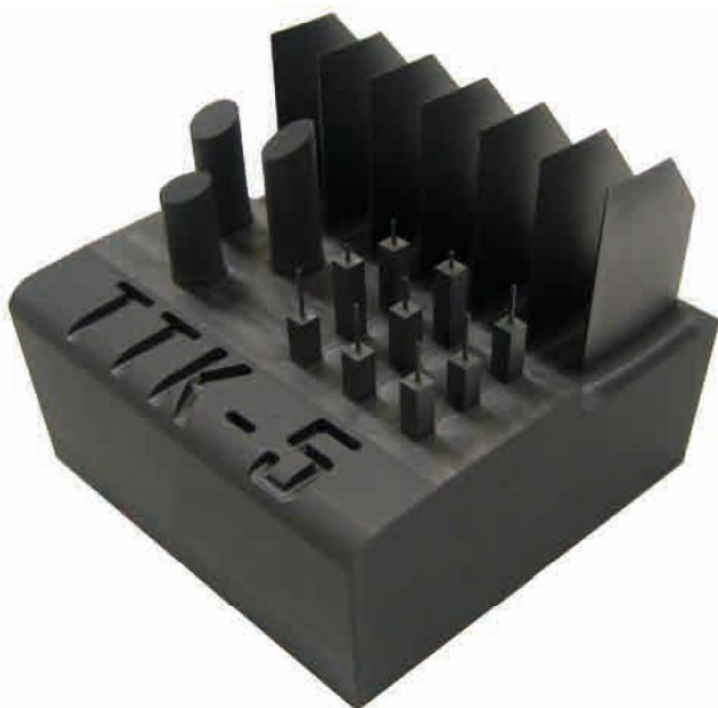


Tungsten Carbide End Mills

UNIMAX Series

Vol. 1

Electrode Milling



DCLRS SP

DDFB SP

DDLFB SP

DLCLB



UNION TOOL EUROPE S.A.

Size $\varnothing 1 \sim \varnothing 6$



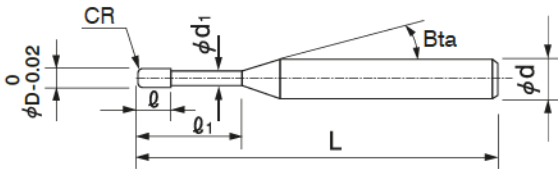
DCLRS SP



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**
- Diamond coated (D016) 4 Flute Long Neck Radius End Mills for Graphite Electrodes.
 - New diamond coating offers excellent resistance to wear for Graphite milling.
 - Long life tool with optimized flute geometry and high adhesion diamond coating.



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 39 models

Unit (mm)

Model Number	Outside Diameter $\varnothing D$	Corner Radius CR	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter $\varnothing d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\varnothing d$
DCLRS SP 4010-002-060	1	R0.02	6	2	0.97	16°	50	4
DCLRS SP 4010-002-100			10				50	
DCLRS SP 4010-002-200			20				60	
DCLRS SP 4010-005-060		R0.05	6				50	
DCLRS SP 4010-005-100			10				50	
DCLRS SP 4010-005-200			20				60	
DCLRS SP 4015-002-120	1.5	R0.02	12	3	1.47	16°	55	4
DCLRS SP 4015-002-200			20				60	
DCLRS SP 4015-002-300			30				80	
DCLRS SP 4015-005-120		R0.05	12				55	
DCLRS SP 4015-005-200			20				60	
DCLRS SP 4015-005-300			30				80	
DCLRS SP 4020-005-100	2	R0.05	10	4	1.98	16°	50	4
DCLRS SP 4020-005-200			20				60	
DCLRS SP 4020-02-100			R0.2				10	
DCLRS SP 4020-02-200		20					60	
DCLRS SP 4020-02-300		30					80	
DCLRS SP 4020-05-100		R0.5	10				50	
DCLRS SP 4020-05-200	20		60					
DCLRS SP 4020-05-300	30		80					
DCLRS SP 4030-005-160	3	R0.05	16	6	2.95	16°	60	4
DCLRS SP 4030-005-200			20				60	
DCLRS SP 4030-005-300			30				80	
DCLRS SP 4030-02-160		R0.2	16				60	
DCLRS SP 4030-02-200			20				60	
DCLRS SP 4030-02-300			30				80	
DCLRS SP 4030-05-160	R0.5	16	60					
DCLRS SP 4030-05-200		20	60					
DCLRS SP 4030-05-300		30	80					

