

2 Flutes UDC Long Neck Ball End Mills for Cemented Carbide and Hard Brittle Materials



Size R0.1~R3



UDCLB



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										
												○ *1			★	● *2	

*1 DCB/DCLB series are highly recommended for Glass Filled Plastic milling.

*2 Hard Brittle (Non-Metallic) Materials: Ceramics (Alumina, Zirconia, etc.), Glasses and etc.

Total 37 models

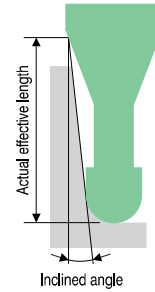
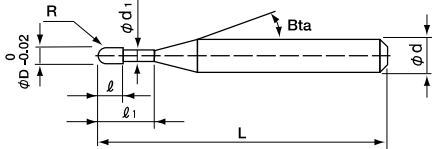
Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ _e	Length of Cut ℓ	Neck Diameter φ _d	Shank Taper Angle β/α	Overall Length L	Shank Diameter φ _d	Suggested Retail Price ¥
UDCLB 2002-0030	R0.1	0.3	0.14	0.18	16°	50	4	39,580
UDCLB 2002-0050		0.5				50	4	39,580
UDCLB 2002-0075		0.75				50	4	39,580
UDCLB 2002-0100		1				50	4	39,580
UDCLB 2004-0050	R0.2	0.5	0.28	0.36	16°	50	4	36,080
UDCLB 2004-0100		1				50	4	36,080
UDCLB 2004-0150		1.5				50	4	36,080
UDCLB 2004-0200		2				50	4	36,080
UDCLB 2006-0100	R0.3	1	0.42	0.56	16°	50	4	32,410
UDCLB 2006-0150		1.5				50	4	32,410
UDCLB 2006-0200		2				50	4	32,410
UDCLB 2006-0300		3				50	4	32,410
UDCLB 2008-0200	R0.4	2	0.56	0.76	16°	50	4	32,410
UDCLB 2008-0300		3				50	4	32,410
UDCLB 2008-0400		4				50	4	32,410
UDCLB 2010-0200		2				0.7	0.96	16°
UDCLB 2010-0250	2.5	50	4	32,410				
UDCLB 2010-0300	3	50	4	32,410				
UDCLB 2010-0400	4	50	4	32,410				
UDCLB 2010-0500	R1	5	1.4	1.9	16°	50	4	32,410
UDCLB 2020-0300		3				50	4	32,410
UDCLB 2020-0400		4				50	4	32,410
UDCLB 2020-0600		6				50	4	32,410
UDCLB 2020-0800	R1.5	8	2.1	2.9	16°	50	4	32,410
UDCLB 2020-1000		10				50	4	32,410
UDCLB 2030-0600		6				60	6	35,580
UDCLB 2030-0800		8				60	6	35,580
UDCLB 2030-1000	R2	10	2.8	3.9	16°	60	6	35,580
UDCLB 2030-1200		12				60	6	35,580
UDCLB 2030-1400		14				60	6	35,580
UDCLB 2040-0800		8				60	6	35,580
UDCLB 2040-1000	R2.5	10	3.5	4.8	16°	60	6	35,580
UDCLB 2040-1500		15				60	6	35,580
UDCLB 2050-1000		10				60	6	35,580
UDCLB 2050-1500		15				60	6	35,580
UDCLB 2060-1000	R3	10	4.2	5.7	—	60	6	35,580
UDCLB 2060-1500		15				60	6	35,580

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

Features

Long Neck Ball type End Mills for milling Cemented Carbide and Hard Brittle (Non-Metallic) Materials. Developed to give improved hardness and durability, new Diamond coating also has outstanding adhesion to the cutting tool. By combining the new coating with optimum cutting geometries, the tool "deep cuts" the work piece. Leaves a burr and pit free surface finish on semi-roughing & finishing process.



Label Sample



#001 φD1.985 R+0.001/-0.002

Diameter and Ball R accuracy measurements are printed on the label to support High Precision milling.

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.

