

# **CBN-EPSB/EPSR**

**Cubic Boron Nitride End Mill  
for high hardened materials**



**D 0.2 mm ~ D 2 mm**  
• For Materials  $\leq 72\text{HRC}$   
•  $l_n \sim 10 \times D$



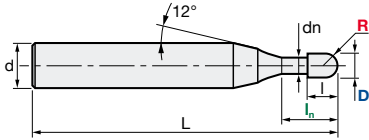
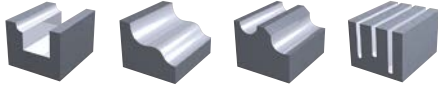
**Diameter  
checked**  
Labelled on box  
D  $\mu\text{m}$  



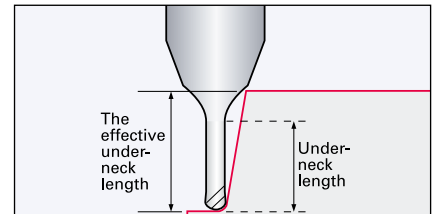
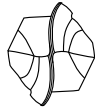
[www.moldino.eu](http://www.moldino.eu)

## CBN-EPSB | Epoch CBN Ball End Mill

<b>CBN</b> Cubic Boron Nitride	<b>V max</b> High Speed	<b>▽</b> Roughing	<b>▽▽</b> Semi-Finishing	<b>▽▽▽</b> Finishing	<b>▽▽▽▽</b> Super-Finishing	<b>HRC</b> 72	<b>No. of Teeth</b> 2	<b>Rake Angle</b> Negative
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R Tol. [mm]	d Tol.
<b>+/- 0.005</b>	<b>h4</b>



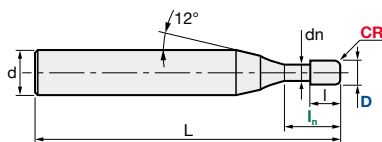
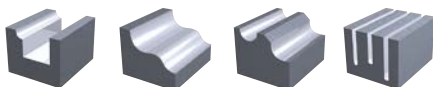
Size										Effective Underneck Using Length by Draft Angle				
ID Code	Item Code	Z	D	R	I <sub>n</sub>	I	dn	L	d	0.5°	1°	1.5°	2°	3°
CB001	CBN-EPSB-2002-0.5-F	2	0.2	0.1	0.5	0.12	0.18	50	4	0.67	0.70	0.72	0.75	0.80
CB002	CBN-EPSB-2002-1-F				1					1.19	1.24	1.28	1.32	1.38
CB003	CBN-EPSB-2003-0.75-F		0.3	0.15	0.75	0.18	0.27			0.95	0.99	1.02	1.05	1.10
CB004	CBN-EPSB-2003-1.5-F				1.5					1.73	1.79	1.83	1.88	2.03
CB005	CBN-EPSB-2004-1-F		0.4	0.2	1	0.24	0.37			1.21	1.25	1.29	1.32	1.38
CB006	CBN-EPSB-2004-2-F				2					2.25	2.31	2.37	2.43	2.68
CB007	CBN-EPSB-2005-1.5-F		0.5	0.25	1.5	0.3	0.47			1.73	1.78	1.83	1.87	2.00
CB008	CBN-EPSB-2005-3-⊙				3					3.28	3.36	3.46	3.62	3.99
CB009	CBN-EPSB-2006-1.5-F		0.6	0.3	1.5	0.36	0.57			1.73	1.78	1.82	1.86	1.98
CB010	CBN-EPSB-2006-3-F				3					3.28	3.36	3.46	3.61	3.97
CB011	CBN-EPSB-2008-2.5-F		0.8	0.4	2.5	0.48	0.77			2.76	2.83	2.89	2.99	3.28
CB012	CBN-EPSB-2008-5-⊙				5					5.33	5.48	5.72	5.99	6.60
CB014	CBN-EPSB-2010-2.5-F		1	0.5	2.5	0.6	0.96			2.77	2.84	2.89	3.00	3.28
CB015	CBN-EPSB-2010-5-F				5					5.34	5.50	5.74	5.99	6.60
CB013	CBN-EPSB-2010-10-⊙		1.5	0.75	10	0.9	1.44			10.50	10.95	11.44	11.98	13.23
CB017	CBN-EPSB-2015-5-F				5					5.36	5.53	5.75	6.00	6.58
CB016	CBN-EPSB-2015-10-⊙		2	1	10	1.2	1.92			10.54	10.98	11.46	11.98	13.22
CB020	CBN-EPSB-2020-5-F				5					5.38	5.56	5.77	6.01	6.56
CB018	CBN-EPSB-2020-10-F				10					10.58	11.01	11.48	11.99	13.20
CB019	CBN-EPSB-2020-20-⊙	20			55			21.00		21.90	22.88	23.96	x	