4 Flutes Long Neck Radius End Mills

Model Number	Outside Diameter $\varnothing D$	Corner Radius CR	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter $\varnothing d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\varnothing d$
DCLRS SP 4040-02-200	4	R0.2	20	8	3.93	16°	60	6
DCLRS SP 4040-02-300			30				80	
DCLRS SP 4040-02-400			40				80	
DCLRS SP 4040-05-200		R0.5	20				60	
DCLRS SP 4040-05-300			30				80	
DCLRS SP 4040-05-400			40				80	
DCLRS SP 4060-02-300	6	R0.2	30	12	5.93	-	100	6
DCLRS SP 4060-02-600			60				120	
DCLRS SP 4060-05-300		R0.5	30				100	
DCLRS SP 4060-05-600			60				120	

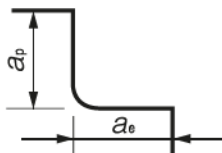
DCLRS Milling Conditions

WORK MATERIAL				GRAPHITE			
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Effective Length (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4010-002-060	1	R0.02	6	26,000	1,700	0.12	0.7
4010-002-100			10	22,000	1,300	0.12	0.6
4010-002-200			20	13,000	750	0.1	0.5
4010-005-060		R0.05	6	26,000	1,700	0.12	0.6
4010-005-100			10	22,000	1,300	0.12	0.5
4010-005-200			20	13,000	750	0.1	0.4
4015-002-120	1.5	R0.02	12	19,000	1,700	0.18	1.1
4015-002-200			20	15,000	1,300	0.14	0.9
4015-002-300			30	10,000	800	0.11	0.7
4015-005-120		R0.05	12	19,000	1,700	0.18	0.95
4015-005-200			20	15,000	1,300	0.14	0.75
4015-005-300			30	10,000	800	0.11	0.6
4020-005-100	2	R0.05	10	20,000	2,400	0.3	1.4
4020-005-200			20	16,000	1,800	0.25	1.35
4020-02-100		R0.2	10	20,000	2,400	0.3	1.2
4020-02-200			20	16,000	1,800	0.25	1.15
4020-02-300			30	12,000	1,300	0.2	1.1
4020-05-100		R0.5	10	20,000	2,400	0.3	0.95
4020-05-200	20		16,000	1,800	0.25	0.9	
4020-05-300	30		12,000	1,300	0.2	0.85	
4030-005-160	3		R0.05	16	16,500	3,100	0.4
4030-005-200		20		16,000	2,900	0.4	2.1
4030-005-300		30		14,000	2,300	0.4	1.9
4030-02-160		R0.2	16	16,500	3,100	0.4	2
4030-02-200			20	16,000	2,900	0.4	1.8
4030-02-300			30	14,000	2,300	0.4	1.6
4030-05-160	R0.5	16	16,500	3,100	0.4	1.7	
4030-05-200		20	16,000	2,900	0.4	1.5	
4030-05-300		30	14,000	2,300	0.4	1.4	
4040-02-200	4	R0.2	20	14,000	3,400	0.5	2.7
4040-02-300			30	13,000	3,000	0.5	2.6
4040-02-400			40	12,000	2,600	0.5	2.5
4040-05-200		R0.5	20	14,000	3,400	0.5	2.3
4040-05-300			30	13,000	3,000	0.5	2.2
4040-05-400			40	12,000	2,600	0.5	2.1
4060-02-300	6	R0.2	30	13,000	4,300	0.75	4
4060-02-600			60	10,000	2,800	0.75	3.7
4060-05-300		R0.5	30	13,000	4,300	0.75	3.5
4060-05-600			60	10,000	2,800	0.75	3.1

a_p : Axial Depth (mm)
 a_e : Radial Depth (mm)

Note:

- Use a milling machine dedicated for Graphite.
- Recommend air blow for Graphite.





