VDLCLB

Value Series DLCCOAT Longneck Ball

DLCCOAT
2 Flutes Short Shank Long Neck Ball End Mills

NEW

Super MG

DLC

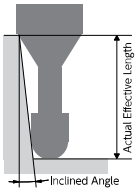
30°

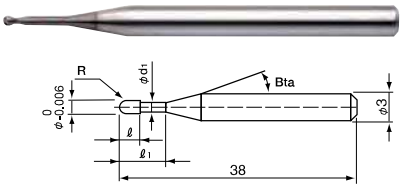
R ±0.002
R0.05~R0.2

R ±0.003
R0.25~R1

Shank Dia 0/-0.003

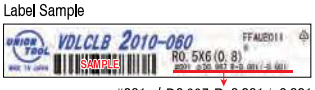
Back Taper Geometry
Except for R0.05~R0.15





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.

Label Sample



#001 φD0.997 R+0.001/−0.001

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

Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

CARBON STEELS S45C S55C	ALLOY STEELS SK / SCM SUS	PREHARDENED STEELS NAK HPM	HARDENED STEELS ~50HRC	~55HRC	~60HRC	~65HRC	~70HRC	CAST IRON	ALUMINUM ALLOYS	GRAPHITE	COPPER	PLASTICS	GLASS FILLED PLASTICS	TITANIUM ALLOYS	HEAT RESISTANT ALLOYS	CEMENTED CARBIDE	HARD BRITTLE (NON-METALLIC) MATERIALS
									●		★						

Total 32 models

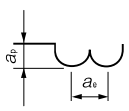
Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter φd1	Shank Taper Angle Bta	Effective Length by Inclined Angles 30′	1°	1° 30′	2°	3°	Suggested Retail Price ¥
VDLCLB 2001-003	R0.05	0.3	0.08	0.092	11°	0.35	0.37	0.39	0.41	0.46	5,300
VDLCLB 2001-005	R0.05	0.5	0.08	0.092	11°	0.56	0.59	0.62	0.66	0.74	5,500
VDLCLB 2002-005	R0.1	0.5	0.16	0.18	11°	0.64	0.67	0.70	0.74	0.83	4,250
VDLCLB 2002-010	R0.1	1	0.16	0.18	11°	1.17	1.22	1.28	1.35	1.51	4,450
VDLCLB 2002-015	R0.1	1.5	0.16	0.18	11°	1.68	1.77	1.86	1.95	2.19	4,600
VDLCLB 2003-010	R0.15	1	0.24	0.28	11°	1.16	1.22	1.27	1.34	1.49	4,450
VDLCLB 2003-020	R0.15	2	0.24	0.28	11°	2.21	2.31	2.43	2.55	2.86	4,800
VDLCLB 2004-010	R0.2	1	0.32	0.38	11°	1.16	1.21	1.27	1.33	1.48	3,850
VDLCLB 2004-020	R0.2	2	0.32	0.38	11°	2.20	2.31	2.42	2.54	2.84	3,950
VDLCLB 2004-030	R0.2	3	0.32	0.38	11°	3.25	3.40	3.57	3.76	4.21	4,000
VDLCLB 2004-040	R0.2	4	0.32	0.38	11°	4.30	4.50	4.73	4.98	5.58	4,100
VDLCLB 2005-020	R0.25	2	0.4	0.48	11°	2.20	2.30	2.41	2.53	2.82	3,800
VDLCLB 2005-030	R0.25	3	0.4	0.48	11°	3.25	3.40	3.57	3.75	4.19	3,850
VDLCLB 2005-040	R0.25	4	0.4	0.48	11°	4.29	4.50	4.72	4.97	5.56	3,950
VDLCLB 2006-020	R0.3	2	0.48	0.58	11°	2.20	2.30	2.40	2.52	2.80	2,950
VDLCLB 2006-030	R0.3	3	0.48	0.58	11°	3.25	3.39	3.56	3.74	4.17	3,050
VDLCLB 2006-040	R0.3	4	0.48	0.58	11°	4.29	4.49	4.71	4.96	5.54	3,100
VDLCLB 2006-050	R0.3	5	0.48	0.58	11°	5.34	5.59	5.87	6.18	6.91	3,200
VDLCLB 2006-060	R0.3	6	0.48	0.58	11°	6.39	6.69	7.03	7.40	8.28	3,250
VDLCLB 2008-030	R0.4	3	0.64	0.78	11°	3.24	3.38	3.54	3.72	4.14	3,050
VDLCLB 2008-040	R0.4	4	0.64	0.78	11°	4.29	4.48	4.70	4.94	5.51	3,100
VDLCLB 2008-060	R0.4	6	0.64	0.78	11°	6.38	6.68	7.01	7.38	8.24	3,200
VDLCLB 2010-020	R0.5	2	0.8	0.97	11°	2.22	2.31	2.41	2.52	2.77	2,900
VDLCLB 2010-030	R0.5	3	0.8	0.97	11°	3.27	3.41	3.56	3.73	4.14	2,900
VDLCLB 2010-040	R0.5	4	0.8	0.97	11°	4.32	4.51	4.72	4.95	5.51	2,900
VDLCLB 2010-060	R0.5	6	0.8	0.97	11°	6.41	6.70	7.03	7.39	8.25	2,950
VDLCLB 2010-080	R0.5	8	0.8	0.97	11°	8.50	8.90	9.34	9.83	10.99	3,100
VDLCLB 2015-040	R0.75	4	1.2	1.45	11°	4.26	4.43	4.63	4.85	5.36	2,950
VDLCLB 2015-060	R0.75	6	1.2	1.45	11°	6.35	6.63	6.94	7.28	8.10	2,950
VDLCLB 2020-040	R1	4	1.6	1.95	11°	4.25	4.41	4.59	4.79	5.27	3,050
VDLCLB 2020-060	R1	6	1.6	1.95	11°	6.34	6.61	6.90	7.23	8.01	3,050
VDLCLB 2020-080	R1	8	1.6	1.95	11°	8.43	8.80	9.21	9.67	No Interference	3,100

