,000	60	0.028	0.8	0.028	17,000	25	0.008	0.6	0.012
		1.2	27,000	60	0.02	1	0.02	17,000	25	0.004	0.8	0.008
		1.6	27,000	60	0.008	1.4	0.008	17,000	25	0.004	1.2	0.004
2005	0.5	0.75	21,500	60	0.05	0.75	0.05	13,000	25	0.01	0.5	0.025
		0.8	21,500	60	0.05	0.75	0.05	13,000	25	0.01	0.5	0.025
		1	21,500	60	0.05	0.75	0.05	13,000	25	0.01	0.5	0.025
		1.25	21,500	60	0.035	1	0.035	13,000	25	0.01	0.75	0.015
2006	0.6	1.5	21,500	60	0.025	1.25	0.025	13,000	25	0.005	1	0.01
		2	21,500	60	0.01	1.75	0.01	13,000	25	0.005	1.5	0.005
		0.9	18,000	60	0.06	0.9	0.06	11,000	25	0.012	0.6	0.03
		1	18,000	60	0.06	0.9	0.06	11,000	25	0.012	0.6	0.03
		1.2	18,000	60	0.06	0.9	0.06	11,000	25	0.012	0.6	0.03
		1.5	18,000	60	0.042	1.2	0.042	11,000	25	0.012	0.9	0.018
2007	0.7	1.8	18,000	60	0.03	1.5	0.03	11,000	25	0.006	1.2	0.012
		2.4	18,000	60	0.012	2.1	0.012	11,000	25	0.006	1.8	0.006
		1	15,500	60	0.07	1.05	0.07	10,000	25	0.014	0.7	0.035
		1.4	15,500	60	0.07	1.05	0.07	10,000	25	0.014	0.7	0.035
		1.75	15,500	60	0.049	1.4	0.049	10,000	25	0.014	1.05	0.021
2008	0.8	2.1	15,500	60	0.035	1.75	0.035	10,000	25	0.007	1.4	0.014
		2.8	15,500	60	0.014	2.45	0.014	10,000	25	0.007	2.1	0.007
		1.2	13,800	60	0.08	1.2	0.08	8,800	30	0.016	0.8	0.04
		1.6	13,800	60	0.08	1.2	0.08	8,800	30	0.016	0.8	0.04
		2	13,800	60	0.056	1.6	0.056	8,800	30	0.016	1.2	0.024
2009	0.9	2.4	13,800	60	0.04	2	0.04	8,800	30	0.008	1.6	0.016
		3.2	13,800	60	0.016	2.8	0.016	8,800	30	0.008	2.4	0.008
		1.2	12,000	65	0.09	1.35	0.09	7,800	30	0.018	0.9	0.045
		1.8	12,000	65	0.09	1.35	0.09	7,800	30	0.018	0.9	0.045
		2.25	12,000	65	0.063	1.8	0.063	7,800	30	0.018	1.35	0.027
2010	1	2.7	12,000	65	0.045	2.25	0.045	7,800	30	0.009	1.8	0.018
		3.6	12,000	65	0.018	3.15	0.018	7,800	30	0.009	2.7	0.009
		1.5	11,000	65	0.25	1.5	0.1	7,100	30	0.05	1	0.05
		2	11,000	65	0.25	1.5	0.1	7,100	30	0.05	1	0.05
		2.5	11,000	65	0.2	2	0.07	7,100	30	0.03	1.5	0.03
2012	1.2	3	11,000	65	0.125	2.5	0.05	7,100	30	0.02	2	0.02
		4	11,000	65	0.075	3.5	0.02	7,100	30	0.01	3	0.01
		1.8	9,400	65	0.3	1.8	0.12	6,000	30	0.06	1.2	0.06
		2.4	9,400	65	0.3	1.8	0.12	6,000	30	0.06	1.2	0.06
		3	9,400	65	0.24	2.4	0.084	6,000	30	0.036	1.8	0.036
2015	1.5	3.6	9,400	65	0.15	3	0.06	6,000	30	0.024	2.4	0.024
		4	9,400	65	0.09	4	0.024	6,000	30	0.012	3.6	0.012
		4.8	9,400	65	0.09	4.2	0.024	6,000	30	0.012	3.6	0.012
		2.25	8,000	70	0.375	2.25	0.15	5,100	35	0.075	1.5	0.075
		3	8,000	70	0.375	2.25	0.15	5,100	35	0.075	1.5	0.075
		3.75	8,000	70	0.3	3	0.105	5,100	35	0.045	2.25	0.045
2015	1.5	4	8,000	70	0.1875	3.75	0.075	5,100	35	0.03	3	0.03
		4.5	8,000	70	0.1875	3.75	0.075	5,100	35	0.03	3	0.03
		6	8,000	70	0.1125	5.25	0.03	5,100	35	0.015	4.5	0.015

Ø3mm Shank
V SeriesUDC-PCD
SeriesCBN
Series

Square

Long Neck
Square

Radius

Long Neck
RadiusTaper Neck
RadiusBall / Long
Shank BallLong Neck
BallTaper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

Milling Conditions for C-CES (2 Flutes)