<b>F</b>	<b>Fine Type</b>	≤ 5x D
<b>⊙</b>	<b>Strong Type</b>	> 5x D

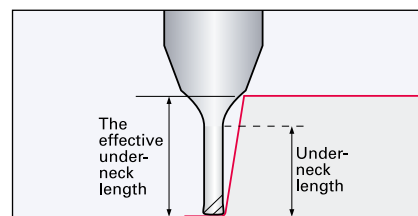
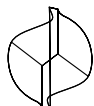
x = no contact

## CBN-EP SR | Epoch CBN Radius End Mill

<b>CBN</b> Cubic Boron Nitride	<b>V max</b> High Speed	<b>▽</b> Roughing	<b>▽▽</b> Semi-Finishing	<b>▽▽▽</b> Finishing	<b>▽▽▽▽</b> Super-Finishing	<b>HRC</b> 72	<b>No. of Teeth</b> 2	<b>Rake Angle</b> Negative
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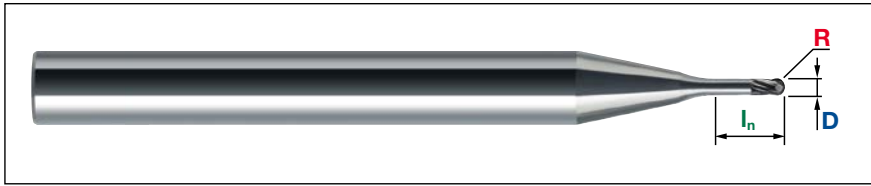
R Tol. [mm]	d Tol.
<b>+/- 0.005</b>	<b>h4</b>



Size										Effective Underneck Using Length by Draft Angle				
ID Code	Item Code	Z	D	CR	I <sub>n</sub>	I	dn	L	d	0.5°	1°	1.5°	2°	3°
CB021	CBN-EP SR-2002-0.5-005	2	0.2	0.05	0.5	0.07	0.18	50	4	0.67	0.70	0.73	0.76	0.81
CB022	CBN-EP SR-2002-1-005				1					1.19	1.24	1.28	1.32	1.39
CB023	CBN-EP SR-2003-0.75-005		0.3		0.75	0.11	0.27			0.96	0.99	1.03	1.06	1.12
CB024	CBN-EP SR-2003-1.5-005				1.5					1.74	1.79	1.84	1.89	2.06
CB025	CBN-EP SR-2004-1-005		0.4	1	0.14	0.37	1.22			1.26	1.30	1.34	1.40	
CB026	CBN-EP SR-2004-2-005			2			2.25			2.32	2.38	2.46	2.73	
CB027	CBN-EP SR-2005-1.5-01		0.5	1.5	0.18	0.47	1.74			1.79	1.84	1.88	2.05	
CB028	CBN-EP SR-2005-3-01			3			3.28			3.37	3.48	3.65	4.04	
CB029	CBN-EP SR-2006-1.5-01		0.6	1.5	0.21	0.57	1.74			1.79	1.84	1.88	2.05	
CB030	CBN-EP SR-2006-3-01			3			3.28			3.37	3.48	3.65	4.04	
CB031	CBN-EP SR-2008-2.5-01		0.8	2.5	0.28	0.77	2.77			2.84	2.91	3.05	3.37	
CB032	CBN-EP SR-2008-5-01			5			5.34			5.51	5.76	6.04	6.69	
CB034	CBN-EP SR-2010-2.5-02		1	2.5	0.35	0.96	2.78			2.85	2.93	3.06	3.37	
CB035	CBN-EP SR-2010-5-02			5			5.35			5.53	5.78	6.05	6.69	
CB033	CBN-EP SR-2010-10-02			10			10.51			10.97	11.48	12.03	13.33	
CB037	CBN-EP SR-2015-5-02		1.5	5	0.53	1.44	5.38			5.58	5.83	6.11	6.75	
CB036	CBN-EP SR-2015-10-02			10			10.56			11.03	11.53	12.09	13.39	
CB040	CBN-EP SR-2020-5-02	2	5	0.7	1.92	55	5.40	5.63	5.88	6.16	6.82			
CB038	CBN-EP SR-2020-10-02		10				10.61	11.08	11.59	12.15	13.45			
CB039	CBN-EP SR-2020-20-02		20				21.04	21.97	22.99	24.11	x			

