Leading Through Innovation

CBN (Cubic Boron Nitride)

CBN FRÄSER

- CBN(Cubic Boron Nitride) Machining High Hardened Steels up to HRc70 Mirror Finish
- CBN (Kubisches Bornitrid) zur Bearbeitung von hochgehärteten Stählen bis HRc70 Hochglanzoberfläche

SELECTION GUIDE

MILLING TOOLS

CBN END MILLS

Cubic Boron Nitride,
Machining High Hardened Steels
up to HRc70, Mirror Finish

Please visit globalyg1.com/mat for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : p. C37

SERIES	ESB94	ESD02
FLUTE	2	2
HELIX ANGLE	30°	0°
CUTTING EDGE SHAPE	BALL NOSE	CORNER RADIUS
SIZE MIN	R0.2	D0.5
SIZE MAX	R1.5	D2.0
PAGE	C35	C36
	-	-
	Uncoated	Uncoated

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment		HB	HRc		
P	1	Non-alloy steel	About 0.15% C	Annealed	125			
	2		About 0.45% C	Annealed	190	13		
	3		About 0.45% C	Quenched & Tempered	250	25		
	4		About 0.75% C	Annealed	270	28		
	5		About 0.75% C	Quenched & Tempered	300	32		
	6	Low alloy steel		Annealed	180	10		
	7			Quenched & Tempered	275	29		
	8			Quenched & Tempered	300	32		
	9			Quenched & Tempered	350	38		
	10	High alloyed steel, and tool steel		Annealed	200	15		
	11			Quenched & Tempered	325	35		
M	12	Stainless steel	Ferritic / Martensitic	Annealed	200	15		
	13		Martensitic	Quenched & Tempered	240	23		
	14		Austenitic		180	10		
K	15	Grey cast iron	Pearlitic / ferritic		180	10		
	16		Pearlitic (Martensitic)		260	26		
	17	Nodular cast iron	Ferritic		160	3		
	18		Pearlitic		250	25		
	19	Malleable cast iron	Ferritic		130			
	20		Pearlitic		230	21		
N	21	Aluminum-wrought alloy	Not Curable		60			
	22		Curable	Hardened	100			
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75			
	24		≤ 12% Si, Curable	Hardened	90			
	25		> 12% Si, Not Curable		130			
	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%		110			
	27		CuZn, CuSnZn (Brass)		90			
	28		CuSn, lead-free copper and electrolytic copper		100			
	29	Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic					
	30		Rubber, Wood, etc.					
S	31	Heat Resistant Super Alloys	Fe Based	Annealed	200	15		
	32			Cured	280	30		
	33		Ni or Co Based	Annealed	250	25		
	34			Cured	350	38		
	35			Cast	320	34		
	36	Titanium Alloys	Pure Titanium		400 Rm			
	37		Alpha + Beta Alloys	Hardened	1050 Rm			
H	38	Hardened steel		Hardened	550	55	◎	◎
	39			Hardened	630	60	◎	◎
	40	Chilled Cast Iron		Cast	400	42		
	41	Hardened Cast Iron		Hardened	550	55	◎	◎

CBN END MILLS

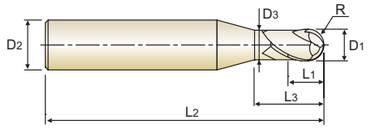
PLAIN SHANK **ESB94** SERIES

CBN, 2 FLUTE BALL NOSE

CBN, 2 SCHNEIDEN STIRNRADIUS
CBN, fraise 2 dents, hémisphérique
CBN, 2 TAGLIENTI, SEMISFERICA

- ▶Achieves stable machining and higher accuracy for duration.
- ▶Saves setting time and cost from the reduction of frequent tool change.
- ▶Improves repeatability in performance.
- ▶Special designed geometry improving tool rigidity at High Speed Cutting.
- ▶Tighter Radius Tolerance of ±0.005mm and higher accuracy with longer tool life.