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)					ALLOY STEELS SK / SCM / SUS (225~325HB)						
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling		Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling	
					a _p (mm)	a _e (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _e (mm)		
2018	1.8	2.7	11,500	130	0.45	2.7	0.18	8,800	120	0.45	2.7	0.18		
		3.6	11,500	130	0.45	2.7	0.18	8,800	120	0.45	2.7	0.18		
		4.5	11,500	130	0.36	3.6	0.126	8,800	120	0.36	3.6	0.126		
		5	11,500	130	0.225	4.5	0.09	8,800	120	0.225	4.5	0.09		
		5.4	11,500	130	0.225	4.5	0.09	8,800	120	0.225	4.5	0.09		
2020	2	7.2	11,500	130	0.135	6.3	0.036	8,800	120	0.135	6.3	0.036		
		3	11,000	130	0.5	3	0.2	8,500	120	0.5	3	0.2		
		4	11,000	130	0.5	3	0.2	8,500	120	0.5	3	0.2		
		5	11,000	130	0.4	4	0.14	8,500	120	0.4	4	0.14		
		6	11,000	130	0.25	5	0.1	8,500	120	0.25	5	0.1		
2025	2.5	8	11,000	130	0.15	7	0.04	8,500	120	0.15	7	0.04		
		3.75	8,800	195	0.625	3.75	0.25	7,000	135	0.625	3.75	0.25		
		5	8,800	195	0.625	3.75	0.25	7,000	135	0.625	3.75	0.25		
		6.25	8,800	195	0.5	5	0.175	7,000	135	0.5	5	0.175		
		7.5	8,800	195	0.3125	6.25	0.125	7,000	135	0.3125	6.25	0.125		
2030	3	8	8,800	195	0.1875	8	0.05	7,000	135	0.1875	8	0.05		
		10	8,800	195	0.1875	8.75	0.05	7,000	135	0.1875	8.75	0.05		
		4.5	7,400	195	1.5	4.5	0.3	6,400	145	1.5	4.5	0.3		
		6	7,400	195	1.5	4.5	0.3	6,400	145	1.5	4.5	0.3		
		7.5	7,400	195	1.2	6	0.21	6,400	145	1.2	6	0.21		
2040	4	8	7,400	195	0.9	7.5	0.15	6,400	145	0.9	7.5	0.15		
		9	7,400	195	0.9	7.5	0.15	6,400	145	0.9	7.5	0.15		
		12	7,400	195	0.45	10.5	0.06	6,400	145	0.45	10.5	0.06		
		6	5,900	230	2	6	0.4	5,000	190	2	6	0.4		
		8	5,900	230	2	6	0.4	5,000	190	2	6	0.4		
2050	5	10	5,900	230	1.6	8	0.28	5,000	190	1.6	8	0.28		
		11	5,900	230	1.2	10	0.2	5,000	190	1.2	10	0.2		
		12	5,900	230	1.2	10	0.2	5,000	190	1.2	10	0.2		
		16	5,900	230	0.6	14	0.08	5,000	190	0.6	14	0.08		
		7.5	5,300	310	2.5	7.5	0.5	4,200	230	2.5	7.5	0.5		
2060	6	10	5,300	310	2.5	7.5	0.5	4,200	230	2.5	7.5	0.5		
		12.5	5,300	310	2	10	0.35	4,200	230	2	10	0.35		
		13	5,300	310	1.5	12.5	0.25	4,200	230	1.5	12.5	0.25		
		15	5,300	310	1.5	12.5	0.25	4,200	230	1.5	12.5	0.25		
		20	5,300	310	0.75	17.5	0.1	4,200	230	0.75	17.5	0.1		
2080	8	9	4,400	305	3	9	0.6	3,500	230	3	9	0.6		
		12	4,400	305	3	9	0.6	3,500	230	3	9	0.6		
		13	4,400	305	2.4	12	0.42	3,500	230	2.4	12	0.42		
		15	4,400	305	2.4	15	0.42	3,500	230	2.4	12	0.42		
		18	4,400	305	1.8	15	0.3	3,500	230	1.8	15	0.3		
2100	10	24	4,400	305	0.9	21	0.12	3,500	230	0.9	21	0.12		
		16	3,300	290	4	12	0.8	2,600	230	4	12	0.8		
		19	3,300	290	3.2	16	0.56	2,600	230	3.2	16	0.56		
		20	3,300	290	3.2	16	0.56	2,600	230	3.2	16	0.56		
		24	3,300	290	2.4	20	0.4	2,600	230	2.4	20	0.4		
2120	12	32	3,300	290	1.2	28	0.16	2,600	230	1.2	28	0.16		
		20	2,600	275	5	15	1	2,100	225	5	15	1		
		22	2,600	275	4	20	0.7	2,100	225	4	20	0.7		
		25	2,600	275	4	20	0.7	2,100	225	4	20	0.7		
		30	2,600	275	3	25	0.5	2,100	225	3	25	0.5		
2120	12	40	2,600	275	1.5	35	0.2	2,100	225	1.5	35	0.2		
		24	2,200	275	6	18	1.2	1,750	225	6	18	1.2		
		26	2,200	275	4.8	24	0.84	1,750	225	4.8	24	0.84		
		30	2,200	275	4.8	24	0.84	1,750	225	4.8	24	0.84		
		36	2,200	275	3.6	30	0.6	1,750	225	3.6	30	0.6		
48	2,200	275	1.8	42	0.24	1,750	225	1.8	42	0.24				

- φ3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

Milling Conditions for C-CES (2 Flutes)

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC)					HARDENED STEELS SKD / SKT (45~55HRC)				
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Side Milling			Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Side Milling		
					a _p (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _p (mm)	a _e (mm)
2018	1.8	2.7	7,000	70	0.45	2.7	0.18	4,400	35	0.09	1.8	0.09
		3.6	7,000	70	0.45	2.7	0.18	4,400	35	0.09	1.8	0.09
		4.5	7,000	70	0.36	3.6	0.126	4,400	35	0.054	2.7	0.054
		5	7,000	70	0.225	4.5	0.09	4,400	35	0.036	3.6	0.036
		5.4	7,000	70	0.225	4.5	0.09	4,400	35	0.036	3.6	0.036
2020	2	7.2	7,000	70	0.135	6.3	0.036	4,400	35	0.018	5.4	0.018
		3	6,400	70	0.5	3	0.2	4,000	40	0.1	2	0.1
		4	6,400	70	0.5	3	0.2	4,000	40	0.1	2	0.1
		5	6,400	70	0.4	4	0.14	4,000	40	0.06	3	0.06
		6	6,400	70	0.25	5	0.1	4,000	40	0.04	4	0.04
2025	2.5	8	6,400	70	0.15	7	0.04	4,000	40	0.02	6	0.02
		3.75	5,000	70	0.625	3.75	0.25	3,200	40	0.125	2.5	0.125
		5	5,000	70	0.625	3.75	0.25	3,200	40	0.125	2.5	0.125
		6.25	5,000	70	0.5	5	0.175	3,200	40	0.075	3.75	0.075
		7.5	5,000	70	0.3125	6.25	0.125	3,200	40	0.05	5	0.05
2030	3	8	5,000	70	0.1875	8	0.05	3,200	40	0.025	7.5	0.025
		10	5,000	70	0.1875	8.75	0.05	3,200	40	0.025	7.5	0.025
		4.5	4,500	80	1.5	4.5	0.3	2,800	45	0.15	3	0.15
		6	4,500	80	1.5	4.5	0.3	2,800	45	0.15	3	0.15
		7.5	4,500	80	1.2	6	0.21	2,800	45	0.09	4.5	0.09
2040	4	8	4,500	80	0.9	7.5	0.15	2,800	45	0.06	6	0.06
		9	4,500	80	0.9	7.5	0.15	2,800	45	0.06	6	0.06
		12	4,500	80	0.45	10.5	0.06	2,800	45	0.03	9	0.03
		6	3,500	90	2	6	0.4	2,150	50	0.2	4	0.2
		8	3,500	90	2	6	0.4	2,150	50	0.2	4	0.2
2050	5	10	3,500	90	1.6	8	0.28	2,150	50	0.12	6	0.12
		11	3,500	90	1.2	10	0.2	2,150	50	0.08	8	0.08
		12	3,500	90	1.2	10	0.2	2,150	50	0.08	8	0.08
		16	3,500	90	0.6	14	0.08	2,150	50	0.04	12	0.04
		7.5	2,950	90	2.5	7.5	0.5	1,850	55	0.25	5	0.25
2060	6	10	2,950	90	2.5	7.5	0.5	1,850	55	0.25	5	0.25
		12.5	2,950	90	2	10	0.35	1,850	55	0.15	7.5	0.15
		13	2,950	90	1.5	12.5	0.25	1,850	55	0.1	10	0.1
		15	2,950	90	1.5	12.5	0.25	1,850	55	0.1	10	0.1
		20	2,950	90	0.75	17.5	0.1	1,850	55	0.05	15	0.05
2080	8	9	2,450	100	3	9	0.6	1,500	55	0.3	6	0.3
		12	2,450	100	3	9	0.6	1,500	55	0.3	6	0.3
		13	2,450	100	2.4	12	0.42	1,500	55	0.18	9	0.18
		15	2,450	100	2.4	12	0.42	1,500	55	0.18	9	0.18
		18	2,450	100	1.8	15	0.3	1,500	55	0.12	12	0.12
2100	10	24	2,450	100	0.9	21	0.12	1,500	55	0.06	18	0.06
		16	1,850	95	4	12	0.8	1,200	50	0.4	8	0.4
		19	1,850	95	3.2	16	0.56	1,200	50	0.24	12	0.24
		20	1,850	95	3.2	16	0.56	1,200	50	0.24	12	0.24
		24	1,850	95	2.4	20	0.4	1,200	50	0.16	16	0.16
2120	12	32	1,850	95	1.2	28	0.16	1,200	50	0.08	24	0.08
		20	1,450	95	5	15	1	950	50	0.5	10	0.5
		22	1,450	95	4	20	0.7	950	50	0.3	15	0.3
		25	1,450	95	4	20	0.7	950	50	0.3	15	0.3
		30	1,450	95	3	25	0.5	950	50	0.2	20	0.2
2120	12	40	1,450	95	1.5	35	0.2	950	50	0.1	30	0.1
		24	1,200	90	6	18	1.2	800	45	0.6	12	0.6
		26	1,200	90	4.8	24	0.84	800	45	0.36	18	0.36
		30	1,200	90	4.8	24	0.84	800	45	0.36	18	0.36
		36	1,200	90	3.6	30	0.6	800	45	0.24	24	0.24
2120	12	48	1,200	90	1.8	42	0.24	800	45	0.12	36	0.12