VDLCLB Milling Conditions

WORK MATERIAL			COPPER / ALUMINUM ALLOY				TUNGSTEN COPPER			
Model Number	Radius of Ball Nose (mm)	Effective Length (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)
2001-003	R0.05	0.3	43,600	220	0.01	0.01	32,700	160	0.008	0.008
2001-005	R0.05	0.5	43,600	160	0.007	0.007	32,700	110	0.005	0.005
2002-005	R0.1	0.5	43,600	550	0.025	0.05	32,700	380	0.02	0.04
2002-010	R0.1	1	43,600	440	0.02	0.04	32,700	270	0.015	0.03
2002-015	R0.1	1.5	32,900	250	0.015	0.03	24,700	120	0.008	0.02
2003-010	R0.15	1	43,600	760	0.03	0.07	32,700	550	0.03	0.07
2003-020	R0.15	2	39,200	390	0.02	0.03	29,400	200	0.01	0.02
2004-010	R0.2	1	43,600	1,090	0.05	0.1	32,700	760	0.04	0.08
2004-020	R0.2	2	43,600	650	0.035	0.06	32,700	380	0.02	0.05
2004-030	R0.2	3	35,000	470	0.02	0.04	29,200	230	0.01	0.03
2004-040	R0.2	4	27,300	270	0.008	0.015	19,600	110	0.005	0.01
2005-020	R0.25	2	43,600	870	0.08	0.15	32,700	550	0.08	0.15
2005-030	R0.25	3	38,200	650	0.06	0.1	29,500	390	0.06	0.08
2005-040	R0.25	4	32,700	440	0.04	0.08	24,000	220	0.025	0.05
2006-020	R0.3	2	43,600	1,750	0.12	0.2	32,700	1,310	0.12	0.2
2006-030	R0.3	3	43,600	1,090	0.1	0.14	32,700	760	0.08	0.1
2006-040	R0.3	4	32,700	760	0.07	0.1	27,300	440	0.04	0.06
2006-050	R0.3	5	29,500	650	0.05	0.08	24,000	330	0.02	0.04
2006-060	R0.3	6	27,300	550	0.04	0.06	21,800	220	0.01	0.03
2008-030	R0.4	3	43,600	2,180	0.15	0.3	32,700	1,530	0.15	0.3
2008-040	R0.4	4	38,200	1,750	0.12	0.2	29,500	1,090	0.1	0.16
2008-060	R0.4	6	32,700	1,090	0.08	0.15	21,800	550	0.05	0.1
2010-020	R0.5	2	39,100	2,740	0.25	0.4	30,000	2,050	0.25	0.4
2010-030	R0.5	3	39,100	2,740	0.25	0.4	30,000	1,960	0.25	0.4
2010-040	R0.5	4	39,100	2,350	0.2	0.4	29,500	1,560	0.2	0.4
2010-060	R0.5	6	34,500	1,840	0.14	0.3	26,200	1,150	0.1	0.25
2010-080	R0.5	8	27,300	1,090	0.12	0.2	19,600	550	0.06	0.1
2015-040	R0.75	4	25,500	2,270	0.3	0.6	21,300	1,700	0.3	0.6
2015-060	R0.75	6	25,500	2,040	0.3	0.6	21,300	1,530	0.3	0.6
2020-040	R1	4	18,700	2,490	0.45	0.8	14,000	1,500	0.45	0.8
2020-060	R1	6	18,700	2,080	0.45	0.8	14,000	1,250	0.45	0.8
2020-080	R1	8	18,700	1,800	0.4	0.8	13,500	1,200	0.4	0.8

Note:
- Decrease the feed rate more than 50% from the milling parameters when slot milling.
- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed, or when chattering occurs.
- Recommend wet coolant for Copper, Aluminum alloy and Tungsten-Copper.