Size **R0.5 ~ R3**

DDFB SP



R0.5 - R2

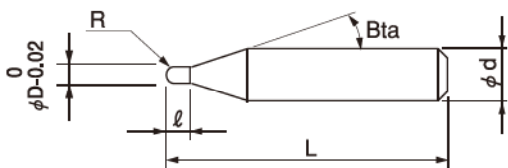
R3

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

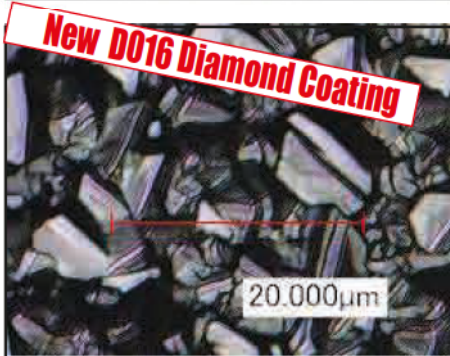
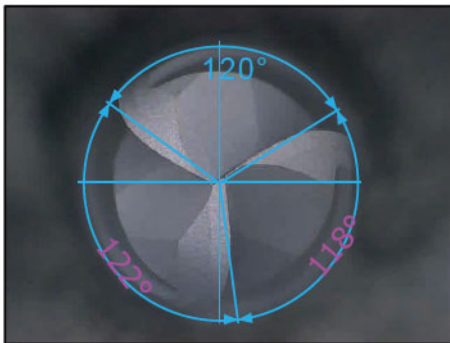
Dia coating (D016) offers excellent wear resistance and offers outstanding tool life.
The 3 flute geometry is specially designed for Roughing, Finishing and offers high Efficiency.



Total 6 models

Unit (mm)

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter Ø d
DDFB SP 3010-0300	R0.5	3	16°	50	4
DDFB SP 3020-0600	R1	6	16°	50	4
DDFB SP 3030-0900	R1.5	9	16°	50	4
DDFB SP 3040-1200	R2	12	16°	50	6
DDFB SP 3060-1800	R3	18	-	50	6
DDFB SP 3100-3000	R5	30	-	50	10





Size **R0.5 ~ R3**

DDFLB SP BT



R0.5 - R2

R3

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										
							○	☆	○	○	◎				○

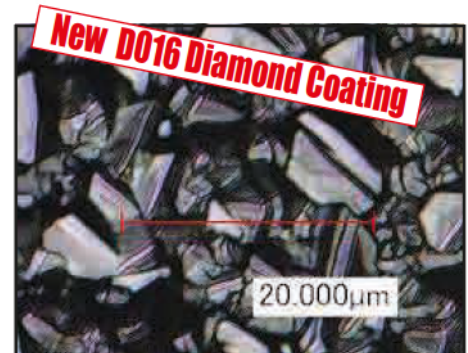
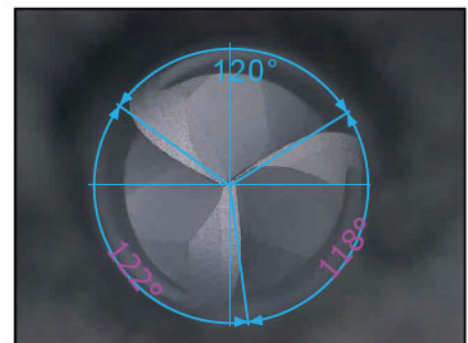
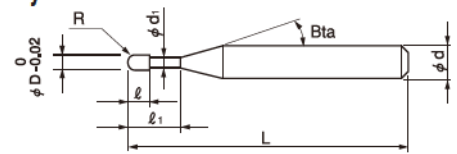
Features

Dia coating (D016) offers excellent wear resistance and offers outstanding tool life.
The 3 flute geometry is specially designed for Roughing, Finishing and offers high Efficiency.