x = no contact

## CBN-EPSPB | Epoch CBN Ball End Mill | Recommended Cutting Conditions



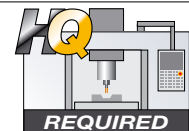
Material			Hardened steels ~55HRC - STAVAX. 1.2344. 1.2379												
Parameter			<div>▽ Roughing</div> (efficiency)						<div>▽▽ Finishing</div> (surface, tool life)						
D	R	L <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	
0.2	0.1	0.5	0.006	0.018	50,000	32	0.018	1,800	0.005	0.005 ~ 0.015	58,000	37	0.0125	1,450	
		1	0.005	0.015	46,000	29	0.018	1,660	0.005	0.005 ~ 0.015	53,000	33	0.0125	1,330	
0.3	0.15	0.75	0.010	0.030	50,000	47	0.018	1,800	0.005	0.005 ~ 0.015	58,000	55	0.0125	1,450	
		1.5	0.008	0.024	45,000	42	0.018	1,620	0.005	0.005 ~ 0.015	53,000	50	0.0125	1,330	
0.4	0.2	1	0.015	0.045	46,000	58	0.024	2,210	0.005	0.005 ~ 0.015	54,000	68	0.0125	1,350	
		2	0.012	0.036	41,000	52	0.024	1,970	0.005	0.005 ~ 0.015	49,000	61	0.0125	1,230	
0.5	0.25	1.5	0.025	0.075	46,000	72	0.027	2,480	0.008	0.008 ~ 0.024	54,000	85	0.0200	2,160	
		3	0.020	0.060	41,000	65	0.027	2,210	0.008	0.008 ~ 0.024	48,000	76	0.0200	1,920	
0.6	0.3	1.5	0.030	0.090	42,000	80	0.030	2,520	0.008	0.008 ~ 0.024	48,000	91	0.0200	1,920	
		3	0.025	0.075	38,000	72	0.030	2,280	0.008	0.008 ~ 0.024	44,000	82	0.0200	1,760	
0.8	0.4	2.5	0.040	0.120	42,000	105	0.033	2,770	0.008	0.008 ~ 0.024	48,000	120	0.0300	2,880	
		5	0.032	0.096	38,000	95	0.033	2,510	0.008	0.008 ~ 0.024	43,000	108	0.0300	2,580	
1	0.5	2.5	0.050	0.150	38,200	120	0.036	2,750	0.010	0.010 ~ 0.030	44,000	139	0.0300	2,640	
		5	0.040	0.120	34,400	108	0.036	2,480	0.010	0.010 ~ 0.030	40,000	125	0.0300	2,400	
		10	0.010	0.030	26,700	84	0.029	1,550	0.010	0.010 ~ 0.030	31,000	97	0.0240	1,490	
1.5	0.75	5	0.070	0.210	32,000	151	0.040	2,560	0.010	0.010 ~ 0.030	38,000	180	0.0400	3,040	
		10	0.020	0.060	22,500	106	0.032	1,440	0.010	0.010 ~ 0.030	27,000	126	0.0320	1,730	
2	1	5	0.080	0.240	28,000	176	0.052	2,910	0.010	0.010 ~ 0.030	34,000	215	0.0500	3,400	
		10	0.065	0.195	25,100	158	0.052	2,610	0.010	0.010 ~ 0.030	31,000	194	0.0500	3,100	
		20	0.017	0.051	19,600	123	0.042	1,650	0.010	0.010 ~ 0.030	24,000	150	0.0400	1,920	