Ø3mm Shank
V SeriesUDC-PCD
SeriesCBN
Series

Square

Square
Long Neck
Square

Radius

Radius
Long Neck
RadiusTaper Neck
RadiusBall / Long
Shank BallBall
Long Neck
BallTaper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

Milling Conditions for C-CES (2 Flutes)

◆High speed milling

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)					ALLOY STEELS SK / SCM / SUS (225~325HB)						
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling		Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling	
					a _p (mm)	a _e (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _e (mm)		
2030	3	4.5	30,000	790	1.5	4.5	0.3	26,500	600	1.5	4.5	0.3		
		6	30,000	790	1.5	4.5	0.3	26,500	600	1.5	4.5	0.3		
		7.5	30,000	790	1.2	6	0.21	26,500	600	1.2	6	0.21		
		8	30,000	790	0.9	7.5	0.15	26,500	600	0.9	7.5	0.15		
		9	30,000	790	0.9	7.5	0.15	26,500	600	0.9	7.5	0.15		
		12	30,000	790	0.45	10.5	0.06	26,500	600	0.45	10.5	0.06		
2040	4	6	23,800	930	2	6	0.4	19,800	750	2	6	0.4		
		8	23,800	930	2	6	0.4	19,800	750	2	6	0.4		
		10	23,800	930	1.6	8	0.28	19,800	750	1.6	8	0.28		
		11	23,800	930	1.2	10	0.2	19,800	750	1.2	10	0.2		
		12	23,800	930	1.2	10	0.2	19,800	750	1.2	10	0.2		
		16	23,800	930	0.6	14	0.08	19,800	750	0.6	14	0.08		
2050	5	7.5	19,000	1,110	2.5	7.5	0.5	15,800	865	2.5	7.5	0.5		
		10	19,000	1,110	2.5	7.5	0.5	15,800	865	2.5	7.5	0.5		
		12.5	19,000	1,110	2	10	0.35	15,800	865	2	10	0.35		
		13	19,000	1,110	1.5	12.5	0.25	15,800	865	1.5	12.5	0.25		
		15	19,000	1,110	1.5	12.5	0.25	15,800	865	1.5	12.5	0.25		
		20	19,000	1,110	0.75	17.5	0.1	15,800	865	0.75	17.5	0.1		
2060	6	9	15,900	1,110	3	9	0.6	13,200	865	3	9	0.6		
		12	15,900	1,110	3	9	0.6	13,200	865	3	9	0.6		
		13	15,900	1,110	2.4	12	0.42	13,200	865	2.4	12	0.42		
		15	15,900	1,110	2.4	12	0.42	13,200	865	2.4	12	0.42		
		18	15,900	1,110	1.8	15	0.3	13,200	865	1.8	15	0.3		
		24	15,900	1,110	0.9	21	0.12	13,200	865	0.9	21	0.12		
2080	8	16	11,900	1,045	4	12	0.8	9,900	875	4	12	0.8		
		19	11,900	1,045	3.2	16	0.56	9,900	875	3.2	16	0.56		
		20	11,900	1,045	3.2	16	0.56	9,900	875	3.2	16	0.56		
		24	11,900	1,045	2.4	20	0.4	9,900	875	2.4	20	0.4		
		32	11,900	1,045	1.2	28	0.16	9,900	875	1.2	28	0.16		
2100	10	20	9,500	1,005	5	15	1	7,900	845	5	15	1		
		22	9,500	1,005	4	20	0.7	7,900	845	4	20	0.7		
		25	9,500	1,005	4	20	0.7	7,900	845	4	20	0.7		
		30	9,500	1,005	3	25	0.5	7,900	845	3	25	0.5		
2120	12	24	7,900	1,000	6	18	1.2	6,600	850	6	18	1.2		
		26	7,900	1,000	4.8	24	0.84	6,600	850	4.8	24	0.84		
		30	7,900	1,000	4.8	24	0.84	6,600	850	4.8	24	0.84		
		36	7,900	1,000	3.6	30	0.6	6,600	850	3.6	30	0.6		
		48	7,900	1,000	1.8	42	0.24	6,600	850	1.8	42	0.24		

φ3mm Shank V Series

UDC-PCD Series

CBN Series

Square
Long Neck Square

Radius
Long Neck Radius
Taper Neck Radius

Ball / Long Shank Ball
Long Neck Ball
Taper Neck Ball

Taper
Barrel

Spiral V Cutter

Drill

Technical Data

Milling Conditions for C-CES (2 Flutes)