- ▶ Sichert dauerhaft stabile Bearbeitung und höhere Genauigkeit.
- ▶ Spart Rüstzeit und -kosten durch weniger Werkzeugwechsel.
- ▶ Verbessert die Wiederholgenauigkeit.
- ▶ Eine besondere Werkzeuggeometrie verbessert die Steifigkeit bei HSC-Bearbeitung.
- ▶ Engere Radiustoleranz ±0.005, höhere Genauigkeit und längere Werkzeuglebenszeit.



CBN | 2 | 30° | R ±0.005 | PLAIN | UNCOATED p. C37

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R (±0.005)	D1	D2	L1	L3	L2	D3
ESB94004012	R0.2	0.4	4	0.3	1.2	50	0.37
ESB94012030	R0.6	1.2	4	0.8	3	50	1.15
ESB94015030	R0.75	1.5	4	0.95	3	50	1.45
ESB94015040	R0.75	1.5	4	0.95	4	50	1.45
ESB94015060	R0.75	1.5	4	0.95	6	50	1.45
ESB94020050	R1.0	2.0	4	1.2	5	50	1.95
ESB94030060	R1.5	3.0	4	1.8	6	50	2.85

Radius Tolerance(Mm)	Shank Dia. Tolerance
± 0.005	h5

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend																				

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend																		◎	◎		◎

CBN END MILLS

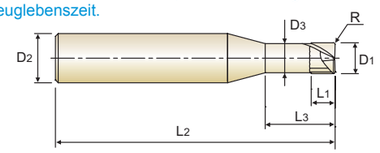
PLAIN SHANK **ESD02** SERIES

CBN, 2 FLUTE CORNER RADIUS

CBN, 2 SCHNEIDEN ECKENRADIUS
CBN, fraise 2 dents, torique
CBN, 2 TAGLIENTI, TORICA

- ▶Achieves stable machining and higher accuracy for duration.
- ▶Saves setting time and cost from the reduction of frequent tool change.
- ▶Improves repeatability in performance.
- ▶Special designed geometry improving tool rigidity at High Speed Cutting.
- ▶Tighter Radius Tolerance of ±0.005mm and higher accuracy with longer tool life.

- ▶ Sichert dauerhaft stabile Bearbeitung und höhere Genauigkeit.
- ▶ Spart Rüstzeit und -kosten durch weniger Werkzeugwechsel.
- ▶ Verbessert die Wiederholgenauigkeit.
- ▶ Eine besondere Werkzeuggeometrie verbessert die Steifigkeit bei HSC-Bearbeitung.
- ▶ Engere Radiustoleranz ±0.005, höhere Genauigkeit und längere Werkzeuglebenszeit.



CBN | 2 | 0° | R ±0.005 | PLAIN | UNCOATED

p. C37

Unit : mm

EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R (±0.005)	D1	D2	L1	L3	L2	D3
ESD02005052	R0.05	**0.5**	4	0.3	2	50	0.46
ESD02005053	R0.05	**0.5**	4	0.3	3	50	0.46
ESD02010053	R0.05	**1.0**	4	0.7	3	50	0.95
ESD02010055	R0.05	**1.0**	4	0.7	5	50	0.95
ESD02010103	R0.1	**1.0**	4	0.7	3	50	0.95
ESD02015105	R0.1	**1.5**	4	1.0	5	50	1.45
ESD02015108	R0.1	**1.5**	4	1.0	8	50	1.45
ESD02015208	R0.2	**1.5**	4	1.0	8	50	1.45
ESD02020106	R0.1	**2.0**	4	1.2	6	50	1.95
ESD02020100	R0.1	**2.0**	4	1.2	10	50	1.95
ESD02020200	R0.2	**2.0**	4	1.2	10	50	1.95