Material			Hardened steels 55~65HRC - 1.2379, 1.3343												
Parameter			<div>▽ Roughing</div> (efficiency)						<div>▽▽ Finishing</div> (surface, tool life)						
			a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	
D	R	I <sub>h</sub>													
0.2	0.1	0.5	0.005	0.015	48,000	30	0.016	1,510	0.0045	0.0045 ~ 0.0135	55,000	35	0.0119	1,310	
		1	0.004	0.013	44,000	28	0.016	1,390	0.0045	0.0045 ~ 0.0135	50,000	31	0.0119	1,190	
0.3	0.15	0.75	0.009	0.026	47,000	45	0.016	1,480	0.0045	0.0045 ~ 0.0135	55,000	52	0.0119	1,310	
		1.5	0.007	0.020	42,000	40	0.016	1,320	0.0045	0.0045 ~ 0.0135	50,000	48	0.0119	1,190	
0.4	0.2	1	0.013	0.038	44,000	55	0.021	1,850	0.0045	0.0045 ~ 0.0135	51,000	65	0.0119	1,210	
		2	0.010	0.031	39,000	49	0.021	1,640	0.0045	0.0045 ~ 0.0135	46,000	58	0.0119	1,090	
0.5	0.25	1.5	0.021	0.064	44,000	68	0.024	2,080	0.0072	0.0072 ~ 0.0216	51,000	81	0.0190	1,940	
		3	0.017	0.051	39,000	62	0.024	1,840	0.0072	0.0072 ~ 0.0216	46,000	72	0.0190	1,750	
0.6	0.3	1.5	0.026	0.077	40,000	76	0.026	2,100	0.0072	0.0072 ~ 0.0216	46,000	86	0.0190	1,750	
		3	0.021	0.064	36,000	68	0.026	1,890	0.0072	0.0072 ~ 0.0216	41,000	78	0.0190	1,560	
0.8	0.4	2.5	0.034	0.102	40,000	100	0.029	2,310	0.0072	0.0072 ~ 0.0216	45,000	114	0.0285	2,570	
		5	0.027	0.082	36,000	90	0.029	2,080	0.0072	0.0072 ~ 0.0216	41,000	103	0.0285	2,340	
1	0.5	2.5	0.043	0.128	36,300	114	0.032	2,290	0.0090	0.0090 ~ 0.0270	42,000	132	0.0285	2,390	
		5	0.034	0.102	32,700	103	0.032	2,060	0.0090	0.0090 ~ 0.0270	38,000	119	0.0285	2,170	
1.5	0.75	10	0.009	0.026	25,400	80	0.025	1,290	0.0090	0.0090 ~ 0.0270	29,000	92	0.0228	1,320	
		5	0.060	0.179	30,400	143	0.035	2,130	0.0090	0.0090 ~ 0.0270	36,000	171	0.0380	2,740	
2	1	10	0.017	0.051	21,400	101	0.028	1,200	0.0090	0.0090 ~ 0.0270	25,000	120	0.0304	1,520	
		5	0.068	0.204	26,600	167	0.046	2,420	0.0090	0.0090 ~ 0.0270	33,000	204	0.0475	3,140	
2	1	10	0.055	0.166	23,900	150	0.046	2,170	0.0090	0.0090 ~ 0.0270	29,000	184	0.0475	2,760	
		20	0.014	0.043	18,600	117	0.037	1,370	0.0090	0.0090 ~ 0.0270	23,000	143	0.0380	1,750	

### PLEASE NOTE:

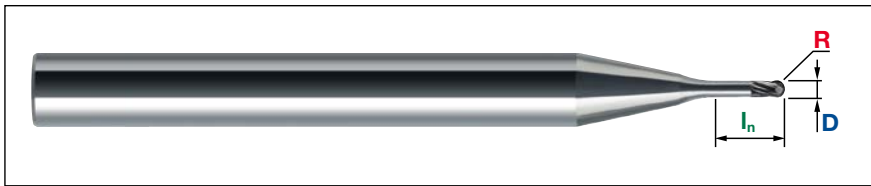
The values in these tables are only recommended under the following conditions:

- The use of a machining centre and toolholder with highest precision, concentricity and rigidity
- All components – including machine and controller – are of the latest technology