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC)					HARDENED STEELS SKD / SKT (45~55HRC)						
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling		Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting		Side Milling	
					a _p (mm)	a _e (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _e (mm)	a _p (mm)	a _e (mm)
2030	3	4.5	21,200	375	1.5	4.5	0.3	15,800	255	0.15	3	0.15		
		6	21,200	375	1.5	4.5	0.3	15,800	255	0.15	3	0.15		
		7.5	21,200	375	1.2	6	0.21	15,800	255	0.09	4.5	0.09		
		8	21,200	375	0.9	7.5	0.15	15,800	255	0.06	6	0.06		
		9	21,200	375	0.9	7.5	0.15	15,800	255	0.06	6	0.06		
		12	21,200	375	0.45	10.5	0.06	15,800	255	0.03	9	0.03		
2040	4	6	15,800	405	2	6	0.4	11,900	275	0.2	4	0.2		
		8	15,800	405	2	6	0.4	11,900	275	0.2	4	0.2		
		10	15,800	405	1.6	8	0.28	11,900	275	0.12	6	0.12		
		11	15,800	405	1.2	10	0.2	11,900	275	0.08	8	0.08		
		12	15,800	405	1.2	10	0.2	11,900	275	0.08	8	0.08		
		16	15,800	405	0.6	14	0.08	11,900	275	0.04	12	0.04		
2050	5	7.5	12,700	385	2.5	7.5	0.5	9,500	280	0.25	5	0.25		
		10	12,700	385	2.5	7.5	0.5	9,500	280	0.25	5	0.25		
		12.5	12,700	385	2	10	0.35	9,500	280	0.15	7.5	0.15		
		13	12,700	385	1.5	12.5	0.25	9,500	280	0.1	10	0.1		
		15	12,700	385	1.5	12.5	0.25	9,500	280	0.1	10	0.1		
		20	12,700	385	0.75	17.5	0.1	9,500	280	0.05	15	0.05		
2060	6	9	10,600	435	3	9	0.6	7,900	290	0.3	6	0.3		
		12	10,600	435	3	9	0.6	7,900	290	0.3	6	0.3		
		13	10,600	435	2.4	12	0.42	7,900	290	0.18	9	0.18		
		15	10,600	435	2.4	12	0.42	7,900	290	0.18	9	0.18		
		18	10,600	435	1.8	15	0.3	7,900	290	0.12	12	0.12		
		24	10,600	435	0.9	21	0.12	7,900	290	0.06	18	0.06		
2080	8	16	7,900	405	4	12	0.8	5,900	245	0.4	8	0.4		
		19	7,900	405	3.2	16	0.56	5,900	245	0.24	12	0.24		
		20	7,900	405	3.2	16	0.56	5,900	245	0.24	12	0.24		
		24	7,900	405	2.4	20	0.4	5,900	245	0.16	16	0.16		
		32	7,900	405	1.2	28	0.16	5,900	245	0.08	24	0.08		
2100	10	20	6,300	415	5	15	1	4,700	245	0.5	10	0.5		
		22	6,300	415	4	20	0.7	4,700	245	0.3	15	0.3		
		25	6,300	415	4	20	0.7	4,700	245	0.3	15	0.3		
		30	6,300	415	3	25	0.5	4,700	245	0.2	20	0.2		
		24	5,300	400	6	18	1.2	3,900	219	0.6	12	0.6		
2120	12	26	5,300	400	4.8	24	0.84	3,900	219	0.36	18	0.36		
		30	5,300	400	4.8	24	0.84	3,900	219	0.36	18	0.36		
		36	5,300	400	3.6	30	0.6	3,900	219	0.24	24	0.24		
		48	5,300	400	1.8	42	0.24	3,900	219	0.12	36	0.12		

Ø3mm Shank
V SeriesUDC-PCD
SeriesCBN
Series

Square

Long Neck
Square

Radius

Long Neck
RadiusTaper Neck
RadiusBall / Long
Shank BallLong Neck
BallTaper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

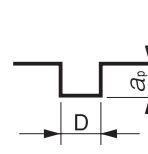
Milling Conditions for C-CES (2 Flutes)

Milling amount for slotting (mm)
 $D < \phi 1$

Work Material \ Length of Cut	2D or below	2.5D or below	3D or below	4D or below
	45HRC or below	$a_p=0.1D$	$a_p=0.07D$	$a_p=0.05D$
45HRC or above	$a_p=0.02D$	$a_p=0.02D$	$a_p=0.01D$	$a_p=0.01D$

$\phi 1 \leq D < \phi 3$

Work Material \ Length of Cut	2D or below	2.5D or below	3D or below	4D or below
	45HRC or below	$a_p=0.25D$	$a_p=0.2D$	$a_p=0.125D$
45HRC or above	$a_p=0.05D$	$a_p=0.03D$	$a_p=0.02D$	$a_p=0.01D$

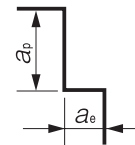


$\phi 3 \leq D$

Work Material \ Length of Cut	2D or below	2.5D or below	3D or below	4D or below
	45HRC or below	$a_p=0.5D$	$a_p=0.4D$	$a_p=0.3D$
45HRC or above	$a_p=0.05D$	$a_p=0.03D$	$a_p=0.02D$	$a_p=0.01D$

Milling amount for side milling (mm)

Work Material \ Length of Cut	2D or below	2.5D or below	3D or below	4D or below
	45HRC or below	$a_p=1.5D$ $a_e=0.1D$	$a_p=2D$ $a_e=0.07D$	$a_p=2.5D$ $a_e=0.05D$
45HRC or above	$a_p=1D$ $a_e=0.05D$	$a_p=1.5D$ $a_e=0.03D$	$a_p=2D$ $a_e=0.02D$	$a_p=3D$ $a_e=0.01D$



D : Outside Diameter (mm)

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

Note:

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

∅3mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Square

Long Neck
Square

Radius

Radius

Long Neck
Radius

Taper Neck
Radius

Ball

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data



Size $\phi 0.2 \sim \phi 12$

C-CES2000S



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
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC										
●	●	●	●	○				○			●			○	○		

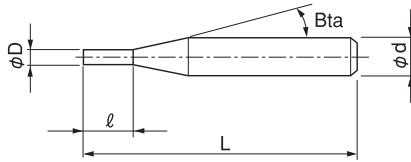
Features

2 flute C-CES with a sharp corner design.

Broad application range from Copper and Carbon Steels up to Hardened Steels (55HRC).

Excellent performance/quality to price ratio.

Refer to page 200 for 4 flute C-CES-S.