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ ₁	Effective Length by Inclined Angles				
			30°	1°	1°30'	2°	3°
UDCLB 2002-0030	RO.1	0.3	0.30	0.31	0.32	0.32	0.34
UDCLB 2002-0050		0.5	0.51	0.52	0.54	0.55	0.59
UDCLB 2002-0075		0.75	0.77	0.79	0.81	0.84	0.89
UDCLB 2002-0100		1	1.02	1.05	1.09	1.12	1.20
UDCLB 2004-0050	RO.2	0.5	0.54	0.55	0.56	0.58	0.61
UDCLB 2004-0100		1	1.06	1.08	1.12	1.15	1.22
UDCLB 2004-0150		1.5	1.57	1.62	1.67	1.72	1.83
UDCLB 2004-0200	RO.3	2	2.09	2.15	2.22	2.29	2.44
UDCLB 2006-0100		1	1.05	1.08	1.11	1.13	1.20
UDCLB 2006-0150		1.5	1.57	1.61	1.66	1.70	1.81
UDCLB 2006-0200	RO.4	2	2.08	2.14	2.21	2.27	2.42
UDCLB 2008-0200		2	2.08	2.14	2.20	2.26	2.40
UDCLB 2008-0300		3	3.11	3.20	3.30	3.40	3.62
UDCLB 2008-0400	RO.5	4	4.14	4.27	4.40	4.54	4.85
UDCLB 2010-0200		2	2.08	2.13	2.19	2.25	2.38
UDCLB 2010-0250		2.5	2.59	2.66	2.74	2.81	2.99
UDCLB 2010-0300	R1	3	3.11	3.20	3.29	3.38	3.60
UDCLB 2010-0400		4	4.14	4.26	4.39	4.52	4.83
UDCLB 2010-0500		5	5.17	5.32	5.49	5.66	6.05
UDCLB 2020-0300	R1.5	3	3.20	3.27	3.35	3.43	3.62
UDCLB 2020-0400		4	4.23	4.34	4.45	4.57	4.84
UDCLB 2020-0600		6	6.30	6.47	6.65	6.85	7.29
UDCLB 2020-0800		8	8.36	8.60	8.85	9.13	9.74
UDCLB 2020-1000	R2	10	10.42	10.73	11.06	11.41	12.19
UDCLB 2030-0600		6	6.28	6.44	6.60	6.78	7.18
UDCLB 2030-0800		8	8.34	8.57	8.80	9.06	9.63
UDCLB 2030-1000	R2.5	10	10.41	10.70	11.01	11.34	12.08
UDCLB 2030-1200		12	12.47	12.83	13.21	13.61	14.52
UDCLB 2030-1400	R3	14	14.53	14.96	15.41	15.89	16.97
UDCLB 2040-0800		8	8.33	8.53	8.76	8.99	9.52
UDCLB 2040-1000	R3	10	10.39	10.66	10.96	11.27	11.97
UDCLB 2040-1500		15	15.55	15.99	16.46	16.96	18.09
UDCLB 2050-1000	R3	10	10.55	10.82	11.10	11.40	12.07
UDCLB 2050-1500		15	15.71	16.14	16.60	17.09	No Interference
UDCLB 2060-1000	R3	10	No Interference	No Interference	No Interference	No Interference	No Interference
UDCLB 2060-1500		15	No Interference	No Interference	No Interference	No Interference	No Interference

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Milling Conditions for UDCLB