Total 30 models

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter ϕd_1	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd
DDFLB SP 3010-040BT	R0.5	4	0.8	0.96	16°	50	4
DDFLB SP 3010-060BT		6				50	4
DDFLB SP 3010-100BT		10				50	4
DDFLB SP 3010-120BT		12				50	4
DDFLB SP 3010-150BT		15				50	4
DDFLB SP 3010-160BT		16				50	4
DDFLB SP 3010-200BT		20				50	4
DDFLB SP 3015-100BT	R0.75	10	1.2	1.43	16°	50	4
DDFLB SP 3015-150BT		15				50	4
DDFLB SP 3020-080BT	R1	8	1.6	1.83	16°	50	4
DDFLB SP 3020-100BT		10				50	4
DDFLB SP 3020-120BT		12				50	4
DDFLB SP 3020-160BT		16				50	4
DDFLB SP 3020-200BT		20				70	4
DDFLB SP 3020-250BT		25				70	4
DDFLB SP 3020-300BT		30				70	4
DDFLB SP 3020-400BT		40				70	4
DDFLB SP 3030-160BT	R1.5	16	2.4	2.73	16°	60	4
DDFLB SP 3030-200BT		20				60	4
DDFLB SP 3030-300BT		30				70	4
DDFLB SP 3030-400BT		40				60	4



Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter $\varnothing d_1$	Shank Taper Angle Beta	Overall Length L	Shank Diameter $\varnothing d$
DDFLB SP 3040-160BT	R2	16	3.2	3.63	16°	70	6
DDFLB SP 3040-200BT		20				70	6
DDFLB SP 3040-300BT		30				70	6
DDFLB SP 3040-400BT		40				100	6
DDFLB SP 3060-300BT	R3	30	4.8	5.42	-	100	6
DDFLB SP 3060-400BT		40				100	6
DDFLB SP 3060-500BT		50				100	6

DLCCOAT 2 Flute Long Neck Ball End Mills for Copper Electrode Milling



Size **R0.05~R3**

DLCLB

Super
MG

DLC

30°

R
±0.002
R0.05~R0.2

R
±0.003
R0.25~R2

R
±0.004
R3

Shank Dia
0/-0.004

Back Taper
Geometry

Back taper geometry does not apply to R0.15 or below.

Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

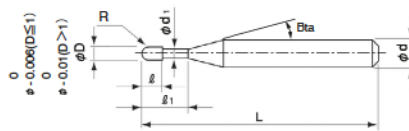
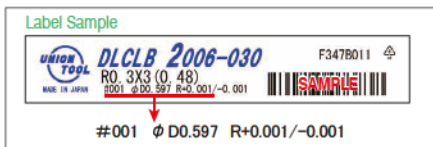
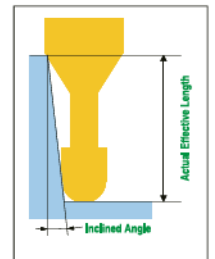
Work Material															
CARBON STEELS S45C S55C	ALLOY STEELS SK / SCM SUS	PREHARDENED STEELS NAK HPM	HARDENED STEELS			CAST IRON	ALUMINUM ALLOYS	GRAPHITE	COPPER	PLASTICS	GLASS FILLED PLASTICS	TITANIUM ALLOYS	HEAT RESISTANT ALLOYS	CEMENTED CARBIDE	HARD BRITTLE (NON-METALLIC) MATERIALS
			~55HRC	~60HRC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

Features

DLC coating offers excellent welding and wear resistance.

The flute geometry is specially designed for copper milling and offers outstanding tool life.

High precision shank diameter tolerance of 0/-0.004 mm.