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 35 models

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price \yen
C-CES 2002-0030S	0.2	0.3	16°	45	4	4,680
C-CES 2002-0060S		0.6		45		
C-CES 2003-0045S	0.3	0.45	16°	45	4	4,080
C-CES 2003-0090S		0.9		45		
C-CES 2004-0060S	0.4	0.6	16°	45	4	4,560
C-CES 2004-0120S		1.2		45		
C-CES 2005-0075S	0.5	0.75	16°	45	4	2,280
C-CES 2005-0150S		1.5		45		
C-CES 2006-0090S	0.6	0.9	16°	45	4	3,480
C-CES 2007-0105S	0.7	1.05	16°	45	4	3,840
C-CES 2008-0120S	0.8	1.2	16°	45	4	2,280
C-CES 2008-0240S		2.4		45		
C-CES 2009-0135S	0.9	1.35	16°	45	4	3,840
C-CES 2010-0150S	1	1.5	16°	45	4	2,040
C-CES 2010-0300S		3		45		
C-CES 2012-0180S	1.2	1.8	16°	45	4	2,280
C-CES 2012-0360S		3.6		45		

Next Page ➡

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle $B\alpha$	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 2015-0225S	1.5	2.25	16°	45	4	2,040
C-CES 2015-0450S		4.5		45	4	2,040
C-CES 2018-0270S	1.8	2.7	16°	45	4	2,280
C-CES 2018-0540S		5.4		45	4	2,280
C-CES 2020-0300S	2	3	16°	45	4	2,040
C-CES 2020-0600S		6		45	4	2,040
C-CES 2025-0375S	2.5	3.75	16°	45	4	2,040
C-CES 2030-0450S	3	4.5	16°	45	6	2,640
C-CES 2030-0900S		9		45	6	2,640
C-CES 2040-0600S	4	6	16°	50	6	2,880
C-CES 2040-1200S		12		50	6	2,880
C-CES 2050-0750S	5	7.5	16°	50	6	3,120
C-CES 2050-1500S		15		50	6	3,120
C-CES 2060-0900S	6	9	—	50	6	3,360
C-CES 2060-1800S		18		50	6	3,360
C-CES 2080-2400S	8	24	—	80	8	6,320
C-CES 2100-3000S	10	30	—	80	10	7,580
C-CES 2120-3600S	12	36	—	90	12	11,170

$\phi 3\text{mm}$ Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Square

Long Neck
Square

Radius

Radius

Long Neck
Radius

Taper Neck
Radius

Ball

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Taper

Barrel

Barrel

Spiral

Spiral
V Cutter

Drill

Drill

Technical Data

Technical Data

Milling Conditions for C-CES-S (2 Flutes)

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)					ALLOY STEELS SK / SCM / SUS (225~325HB)				
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting	Side Milling		Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting	Side Milling	
					a _p (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _p (mm)	a _e (mm)
2002	0.2	0.3	27,000	60	0.02	0.3	0.02	27,000	60	0.02	0.3	0.02
		0.6	27,000	60	0.01	0.5	0.01	27,000	60	0.01	0.5	0.01
2003	0.3	0.45	27,000	77	0.03	0.45	0.03	27,000	77	0.03	0.45	0.03
		0.9	27,000	77	0.015	0.75	0.015	27,000	77	0.015	0.75	0.015
2004	0.4	0.6	27,000	84	0.04	0.6	0.04	27,000	84	0.04	0.6	0.04
		1.2	27,000	84	0.02	1	0.02	27,000	84	0.02	1	0.02
2005	0.5	0.75	27,000	84	0.05	0.75	0.05	26,100	84	0.05	0.75	0.05
		1.5	27,000	84	0.025	1.25	0.025	26,100	84	0.025	1.25	0.025
2006	0.6	0.9	27,000	84	0.06	0.9	0.06	21,600	84	0.06	0.9	0.06
2007	0.7	1.05	24,750	84	0.07	1.05	0.07	18,900	84	0.07	1.05	0.07
2008	0.8	1.2	21,600	84	0.08	1.2	0.08	17,100	84	0.08	1.2	0.08
		2.4	21,600	84	0.04	2	0.04	17,100	84	0.04	2	0.04
2009	0.9	1.35	19,350	88	0.09	1.35	0.09	14,850	84	0.09	1.35	0.09
2010	1	1.5	18,000	88	0.25	1.5	0.1	13,500	84	0.25	1.5	0.1
		3	18,000	88	0.125	2.5	0.05	13,500	84	0.125	2.5	0.05
2012	1.2	1.8	15,030	91	0.3	1.8	0.12	11,250	84	0.3	1.8	0.12
		3.6	15,030	91	0.15	3	0.06	11,250	84	0.15	3	0.06
2015	1.5	2.25	12,150	91	0.375	2.25	0.15	9,000	84	0.375	2.25	0.15
		4.5	12,150	91	0.1875	3.75	0.075	9,000	84	0.1875	3.75	0.075
2018	1.8	2.7	10,350	91	0.45	2.7	0.18	7,920	84	0.45	2.7	0.18
		5.4	10,350	91	0.225	4.5	0.09	7,920	84	0.225	4.5	0.09
2020	2	3	9,900	91	0.5	3	0.2	7,650	84	0.5	3	0.2
		6	9,900	91	0.25	5	0.1	7,650	84	0.25	5	0.1
2025	2.5	3.75	7,920	137	0.625	3.75	0.25	6,300	95	0.625	3.75	0.25
2030	3	4.5	6,660	137	1.5	4.5	0.3	5,760	102	1.5	4.5	0.3
		9	6,660	137	0.9	7.5	0.15	5,760	102	0.9	7.5	0.15
2040	4	6	5,310	161	2	6	0.4	4,500	133	2	6	0.4
		12	5,310	161	1.2	10	0.2	4,500	133	1.2	10	0.2
2050	5	7.5	4,770	217	2.5	7.5	0.5	3,780	161	2.5	7.5	0.5
		15	4,770	217	1.5	12.5	0.25	3,780	161	1.5	12.5	0.25
2060	6	9	3,960	214	3	9	0.6	3,150	161	3	9	0.6
		18	3,960	214	1.8	15	0.3	3,150	161	1.8	15	0.3
2080	8	24	2,970	203	2.4	20	0.4	2,340	161	2.4	20	0.4
2100	10	30	2,340	193	3	25	0.5	1,890	158	3	25	0.5
2120	12	36	1,980	193	3.6	30	0.6	1,575	158	3.6	30	0.6

- 3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

Milling Conditions for C-CES-S (2 Flutes)