## CBN-EPSPB | Epoch CBN Ball End Mill | Recommended Cutting Conditions



Material			Hardened steels 65~68HRC · High speed steel											
Parameter			<div>▽ Roughing</div> (efficiency)						<div>▽▽ Finishing</div> (surface, tool life)					
D	R	I <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>t</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>t</sub> (mm/t)	V <sub>f</sub> (mm/min)
0.2	0.1	0.5	0.004	0.013	45,000	28	0.014	1,220	0.004	0.004 ~ 0.012	52,000	33	0.0106	1,110
		1	0.004	0.011	42,000	26	0.014	1,130	0.004	0.004 ~ 0.012	47,000	30	0.0106	1,000
0.3	0.15	0.75	0.007	0.021	45,000	42	0.014	1,220	0.004	0.004 ~ 0.012	53,000	50	0.0106	1,130
		1.5	0.006	0.017	40,000	38	0.014	1,080	0.004	0.004 ~ 0.012	48,000	45	0.0106	1,020
0.4	0.2	1	0.011	0.032	42,000	52	0.018	1,510	0.004	0.004 ~ 0.012	49,000	61	0.0106	1,040
		2	0.008	0.025	37,000	47	0.018	1,330	0.004	0.004 ~ 0.012	44,000	55	0.0106	940
0.5	0.25	1.5	0.018	0.053	41,000	65	0.020	1,660	0.006	0.006 ~ 0.019	49,000	77	0.0170	1,670
		3	0.014	0.042	37,000	59	0.020	1,500	0.006	0.006 ~ 0.019	44,000	68	0.0170	1,500
0.6	0.3	1.5	0.021	0.063	38,000	72	0.023	1,710	0.006	0.006 ~ 0.019	43,000	82	0.0170	1,460
		3	0.018	0.053	34,000	65	0.023	1,530	0.006	0.006 ~ 0.019	39,000	74	0.0170	1,330
0.8	0.4	2.5	0.028	0.084	38,000	95	0.025	1,880	0.006	0.006 ~ 0.019	43,000	108	0.0255	2,190
		5	0.022	0.067	34,000	86	0.025	1,680	0.006	0.006 ~ 0.019	39,000	97	0.0255	1,990
1	0.5	2.5	0.035	0.105	34,000	108	0.027	1,840	0.008	0.008 ~ 0.024	40,000	125	0.0255	2,040
		5	0.028	0.084	31,000	97	0.027	1,670	0.008	0.008 ~ 0.024	36,000	113	0.0255	1,840
1.5	0.75	10	0.007	0.021	24,000	76	0.022	1,040	0.008	0.008 ~ 0.024	28,000	87	0.0204	1,140
		5	0.049	0.147	29,000	136	0.030	1,740	0.008	0.008 ~ 0.024	34,000	162	0.0340	2,310
2	1	10	0.014	0.042	20,000	95	0.024	960	0.008	0.008 ~ 0.024	24,000	113	0.0272	1,310
		5	0.056	0.168	25,000	158	0.039	1,950	0.008	0.008 ~ 0.024	31,000	194	0.0425	2,640
2	1	10	0.046	0.137	23,000	142	0.039	1,790	0.008	0.008 ~ 0.024	28,000	175	0.0425	2,380
		20	0.012	0.036	18,000	111	0.032	1,130	0.008	0.008 ~ 0.024	21,000	135	0.0340	1,430

Material			Hardened steels 68~72HRC · High speed steel												
Parameter			<div>▽ Roughing</div> (efficiency)						<div>▽▽▽ Finishing</div> (surface, tool life)						
			D	R	I <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)
0.2	0.1	0.5	0.004	0.011	43,000	27	0.011	970	0.0035	0.0035 ~ 0.0105		49,000	31	0.0094	920
		1	0.003	0.009	39,000	25	0.011	880	0.0035	0.0035 ~ 0.0105		45,000	28	0.0094	840
0.3	0.15	0.75	0.006	0.018	42,000	40	0.011	950	0.0035	0.0035 ~ 0.0105		50,000	47	0.0094	940
		1.5	0.005	0.014	38,000	36	0.011	860	0.0035	0.0035 ~ 0.0105		45,000	43	0.0094	840
0.4	0.2	1	0.009	0.027	39,000	49	0.015	1,170	0.0035	0.0035 ~ 0.0105		46,000	58	0.0094	860
		2	0.007	0.022	35,000	44	0.015	1,050	0.0035	0.0035 ~ 0.0105		41,000	52	0.0094	770
0.5	0.25	1.5	0.015	0.045	39,000	61	0.017	1,320	0.0056	0.0056 ~ 0.0168		46,000	72	0.0150	1,380
		3	0.012	0.036	35,000	55	0.017	1,180	0.0056	0.0056 ~ 0.0168		41,000	65	0.0150	1,230
0.6	0.3	1.5	0.018	0.054	36,000	68	0.019	1,350	0.0056	0.0056 ~ 0.0168		41,000	77	0.0150	1,230
		3	0.015	0.045	32,000	61	0.019	1,200	0.0056	0.0056 ~ 0.0168		37,000	70	0.0150	1,110
0.8	0.4	2.5	0.024	0.072	36,000	89	0.021	1,490	0.0056	0.0056 ~ 0.0168		41,000	102	0.0225	1,850
		5	0.019	0.058	32,000	81	0.021	1,320	0.0056	0.0056 ~ 0.0168		37,000	92	0.0225	1,670
1	0.5	2.5	0.030	0.090	32,000	102	0.023	1,440	0.0070	0.0070 ~ 0.0210		38,000	118	0.0225	1,710
		5	0.024	0.072	29,000	92	0.023	1,310	0.0070	0.0070 ~ 0.0210		34,000	106	0.0225	1,530
		10	0.006	0.018	23,000	71	0.018	830	0.0070	0.0070 ~ 0.0210		26,000	82	0.0180	940
1.5	0.75	5	0.042	0.126	27,000	128	0.025	1,350	0.0070	0.0070 ~ 0.0210		32,000	153	0.0300	1,920
		10	0.012	0.036	19,000	90	0.020	760	0.0070	0.0070 ~ 0.0210		23,000	107	0.0240	1,100
2	1	5	0.048	0.144	24,000	150	0.033	1,560	0.0070	0.0070 ~ 0.0210		29,000	183	0.0375	2,180
		10	0.039	0.117	21,000	134	0.033	1,370	0.0070	0.0070 ~ 0.0210		26,000	165	0.0375	1,950
		20	0.010	0.031	17,000	105	0.026	890	0.0070	0.0070 ~ 0.0210		20,000	128	0.0300	1,200