Milling Example of Copper Electrode Model (Tough Pitch Copper)
R1 x Effective length 8mm
The comparison example of VDLCLB(ϕ3 shank) and DLCLB(ϕ4 shank)

Comparison of tool wearing

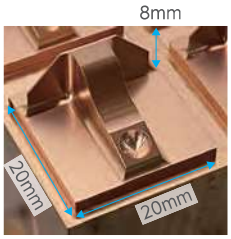
<Condition>

Work material : Tough Pitch Copper
Coolant : Oil mist
Milling shape : □20 mm x 20 mm x height 8 mm

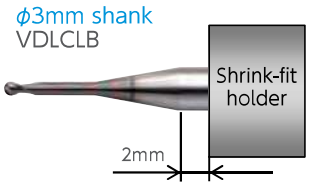
<Tool>*1

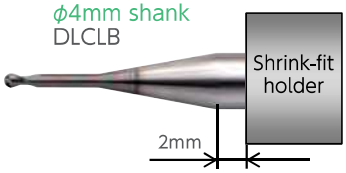
VDLCLB 2020-080 (ϕ3 shank)
DLCLB 2020-080 (ϕ4 shank)
*1 1 for roughing to semi-finishing, 1 for finishing
total 2 ea.
*2 Both models are set so that the overhang of shank is 2 mm.

VDLCLB
Milling Video



Milling shape

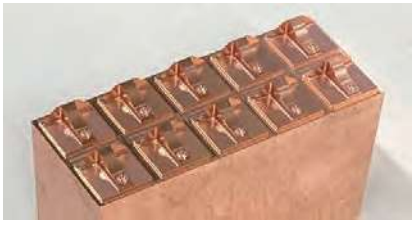


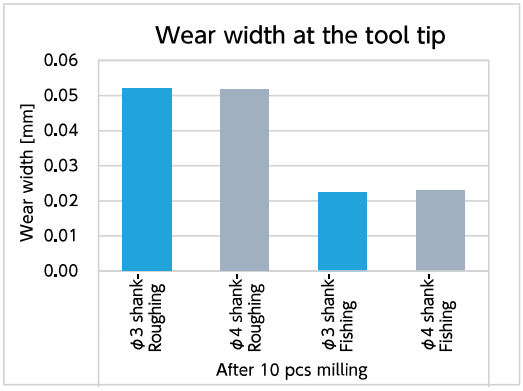


No.	Milling Process	Spindle speed (min⁻¹)	Feed rate (mm/min)	ap (mm)	ae (mm)	Allowance (mm)	Cycle time/ 1 pc
1	Roughing	18,700	1,800	0.4	0.8	0.08	14 min. 6 sec.
2	Semi-finishing	18,700	1,800	0.05	0.05	0.03	1 h 17 min. 24 sec.
3	Finishing	18,700/ 30,000(Bottom)	900	0.03	0.03	0	1 h 17 min. 0 sec.
						Total	2 h 48 min. 30 sec.

VDLCLB(ϕ3 shank)
Milling application

DLCLB(ϕ4 shank)
Milling application





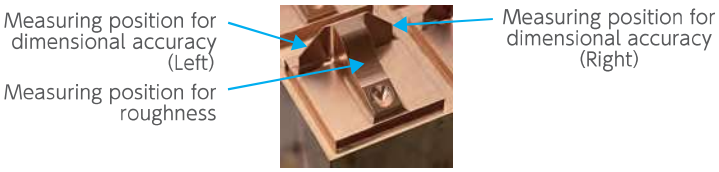
【Tool after 10pcs milling 】

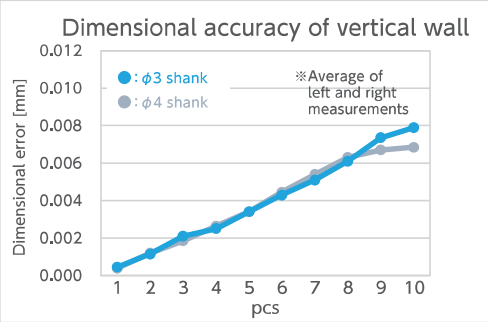
	VDLCLB (ϕ3 shank)	DLCLB (ϕ4 shank)
Roughing to Semi-finishing Cycle time: 15 h 15 min		
Finishing Cycle time: 12 h 50 min.		

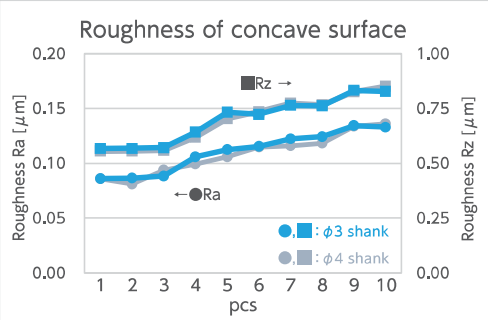
No difference of tool wearing with regard to the shank diameter gap.

Comparison of dimensional accuracy and roughness

Measuring for dimensional accuracy of vertical wall and roughness of concave surface.







Both the dimensional accuracy and roughness gave very similar results, with no difference with regard to the shank diameter gap.