WORK MATERIAL			PREHARDENED STEELS HARDENED STEELS NAK / SKD (30~45HRC)					HARDENED STEELS SKD / SKT (45~55HRC)				
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting	Side Milling		Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	Slotting	Side Milling	
					a _p (mm)	a _p (mm)	a _e (mm)			a _p (mm)	a _p (mm)	a _e (mm)
2002	0.2	0.3	24,000	21	0.02	0.3	0.02	24,000	18	0.004	0.2	0.01
		0.6	24,000	21	0.01	0.5	0.01	24,000	18	0.002	0.4	0.004
2003	0.3	0.45	24,000	39	0.03	0.45	0.03	17,600	18	0.006	0.3	0.015
		0.9	24,000	39	0.015	0.75	0.015	17,600	18	0.003	0.6	0.006
2004	0.4	0.6	21,600	42	0.04	0.6	0.04	13,600	18	0.008	0.4	0.02
		1.2	21,600	42	0.02	1	0.02	13,600	18	0.004	0.8	0.008
2005	0.5	0.75	17,200	42	0.05	0.75	0.05	10,400	18	0.01	0.5	0.025
		1.5	17,200	42	0.025	1.25	0.025	10,400	18	0.005	1	0.01
2006	0.6	0.9	14,400	42	0.06	0.9	0.06	8,800	18	0.012	0.6	0.03
2007	0.7	1.05	12,400	42	0.07	1.05	0.07	8,000	18	0.014	0.7	0.035
2008	0.8	1.2	11,040	42	0.08	1.2	0.08	7,040	21	0.016	0.8	0.04
		2.4	11,040	42	0.04	2	0.04	7,040	21	0.008	1.6	0.016
2009	0.9	1.35	9,600	46	0.09	1.35	0.09	6,240	21	0.018	0.9	0.045
2010	1	1.5	8,800	46	0.25	1.5	0.1	5,680	21	0.05	1	0.05
		3	8,800	46	0.125	2.5	0.05	5,680	21	0.02	2	0.02
2012	1.2	1.8	7,520	46	0.3	1.8	0.12	4,800	21	0.06	1.2	0.06
		3.6	7,520	46	0.15	3	0.06	4,800	21	0.024	2.4	0.024
2015	1.5	2.25	6,400	49	0.375	2.25	0.15	4,080	25	0.075	1.5	0.075
		4.5	6,400	49	0.1875	3.75	0.075	4,080	25	0.03	3	0.03
2018	1.8	2.7	5,600	49	0.45	2.7	0.18	3,520	25	0.09	1.8	0.09
		5.4	5,600	49	0.225	4.5	0.09	3,520	25	0.036	3.6	0.036
2020	2	3	5,120	49	0.5	3	0.2	3,200	28	0.1	2	0.1
		6	5,120	49	0.25	5	0.1	3,200	28	0.04	4	0.04
2025	2.5	3.75	4,000	49	0.625	3.75	0.25	2,560	28	0.125	2.5	0.125
2030	3	4.5	3,600	56	1.5	4.5	0.3	2,240	32	0.15	3	0.15
		9	3,600	56	0.9	7.5	0.15	2,240	32	0.06	6	0.06
2040	4	6	2,800	63	2	6	0.4	1,720	35	0.2	4	0.2
		12	2,800	63	1.2	10	0.2	1,720	35	0.08	8	0.08
2050	5	7.5	2,360	63	2.5	7.5	0.5	1,480	39	0.25	5	0.25
		15	2,360	63	1.5	12.5	0.25	1,480	39	0.1	10	0.1
2060	6	9	1,960	70	3	9	0.6	1,200	39	0.3	6	0.3
		18	1,960	70	1.8	15	0.3	1,200	39	0.12	12	0.12
2080	8	24	1,480	67	2.4	20	0.4	960	35	0.16	16	0.16
2100	10	30	1,160	67	3	25	0.5	760	35	0.2	20	0.2
2120	12	36	960	63	3.6	30	0.6	640	32	0.24	24	0.24

Ø3mm Shank
V SeriesUDC-PCD
SeriesCBN
Series

Square

Square

Long Neck
Square

Radius

Radius

Long Neck
RadiusTaper Neck
RadiusBall / Long
Shank Ball

Ball

Long Neck
BallTaper Neck
Ball

Taper

Taper

Barrel

Spiral
V Cutter

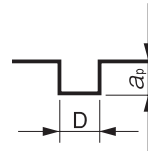
Drill

Technical Data

Milling Conditions for C-CES-S (2 Flutes)

Milling amount for slotting (mm)
 $D < \phi 1$

Length of Cut	2D or below	3D or below
Work Material		
45HRC or below	$a_p = 0.1D$	$a_p = 0.05D$
45HRC or above	$a_p = 0.02D$	$a_p = 0.01D$



$\phi 1 \leq D < \phi 3$

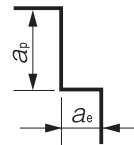
Length of Cut	2D or below	3D or below
Work Material		
45HRC or below	$a_p = 0.25D$	$a_p = 0.125D$
45HRC or above	$a_p = 0.05D$	$a_p = 0.02D$

$\phi 3 \leq D$

Length of Cut	2D or below	3D or below
Work Material		
45HRC or below	$a_p = 0.5D$	$a_p = 0.3D$
45HRC or above	$a_p = 0.05D$	$a_p = 0.02D$

Milling amount for side milling (mm)

Length of Cut	2D or below	3D or below
Work Material		
45HRC or below	$a_p = 1.5D$ $a_e = 0.1D$	$a_p = 2.5D$ $a_e = 0.05D$
45HRC or above	$a_p = 1D$ $a_e = 0.05D$	$a_p = 2D$ $a_e = 0.02D$



D : Outside Diameter (mm)

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

Note:

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

$\phi 3$ mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data



Size $\phi 1 \sim \phi 20$

C-CES4000

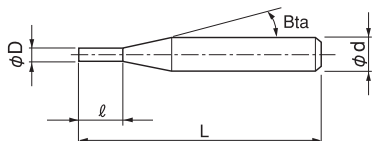


Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

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
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC										
●	●	●	●	○				○			●			○	○		

Features

**Broad application range from Copper and Carbon Steels up to Hardened Steels (55HRC).
Excellent performance/quality to price ratio.
Refer to page 166 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. Actual measurement is necessary when using longer length of cut than the written length.