WORK MATERIAL		CEMENTED CARBIDE (≥87HRA)						CEMENTED CARBIDE (<87HRA)				HARD BRITTLE MATERIALS					
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a _p (mm)	a _e (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a _p (mm)	a _e (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a _p (mm)	a _e (mm)
2002-0030	R0.1	0.3	30,000	100	10	0.01	0.01	30,000	100	10	0.01	0.01	30,000	100	10	0.01	0.01
		0.5	30,000	30	10	0.005	0.008	30,000	30	10	0.005	0.008	30,000	30	10	0.005	0.008
		0.75	30,000	30	10	0.005	0.006	30,000	30	10	0.005	0.006	30,000	30	10	0.005	0.006
2002-0100		1	30,000	25	10	0.005	0.005	30,000	25	10	0.005	0.005	30,000	25	10	0.005	0.005
2004-0050	R0.2	0.5	30,000	150	15	0.02	0.08	30,000	150	15	0.02	0.08	30,000	150	15	0.02	0.08
2004-0100		1	30,000	100	10	0.015	0.07	30,000	100	10	0.015	0.07	30,000	100	10	0.015	0.07
2004-0150		1.5	30,000	60	10	0.01	0.06	30,000	60	10	0.01	0.06	30,000	60	10	0.01	0.06
2004-0200		2	30,000	30	10	0.008	0.05	30,000	30	10	0.008	0.05	30,000	30	10	0.008	0.05
2006-0100	R0.3	1	30,000	200	20	0.03	0.14	30,000	200	20	0.03	0.14	30,000	200	20	0.03	0.14
2006-0150		1.5	30,000	200	20	0.03	0.14	30,000	200	20	0.03	0.14	30,000	200	20	0.03	0.14
2006-0200		2	30,000	150	15	0.022	0.11	30,000	150	15	0.022	0.11	30,000	150	15	0.022	0.11
2006-0300		3	30,000	75	10	0.01	0.08	30,000	75	10	0.01	0.08	30,000	75	10	0.01	0.08
2008-0200	R0.4	2	30,000	250	25	0.04	0.19	30,000	250	25	0.04	0.19	30,000	250	25	0.04	0.19
2008-0300		3	30,000	230	23	0.037	0.17	30,000	230	23	0.037	0.17	30,000	230	23	0.037	0.17
2008-0400		4	30,000	210	21	0.035	0.16	30,000	210	21	0.035	0.16	30,000	210	21	0.035	0.16
2010-0200	R0.5	2	30,000	300	30	0.05	0.25	20,000	400	200	0.35	0.075	30,000	300	30	0.05	0.25
2010-0250		2.5	30,000	300	30	0.05	0.25	20,000	400	200	0.35	0.075	30,000	300	30	0.05	0.25
2010-0300		3	30,000	300	30	0.05	0.25	20,000	400	200	0.35	0.075	30,000	300	30	0.05	0.25
2010-0400		4	30,000	300	30	0.05	0.25	20,000	400	200	0.3	0.07	30,000	300	30	0.05	0.25
2010-0500		5	30,000	300	30	0.05	0.25	20,000	400	200	0.3	0.07	30,000	300	30	0.05	0.25
2020-0300	R1	3	30,000	300	100	0.1	0.3	16,500	420	210	0.25	0.1	24,000	240	100	0.1	0.3
2020-0400		4	30,000	300	100	0.1	0.3	16,500	420	210	0.25	0.1	24,000	240	100	0.1	0.3
2020-0600		6	30,000	300	100	0.1	0.3	16,500	420	210	0.25	0.1	24,000	240	100	0.1	0.3
2020-0800		8	30,000	300	100	0.1	0.3	16,500	420	210	0.25	0.1	24,000	240	100	0.1	0.3
2020-1000		10	30,000	300	100	0.1	0.3	16,500	420	210	0.25	0.1	24,000	240	100	0.1	0.3
2030-0600	R1.5	6	27,500	275	140	0.125	0.33	11,000	280	140	0.38	0.15	24,000	240	120	0.125	0.33
2030-0800		8	27,500	275	140	0.125	0.33	11,000	280	140	0.38	0.15	24,000	240	120	0.125	0.33
2030-1000		10	27,500	275	140	0.125	0.33	11,000	280	140	0.3	0.15	24,000	240	120	0.125	0.33
2030-1200		12	27,500	220	110	0.125	0.33	11,000	280	140	0.3	0.15	24,000	200	100	0.125	0.33
2030-1400		14	27,500	220	110	0.125	0.33	11,000	280	140	0.3	0.15	24,000	200	100	0.125	0.33
2040-0800	R2	8	24,000	240	120	0.15	0.35	8,250	300	150	0.5	0.2	24,000	240	120	0.15	0.35
2040-1000		10	24,000	240	120	0.15	0.35	8,250	300	150	0.5	0.2	24,000	240	120	0.15	0.35
2040-1500		15	24,000	240	120	0.15	0.35	8,250	300	150	0.5	0.2	24,000	240	120	0.15	0.35
2050-1000	R2.5	10	22,000	220	110	0.175	0.37	6,600	330	160	0.6	0.25	22,000	220	110	0.175	0.37
2050-1500		15	22,000	220	110	0.175	0.37	6,600	330	160	0.6	0.25	22,000	220	110	0.175	0.37
2060-1000	R3	10	20,000	200	100	0.2	0.4	5,500	280	140	0.65	0.28	20,000	200	100	0.2	0.4
2060-1500		15	20,000	200	100	0.2	0.4	5,500	280	140	0.65	0.28	20,000	200	100	0.2	0.4

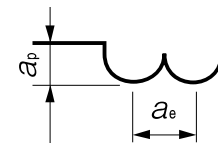
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These milling parameters are based on VF-20, VM-40, VC-70, VU-70 (TAS standard) for Cemented Carbide, and Alumina for Hard Brittle Materials. These are for reference only. Tool life may differ depending on the type of Cemented Carbide / Hard Brittle Materials. For best result, fine parameter adjustments may be required, depending on the materials of Cemented Carbide / Hard Brittle Materials; milling shape and strategy; machine rigidity and spindle capability.