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

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

Total 71 models

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter ϕd_1	Shank Taper Angle Beta	Overall Length L	Shank Diameter ϕd	Price ¥	Effective Length by Inclined Angles				
									30°	1°	1°30'	2°	3°
DLCLB 2001-003	R0.05	0.3	0.08	0.095	11°	45	4	14,100	0.34	0.36	0.39	0.41	0.46
DLCLB 2001-005		0.5							0.55	0.59	0.62	0.65	0.73
DLCLB 20015-003	R0.075	0.3	0.12	0.14	11°	45	4	15,600	0.36	0.38	0.40	0.42	0.47
DLCLB 20015-005		0.5							0.57	0.60	0.63	0.66	0.74
DLCLB 20015-010		1							1.09	1.15	1.21	1.27	1.43
DLCLB 2002-003	R0.1	0.3	0.16	0.19	11°	45	4	11,300	0.41	0.43	0.45	0.47	0.53
DLCLB 2002-005		0.5							0.62	0.65	0.68	0.72	0.80
DLCLB 2002-010		1							1.14	1.20	1.26	1.33	1.49
DLCLB 2002-015		1.5							1.67	1.75	1.84	1.94	2.17
DLCLB 2003-006	R0.15	0.6	0.24	0.29	11°	45	4	11,800	0.72	0.75	0.79	0.83	0.92
DLCLB 2003-010		1							1.14	1.19	1.25	1.32	1.47
DLCLB 2003-015		1.5							1.67	1.74	1.83	1.93	2.15
DLCLB 2003-020		2							2.19	2.29	2.41	2.53	2.84

DLCCOAT 2 Flute Long Neck Ball End Mills for Copper Electrode Milling

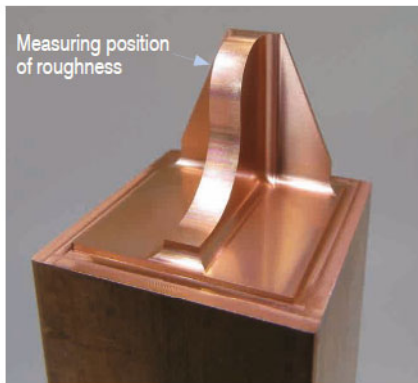
Model Number	Radius of Ball Nose R	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter $\varnothing d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\varnothing d$	Price ¥	Effective Length by Inclined Angles				
									30°	1°	1°30'	2°	3°
DLCLB 2004-010	R0.2	1	0.32	0.39	11°	45	4	10,300	1.14	1.19	1.24	1.30	1.45
DLCLB 2004-020		2				45	4	10,500	2.19	2.29	2.40	2.52	2.82
DLCLB 2004-030		3				45	4	10,700	3.23	3.39	3.56	3.74	4.19
DLCLB 2004-040		4				45	4	10,900	4.28	4.49	4.71	4.96	5.56
DLCLB 2005-010	R0.25	1	0.4	0.49	11°	45	4	10,100	1.14	1.18	1.24	1.29	1.43
DLCLB 2005-020		2				45	4	10,100	2.18	2.28	2.39	2.51	2.80
DLCLB 2005-030		3				45	4	10,300	3.23	3.38	3.55	3.73	4.17
DLCLB 2005-040		4				45	4	10,500	4.28	4.48	4.70	4.95	5.54
DLCLB 2005-050		5				45	4	10,700	5.33	5.58	5.86	6.17	6.91
DLCLB 2006-010	R0.3	1	0.48	0.59	11°	45	4	7,900	1.14	1.18	1.23	1.28	1.41
DLCLB 2006-020		2				45	4	7,900	2.18	2.28	2.38	2.50	2.78
DLCLB 2006-030		3				45	4	8,100	3.23	3.38	3.54	3.72	4.15
DLCLB 2006-040		4				45	4	8,300	4.28	4.48	4.70	4.94	5.52
DLCLB 2006-050		5				45	4	8,500	5.32	5.57	5.85	6.16	6.89
DLCLB 2006-060		6				45	4	8,700	6.37	6.67	7.01	7.38	8.26
DLCLB 2008-020	R0.4	2	0.64	0.79	11°	45	4	8,100	2.18	2.27	2.37	2.48	2.75
DLCLB 2008-030		3				45	4	8,100	3.22	3.37	3.52	3.70	4.12
DLCLB 2008-040		4				45	4	8,300	4.27	4.47	4.68	4.92	5.48
DLCLB 2008-060		6				45	4	8,500	6.37	6.66	6.99	7.36	8.22
DLCLB 2008-080		8				45	4	8,700	8.46	8.86	9.30	9.79	10.96
DLCLB 2010-020	R0.5	2	0.8	0.98	11°	45	4	7,700	2.19	2.28	2.37	2.48	2.73
DLCLB 2010-030		3				45	4	7,700	3.24	3.37	3.53	3.70	4.10
DLCLB 2010-040		4				45	4	7,700	4.28	4.47	4.68	4.92	5.47
DLCLB 2010-050		5				45	4	7,900	5.33	5.57	5.84	6.14	6.84
DLCLB 2010-060		6				45	4	7,900	6.38	6.67	6.99	7.35	8.21
DLCLB 2010-080		8				45	4	8,300	8.47	8.87	9.31	9.79	10.95
DLCLB 2010-100		10				45	4	8,300	10.57	11.07	11.62	12.23	13.68
DLCLB 2010-120		12				45	4	8,300	12.66	13.26	13.93	14.67	16.42
DLCLB 2015-040	R0.75	4	1.2	1.47	11°	45	4	7,900	4.21	4.39	4.58	4.80	5.31
DLCLB 2015-060		6				45	4	7,900	6.31	6.59	6.89	7.23	8.04
DLCLB 2015-120		12				50	4	8,900	12.59	13.18	13.83	14.55	16.26
DLCLB 2015-180		18				55	4	9,900	18.87	19.77	20.76	21.86	24.47