Total 56 models

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 4010	1	2.5	16°	45	4	5,160
C-CES 4010-0300		3		45	4	5,160
C-CES 4010-0400		4		45	4	5,400
C-CES 4015	1.5	3.75	16°	45	4	5,160
C-CES 4015-0450		4.5		45	4	5,160
C-CES 4015-0600		6		45	4	5,400
C-CES 4020	2	5	16°	45	4	3,300
C-CES 4020-0600		6		45	4	3,300
C-CES 4020-0800		8		45	4	4,440
C-CES 4025	2.5	6.25	16°	45	4	3,300
C-CES 4025-0750		7.5		50	4	3,300
C-CES 4025-1000		10		50	4	4,440
C-CES 4030-0750	3	7.5	16°	45	6	3,420
C-CES 4030		8		45	6	3,420
C-CES 4030-0900		9		50	6	3,420
C-CES 4030-1200		12		50	6	4,320
C-CES 4035	3.5	10	16°	45	6	7,150

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 4040	4	11	16°	45	6	3,860
C-CES 4040-1200		12		60	6	3,860
C-CES 4040-1600		16		60	6	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	6	3,970
C-CES 4050-1500		15		60	6	3,970
C-CES 4050-2000		20		60	6	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	6	4,170
C-CES 4060-1800		18		60	6	4,170
C-CES 4060-2400		24		60	6	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	8	7,090
C-CES 4080-2400		24		80	8	7,090
C-CES 4080-3200		32		80	8	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	10	9,460
C-CES 4100-3000		30		90	10	9,460
C-CES 4100-4000		40		90	10	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	12	11,880
C-CES 4120-3600		36		90	12	11,880
C-CES 4120-4800		48		100	12	25,200
C-CES 4120-5000		50		100	12	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

$\phi 3$ mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

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)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _{ax} Axial Depth (mm)	a _{ar} Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _{ax} Axial Depth (mm)	a _{ar} Radial Depth (mm)
4010	1	2.5	20,000	240	2	0.07	15,000	215	2	0.07
		3			2.5	0.05			2.5	0.05
		4			3.5	0.02			3.5	0.02
4015	1.5	3.75	13,500	245	3	0.105	10,000	215	3	0.105
		4.5			3.75	0.075			3.75	0.075
		6			5.25	0.03			5.25	0.03
4020	2	5	11,000	245	4	0.14	8,500	215	4	0.14
		6			5	0.1			5	0.1
		8			7	0.04			7	0.04
4025	2.5	6.25	8,800	370	5	0.175	7,000	245	5	0.175
		7.5			6.25	0.125			6.25	0.125
		10			8.75	0.05			8.75	0.05
4030	3	7.5	7,400	370	6	0.21	6,400	260	6	0.21
		8			7.5	0.15			7.5	0.15
		9			7.5	0.15			7.5	0.15
		12			10.5	0.06			10.5	0.06
4040	4	11	5,900	435	10	0.2	5,000	340	10	0.2
		12			10	0.2			10	0.2
		16			14	0.08			14	0.08
4050	5	12.5	5,300	590	10	0.35	4,200	415	10	0.35
		13			12.5	0.25			12.5	0.25
		15			12.5	0.25			12.5	0.25
		20			17.5	0.1			17.5	0.1
4060	6	13	4,400	580	12	0.42	3,500	415	12	0.42
		15			12	0.42			12	0.42
		18			15	0.3			15	0.3
		24			21	0.12			21	0.12
4080	8	19	3,300	550	16	0.56	2,600	415	16	0.56
		20			16	0.56			16	0.56
		24			20	0.4			20	0.4
		32			28	0.16			28	0.16
4100	10	22	2,600	525	20	0.7	2,100	405	20	0.7
		25			20	0.7			20	0.7
		30			25	0.5			25	0.5
		40			35	0.2			35	0.2
4120	12	26	2,200	525	24	0.84	1,750	405	24	0.84
		30			24	0.84			24	0.84
		36			30	0.6			30	0.6
		48			42	0.24			42	0.24
		50			42	0.24			42	0.24

- φ3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

Milling Conditions for C-CES (4 Flutes)

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC)				HARDENED STEELS SKD / SKT (45~55HRC)			
			Side Milling				Side Milling			
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a ₀ Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a ₀ Axial Depth (mm)	a _e Radial Depth (mm)
4010	1	2.5	11,000	85	2	0.07	7,100	40	1.5	0.03
		3			2.5	0.05			2	0.02
		4			3.5	0.02			3	0.01
4015	1.5	3.75	8,000	90	3	0.105	5,100	50	2.25	0.045
		4.5			3.75	0.075			3	0.03
		6			5.25	0.03			4.5	0.015
4020	2	5	6,400	90	4	0.14	4,000	55	3	0.06
		6			5	0.1			4	0.04
		8			7	0.04			6	0.02
4025	2.5	6.25	5,000	90	5	0.175	3,200	55	3.75	0.075
		7.5			6.25	0.125			5	0.05
		10			8.75	0.05			7.5	0.025
4030	3	7.5	4,500	105	6	0.21	2,800	65	4.5	0.09
		8			7.5	0.15			6	0.06
		9			7.5	0.15			6	0.06
		12			10.5	0.06			9	0.03
4040	4	11	3,500	120	10	0.2	2,150	70	8	0.08
		12			10	0.2			8	0.08
		16			14	0.08			12	0.04
4050	5	12.5	2,950	120	10	0.35	1,850	75	7.5	0.15
		13			12.5	0.25			10	0.1
		15			12.5	0.25			10	0.1
		20			17.5	0.1			15	0.05
4060	6	13	2,450	130	12	0.42	1,500	70	9	0.18
		15			12	0.42			9	0.18
		18			15	0.3			12	0.12
		24			21	0.12			18	0.06
4080	8	19	1,850	125	16	0.56	1,200	70	12	0.24
		20			16	0.56			12	0.24
		24			20	0.4			16	0.16
		32			28	0.16			24	0.08
4100	10	22	1,450	125	20	0.7	950	65	15	0.3
		25			20	0.7			15	0.3
		30			25	0.5			20	0.2
		40			35	0.2			30	0.1
4120	12	26	1,200	120	24	0.84	800	60	18	0.36
		30			24	0.84			18	0.36
		36			30	0.6			24	0.24
		48			42	0.24			36	0.12
		50			42	0.24			36	0.12

4 Flutes

Ø3mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

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)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _{ax} Axial Depth (mm)	a _{ar} Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _{ax} Axial Depth (mm)	a _{ar} Radial Depth (mm)
4030	3	7.5	30,000	1,500	6	0.21	26,500	1,075	6	0.21
		8			7.5	0.15			7.5	0.15
		9			7.5	0.15			7.5	0.15
		12			10.5	0.06			10.5	0.06
4040	4	11	23,800	1,755	10	0.2	19,800	1,345	10	0.2
		12			10	0.2			10	0.2
		16			14	0.08			14	0.08
4050	5	12.5	19,000	2,115	10	0.35	15,800	1,560	10	0.35
		13			12.5	0.25			12.5	0.25
		15			12.5	0.25			12.5	0.25
		20			17.5	0.1			17.5	0.1
4060	6	13	15,900	2,095	12	0.42	13,200	1,565	12	0.42
		15			12	0.42			12	0.42
		18			15	0.3			15	0.3
		24			21	0.12			21	0.12
4080	8	19	11,900	1,985	16	0.56	9,900	1,580	16	0.56
		20			16	0.56			16	0.56
		24			20	0.4			20	0.4
		32			28	0.16			28	0.16
4100	10	22	9,500	1,920	20	0.7	7,900	1,525	20	0.7
		25			20	0.7			20	0.7
		30			25	0.5			25	0.5
		40			35	0.2			35	0.2
4120	12	26	7,900	1,885	24	0.84	6,600	1,525	24	0.84
		30			24	0.84			24	0.84
		36			30	0.6			30	0.6
		48			42	0.24			42	0.24
		50			42	0.24			42	0.24