※ Feed Rate2: Feed rate of approach and *connection moves.
*Changing from one engagement point to the next.

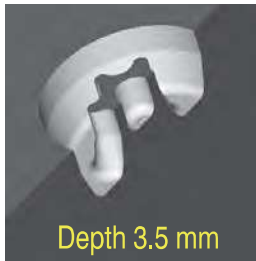
Note:

- This application requires a high cutting force. A machine with poor rigidity and high vibration is not recommended.
- Allow sufficient machine and spindle warm-up time for stability and to remove any expansion of the main spindle before running the program.
- Tool setting length should achieve the least possible overhang.
- Avoid contact with the coated area of the shank. This will prevent tip vibration and tool jamming in the collet / holder.
- Run-out and vibration should be checked dynamically at the tool point while mounted in the machine and both should achieve the lowest level possible.
- Use an inclined or helical approach (Recommended inclination angle: <5 degree).
- Decrease both spindle speed and feed rate proportionally.
- Air blow is highly recommended for longer tool life. Both oil mist and oil coolant are alternatives.
- Recommend water soluble coolant for Hard Brittle (Non-Metallic) Materials.
- When milling some work pieces, heavier chips may be created. To evacuate these chips it is important to accurately position the coolant nozzle on the milling part.
- Remove chips to prevent heat generation and ignition during milling process.
- Protective gear, such as safety glasses and face guards are required when milling.
- Chips / dust generated while milling can have adverse affects on the machine parts if they are not properly evacuated. Take steps to assure proper evacuation.

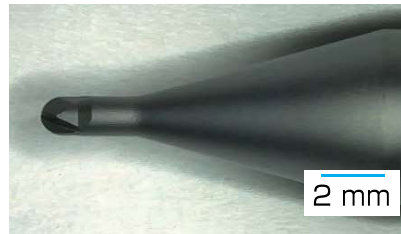


Cemented Carbide Hexalobular milled with UDCLB R0.5 x EL2

VF-20 (92.5HRA)

Size: $\phi 9$ x Depth 3.5 mm

Tool	UDCLB 2010-0200 (R0.5 x 2 mm)
Spindle Speed	$n=30,000 \text{ min}^{-1}$
Feed Rate	$V_f=300 \text{ mm/min}$
a_p	0.05 mm
a_e	0.30 mm (Bottom Surface 0.05 mm)
Coolant	Air Blow
Cycle Time	64.5 min
Material Removal Amount	164.6 mm^3 $2.57 \text{ mm}^3/\text{min}$

UDCLB
Hexalobular
Milling Video

Cemented Carbide Hexalobular milled with UDCLB R0.5

VF-20 (92.5HRA)

Size:
 $\phi 9$ x Depth 6 mm

Tool	UDCLB 2010-0200 (R0.5 x 2 mm) UDCLB 2010-0500 (R0.5 x 5 mm)
Spindle Speed	$n=30,000 \text{ min}^{-1}$
Feed Rate	$V_f=300 \text{ mm/min}$
Milling Amount	1. R0.5 x 2 Roughing (~Depth 3.5 mm) $a_p=0.05 \text{ mm}$ $a_e=0.3 \text{ mm}$ 2. R0.5 x 5 Roughing (~Depth 6 mm) $a_p=0.05 \text{ mm}$ $a_e=0.25 \text{ mm}$ 3. R0.5 x 5 Finishing $a_p=0.03 \text{ mm}$ $a_e=0.005 \text{ mm}$
Coolant	Air Blow
Cycle Time	156 min
Material Removal Amount	274.4 mm^3



Tool #1 milled depth 3.5 mm.

Tool #2 milled 131.9 mm^3 in 76.5 minutes. $\phi 3$ mm Shank
V SeriesUDC-PCD
SeriesCBN
Series

Square

Square

Long Neck
Square

Radius

Radius

Long Neck
RadiusTaper Neck
Radius

Ball

Ball / Long
Shank Ball

Ball

Long Neck
BallTaper Neck
Ball

Taper

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data