DLCCOAT 2 Flute Long Neck Ball End Mills for Copper Electrode Milling

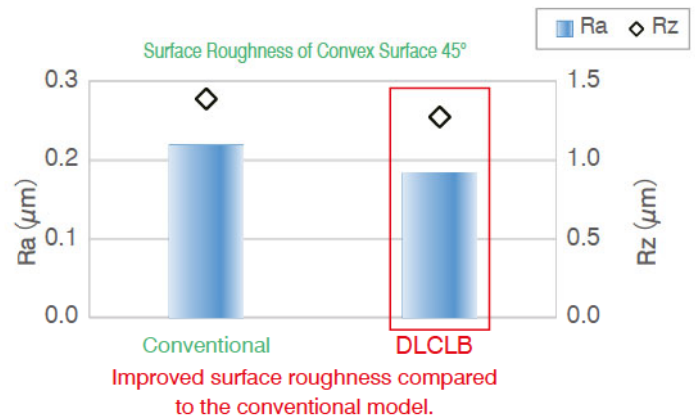
Model Number	Radius of Ball Nose R	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter ϕd_1	Shank Taper Angle Beta	Overall Length L	Shank Diameter ϕd	Price ¥	Effective Length by Inclined Angles				
									30°	1°	1°30'	2°	3°
DLCLB 2020-040	R1	4	1.6	1.98	11°	45	4	8,100	4.18	4.34	4.51	4.71	5.18
DLCLB 2020-060		6				45	4	8,100	6.27	6.53	6.82	7.15	7.92
DLCLB 2020-080		8				45	4	8,300	8.36	8.73	9.14	9.59	10.66
DLCLB 2020-100		10				45	4	8,300	10.46	10.93	11.45	12.02	13.39
DLCLB 2020-120		12				50	4	8,300	12.55	13.12	13.76	14.46	16.13
DLCLB 2020-140		14				50	4	8,300	14.65	15.32	16.07	16.90	18.87
DLCLB 2020-160		16				50	4	8,300	16.74	17.52	18.38	19.34	No Interference
DLCLB 2020-200		20				55	4	9,200	20.93	21.91	23.00	24.21	No Interference
DLCLB 2020-250		25				65	4	10,200	26.16	27.41	28.78	No Interference	No Interference
DLCLB 2030-100		R1.5				10	2.4	2.95	11°	60	6	10,500	10.51
DLCLB 2030-120	12		60	6	10,800	12.61				13.16	13.77	14.45	16.06
DLCLB 2030-140	14		60	6	10,800	14.70				15.36	16.08	16.89	18.80
DLCLB 2030-160	16		60	6	11,200	16.80				17.56	18.39	19.32	21.54
DLCLB 2030-200	20		70	6	11,200	20.98				21.95	23.02	24.20	27.01
DLCLB 2030-250	25		70	6	11,200	26.22				27.44	28.79	30.30	No Interference
DLCLB 2030-300	30		70	6	12,200	31.45				32.94	34.57	36.39	No Interference
DLCLB 2040-100	R2	10	3.2	3.95	11°	70	6	9,700	10.49	10.91	11.38	11.90	13.14
DLCLB 2040-150		15				70	6	9,700	15.73	16.41	17.16	18.00	19.99
DLCLB 2040-200		20				70	6	11,500	20.96	21.90	22.94	24.09	No Interference
DLCLB 2040-250		25				70	6	12,200	26.20	27.39	28.72	30.19	No Interference
DLCLB 2040-300		30				70	6	12,700	31.43	32.89	34.50	No Interference	No Interference
DLCLB 2040-400		40				80	6	13,700	41.90	43.87	No Interference	No Interference	No Interference
DLCLB 2060-100	R3	10	4.8	5.95	-	80	6	12,700	No Interference	No Interference	No Interference	No Interference	No Interference
DLCLB 2060-150		15				80	6	12,700	No Interference	No Interference	No Interference	No Interference	No Interference
DLCLB 2060-200		20				80	6	12,700	No Interference	No Interference	No Interference	No Interference	No Interference
DLCLB 2060-300		30				80	6	13,300	No Interference	No Interference	No Interference	No Interference	No Interference