Corner Radius(mm)	Shank Dia. Tolerance
± 0.005	h5

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend																				

ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend																		◎	◎		◎

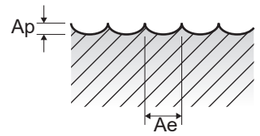
CBN END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ESB94 SERIES 2 FLUTE BALL NOSE

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

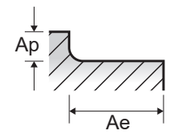
ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 0.4	0.5	0.6	0.8	1.0	1.2	1.5	2.0	3.0
H	38	Hardened steel	0.5D	0.2R	Vc	65	80	95	125	155	190	235	250	250
					fz	0.012	0.015	0.02	0.02	0.03	0.03	0.03	0.04	0.04
					RPM	51725	50930	50399	49736	49338	50399	49869	39789	26526
					FEED	1241	1528	2016	1989	2960	3024	2992	3183	2122
	39.1		0.5D	0.1R	Vc	65	80	95	125	155	190	235	250	250
					fz	0.012	0.015	0.02	0.02	0.03	0.03	0.03	0.04	0.04
					RPM	51725	50930	50399	49736	49338	50399	49869	39789	26526
					FEED	1241	1528	2016	1989	2960	3024	2992	3183	2122
	39.2		0.5D	0.1R	Vc	65	80	95	125	155	190	235	200	205
					fz	0.012	0.015	0.02	0.02	0.03	0.03	0.03	0.039	0.04
					RPM	51725	50930	50399	49736	49338	50399	49869	31831	21751
					FEED	1241	1528	2016	1989	2960	3024	2992	2483	1740
	39.3		R0.2~R0.4 = 0.005mm R0.5~R1.5 = 0.01mm	R0.2~R0.4 = 0.005mm R0.5~R1.5 = 0.01mm	Vc	65	80	95	125	155	190	235	200	205
					fz	0.012	0.015	0.02	0.02	0.03	0.03	0.03	0.039	0.04
					RPM	51725	50930	50399	49736	49338	50399	49869	31831	21751
					FEED	1241	1528	2016	1989	2960	3024	2992	2483	1740
	41	Hardened Cast Iron	0.5D	0.2R	Vc	65	80	95	125	155	190	235	250	250
					fz	0.012	0.015	0.02	0.02	0.03	0.03	0.03	0.04	0.04
					RPM	51725	50930	50399	49736	49338	50399	49869	39789	26526
					FEED	1241	1528	2016	1989	2960	3024	2992	3183	2122



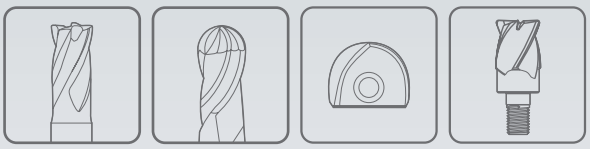
ESD02 SERIES 2 FLUTE CORNER RADIUS

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø) 0.5	1.0	1.5	2.0
H	38 39.1	Hardened steel	Vc	80	135	140	140
			fz	0.007	0.012	0.017	0.02
			RPM	50930	42972	29709	22282
			FEED	713	1031	1010	891
			Ae	0.1	0.2	0.4	0.6
			Ap	0.01	0.01	0.02	0.03
	39.2 ~ 39.3		Vc	80	95	90	90
			fz	0.006	0.012	0.018	0.029
			RPM	50930	30239	19099	14324
			FEED	611	726	688	831
			Ae	0.06	0.1	**0.2**	**0.3**
			Ap	0.005	0.01	**0.02**	**0.03**
	41	Hardened Cast Iron	Vc	80	135	140	140
			fz	0.007	0.012	0.017	0.02
			RPM	50930	42972	29709	22282
			FEED	713	1031	1010	891
			Ae	0.1	0.2	0.4	0.6
			Ap	0.01	0.01	0.02	0.03



Global Cutting Tool Leader **YG-1**



MILLING