φ3mm Shank
V SeriesUDC-PCD
SeriesCBN
Series

Square

Long Neck
Square

Radius

Long Neck
RadiusTaper Neck
RadiusBall / Long
Shank BallLong Neck
BallTaper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data

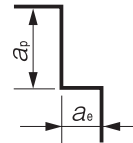
Milling Conditions for C-CES (4 Flutes)

4 Flutes

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC)				HARDENED STEELS SKD / SKT (45~55HRC)			
			Side Milling				Side Milling			
Model Number	Outside Diameter (mm)	Length of Cut (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
4030	3	7.5	21,200	495	6	0.21	15,800	365	4.5	0.09
		8			7.5	0.15			6	0.06
		9			7.5	0.15			6	0.06
		12			10.5	0.06			9	0.03
4040	4	11	15,800	540	10	0.2	11,900	385	8	0.08
		12			10	0.2			8	0.08
		16			14	0.08			12	0.04
4050	5	12.5	12,700	515	10	0.35	9,500	385	7.5	0.15
		13			12.5	0.25			10	0.1
		15			12.5	0.25			10	0.1
		20			17.5	0.1			15	0.05
4060	6	13	10,600	560	12	0.42	7,900	370	9	0.18
		15			12	0.42			9	0.18
		18			15	0.3			12	0.12
		24			21	0.12			18	0.06
4080	8	19	7,900	535	16	0.56	5,900	345	12	0.24
		20			16	0.56			12	0.24
		24			20	0.4			16	0.16
		32			28	0.16			24	0.08
4100	10	22	6,300	545	20	0.7	4,700	320	15	0.3
		25			20	0.7			15	0.3
		30			25	0.5			20	0.2
		40			35	0.2			30	0.1
4120	12	26	5,300	530	24	0.84	3,900	295	18	0.36
		30			24	0.84			18	0.36
		36			30	0.6			24	0.24
		48			42	0.24			36	0.12
		50			42	0.24			36	0.12

Milling amount (mm)

Work Material	Length of Cut	2.5D or below	3D or below	4D or above
	45HRC or below		a _p =2D a _e =0.07D	a _p =2.5D a _e =0.05D
45HRC or above		a _p =1.5D a _e =0.03D	a _p =2D a _e =0.02D	a _p =3D a _e =0.01D



D : Outside Diameter (mm)

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

Note:

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

- Ø3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
 - Long Neck Square
- Radius
 - Long Neck Radius
 - Taper Neck Radius
- Ball
 - Ball / Long Shank Ball
 - Long Neck Ball
 - Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data



Size $\phi 1 \sim \phi 12$

C-CES4000S



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
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC										
●	●	●	●	○				○			●			○	○		

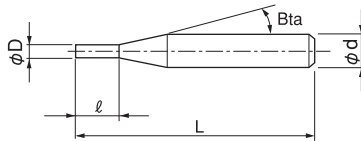
Features

4 flute C-CES with a sharp corner design.

Broad application range from Copper and Carbon Steels up to Hardened Steels (55HRC).

Excellent performance / quality to price ratio.

Refer to page 180 for 2 flute C-CES-S.



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 11 models

Unit (mm)

Model Number	Outside Diameter ϕD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
C-CES 4010S	1	2.5	16°	45	4	5,160
C-CES 4015S	1.5	3.75	16°	45	4	5,160
C-CES 4020S	2	6	16°	45	4	3,300
C-CES 4025S	2.5	6.25	16°	45	4	3,300
C-CES 4030S	3	8	16°	45	6	3,420
C-CES 4040S	4	11	16°	45	6	3,860
C-CES 4050S	5	13	16°	50	6	3,970
C-CES 4060S	6	13	—	50	6	4,170
C-CES 4080S	8	19	—	60	8	7,090
C-CES 4100S	10	22	—	70	10	9,460
C-CES 4120S	12	26	—	75	12	11,880

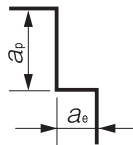
Milling Conditions for C-CES-S (4 Flutes)

WORK MATERIAL		CARBON STEELS S45C / S50C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB)			
		Side Milling				Side Milling			
Model Number	Outside Diameter (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
4010S	1	20,000	170	2	0.07	13,700	150	2	0.07
4015S	1.5	13,400	190	3	0.105	9,100	160	3	0.105
4020S	2	11,600	200	4	0.14	5,600	170	4	0.14
4025S	2.5	9,300	300	5	0.175	4,200	190	5	0.175
4030S	3	8,800	340	6	0.21	6,700	210	6	0.21
4040S	4	6,600	370	8	0.28	5,000	270	8	0.28
4050S	5	5,300	450	10	0.35	4,000	320	10	0.35
4060S	6	4,400	450	12	0.42	3,300	320	12	0.42
4080S	8	3,300	420	16	0.56	2,500	300	16	0.56
4100S	10	2,650	410	20	0.7	2,000	300	20	0.7
4120S	12	2,200	400	24	0.84	1,700	300	24	0.84

WORK MATERIAL		PREHARDENED STEELS / HARDENED STEELS NAK / SKD (30~45HRC)				HARDENED STEELS SKD / SKT (45~55HRC)			
		Side Milling				Side Milling			
Model Number	Outside Diameter (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
4010S	1	7,300	55	2	0.07	1,600	15	1.5	0.03
4015S	1.5	4,900	60	3	0.105	1,100	15	2.25	0.045
4020S	2	5,300	65	4	0.14	2,400	30	3	0.06
4025S	2.5	4,200	70	5	0.175	1,900	35	3.75	0.075
4030S	3	4,600	90	6	0.21	2,700	50	4.5	0.09
4040S	4	3,400	100	8	0.28	2,000	55	6	0.12
4050S	5	2,700	110	10	0.35	1,600	60	7.5	0.15
4060S	6	2,300	110	12	0.42	1,300	60	9	0.18
4080S	8	1,700	100	16	0.56	1,000	50	12	0.24
4100S	10	1,400	100	20	0.7	800	50	15	0.3
4120S	12	1,150	90	24	0.84	700	45	18	0.36

Milling Amount for side milling (mm)

45HRC or below	a _p =2D a _e =0.07D
45HRC or above	a _p =1.5D a _e =0.03D



D : Outside Diameter (mm)

Note:

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

4 Flutes

Ø3mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Square

Long Neck
Square

Radius

Radius

Long Neck
Radius

Radius

Taper Neck
Radius

Ball

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Taper

Barrel

Barrel

Spiral

Spiral
V Cutter

Drill

Drill

Technical Data

Technical Data

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