DLCLB Milling Conditions

WORK MATERIAL			COPPER				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		0.5	43,600	160	0.007	0.007	32,700	110	0.005	0.005
20015-003	R0.075	0.3	43,600	250	0.015	0.02	32,700	190	0.012	0.016
20015-005		0.5	43,600	220	0.015	0.02	32,700	150	0.012	0.016
20015-010		1	43,600	160	0.007	0.01	32,700	120	0.006	0.008
2002-003	R0.1	0.3	43,600	550	0.025	0.05	32,700	380	0.02	0.04
2002-005		0.5	43,600	550	0.025	0.05	32,700	380	0.02	0.04
2002-010		1	43,600	440	0.02	0.04	32,700	270	0.015	0.03
2002-015		1.5	32,900	250	0.015	0.03	24,700	120	0.008	0.02
2003-006	R0.15	0.6	43,600	760	0.03	0.07	32,700	550	0.03	0.07
2003-010		1	43,600	760	0.03	0.07	32,700	550	0.03	0.07
2003-015		1.5	43,600	550	0.025	0.05	32,700	290	0.02	0.05
2003-020		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		2	43,600	650	0.035	0.06	32,700	380	0.02	0.05
2004-030		3	35,000	470	0.02	0.04	29,200	230	0.01	0.03
2004-040		4	27,300	270	0.008	0.015	19,600	110	0.005	0.01
2005-010	R0.25	1	43,600	1,420	0.08	0.15	32,700	890	0.08	0.15
2005-020		2	43,600	870	0.08	0.15	32,700	550	0.08	0.15
2005-030		3	38,200	650	0.06	0.1	29,500	390	0.06	0.08
2005-040		4	32,700	440	0.04	0.08	24,000	220	0.025	0.05
2005-050		5	27,300	330	0.02	0.04	19,600	160	0.01	0.02
2006-010	R0.3	1	43,600	1,870	0.12	0.2	32,700	1,400	0.12	0.2
2006-020		2	43,600	1,750	0.12	0.2	32,700	1,310	0.12	0.2
2006-030		3	43,600	1,090	0.1	0.14	32,700	760	0.08	0.1
2006-040		4	32,700	760	0.07	0.1	27,300	440	0.04	0.06
2006-050		5	29,500	650	0.05	0.08	24,000	330	0.02	0.04
2006-060		6	27,300	550	0.04	0.06	21,800	220	0.01	0.03
2008-020	R0.4	2	43,600	2,820	0.15	0.3	32,700	1,980	0.15	0.3
2008-030		3	43,600	2,180	0.15	0.3	32,700	1,530	0.15	0.3
2008-040		4	38,200	1,750	0.12	0.2	29,500	1,090	0.1	0.16
2008-060		6	32,700	1,090	0.08	0.15	21,800	550	0.05	0.1
2008-080		8	23,800	760	0.05	0.06	17,300	320	0.02	0.025
2010-020	R0.5	2	39,100	2,740	0.25	0.4	30,000	2,050	0.25	0.4
2010-030		3	39,100	2,740	0.25	0.4	30,000	1,960	0.25	0.4
2010-040		4	39,100	2,350	0.2	0.4	29,500	1,560	0.2	0.4
2010-050		5	38,200	2,180	0.16	0.3	29,500	1,530	0.12	0.25
2010-060		6	34,500	1,840	0.14	0.3	26,200	1,150	0.1	0.25
2010-080		8	27,300	1,090	0.12	0.2	19,600	550	0.06	0.1
2010-100		10	20,300	810	0.08	0.15	16,200	300	0.03	0.05
2010-120		12	13,100	490	0.06	0.1	9,800	160	0.015	0.04
2015-040	R0.75	4	25,500	2,270	0.3	0.6	21,300	1,700	0.3	0.6
2015-060		6	25,500	2,040	0.3	0.6	21,300	1,530	0.3	0.6
2015-120		12	17,500	1,090	0.15	0.3	13,100	550	0.1	0.2
2015-180		18	8,500	590	0.08	0.12	6,800	170	0.02	0.06
2020-040	R1	4	18,700	2,490	0.45	0.8	14,000	1,500	0.45	0.8
2020-060		6	18,700	2,080	0.45	0.8	14,000	1,250	0.45	0.8
2020-080		8	18,700	1,800	0.4	0.8	13,500	1,200	0.4	0.8
2020-100		10	18,700	1,700	0.3	0.6	13,500	1,190	0.25	0.5
2020-120		12	16,800	1,470	0.3	0.6	12,600	950	0.25	0.5
2020-140		14	15,000	1,250	0.28	0.5	11,200	750	0.18	0.4
2020-160		16	13,100	1,090	0.25	0.5	9,800	550	0.12	0.25
2020-200		20	10,000	800	0.15	0.3	8,000	350	0.06	0.1
2020-250		25	6,700	500	0.08	0.15	5,000	170	0.03	0.05



Model Size : 20 x 20 x Depth 16 mm
 Coolant : Oil Mist

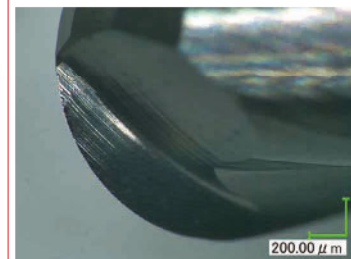
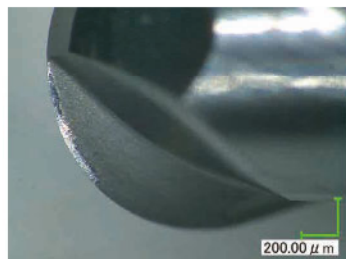


No	Milling Process	Milling Method	Tool	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Overhang Length (mm)	Cycle Time
1	Roughing	Contouring	DLCLB 2020-160	10,800	1,090	0.25	0.5	24	1:31:59
2	Semi-finishing			10,800	1,090	0.05	0.05		1:31:15
3	Finishing			13,090	545	0.0001 (Cusp Height)	0.03		1:15:26

Total 4:18:40

Conventional

DLCLB



Tools after milling

DLCLB has less wear and damage after 4 hours of milling, and enables stable milling throughout the long cycle time.

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