### PLEASE NOTE:

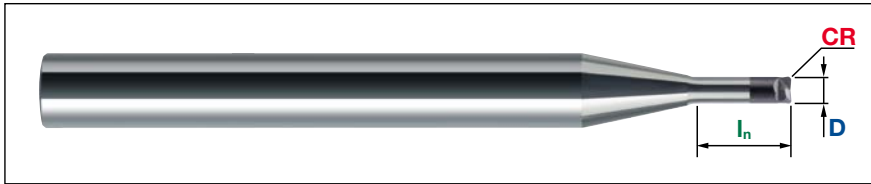
The values in these tables are only recommended under the following conditions:

1. The use of a machining centre and toolholder with highest precision, concentricity and rigidity
2. All components – including machine and controller – are of the latest technology





## CBN-EPSR | Epoch CBN Radius End Mill | Recommended Cutting Conditions



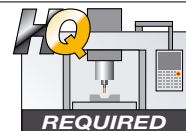
Material			Hardened steels ~55HRC - STAVAX, 1.2344, 1.2379												
Parameter			<div>▽</div> <div>Roughing (efficiency)</div>						<div>▽▽▽</div> <div>Finishing (surface, tool life)</div>						
D	CR	I <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	
0.2	0.05	0.5	0.005	0.050	43,000	27	0.015	1,320	0.005	0.005 ~ 0.015	52,000	33	0.0125	1,300	
		1	0.004	0.050	39,000	25	0.015	1,190	0.005	0.005 ~ 0.015	47,000	30	0.0125	1,180	
0.3		0.75	0.008	0.100	42,000	40	0.015	1,290	0.005	0.005 ~ 0.015	53,000	50	0.0125	1,330	
		1.5	0.006	0.100	38,000	36	0.015	1,160	0.005	0.005 ~ 0.015	48,000	45	0.0125	1,200	
0.4		1	0.011	0.150	39,000	49	0.020	1,590	0.005	0.005 ~ 0.015	49,000	61	0.0125	1,230	
		2	0.009	0.150	35,000	44	0.020	1,430	0.005	0.005 ~ 0.015	44,000	55	0.0125	1,100	
0.5	0.1	1.5	0.019	0.150	39,000	61	0.023	1,790	0.008	0.008 ~ 0.024	49,000	77	0.0200	1,960	
		3	0.015	0.150	35,000	55	0.023	1,610	0.008	0.008 ~ 0.024	44,000	68	0.0200	1,760	
0.6		1.5	0.023	0.200	36,000	68	0.026	1,840	0.008	0.008 ~ 0.024	43,000	82	0.0200	1,720	
		3	0.019	0.200	32,000	61	0.026	1,630	0.008	0.008 ~ 0.024	39,000	74	0.0200	1,560	
0.8		2.5	0.030	0.300	36,000	89	0.028	2,020	0.008	0.008 ~ 0.024	43,000	108	0.0300	2,580	
		5	0.024	0.300	32,000	81	0.028	1,800	0.008	0.008 ~ 0.024	39,000	97	0.0300	2,340	
1	0.2	2.5	0.038	0.300	32,500	102	0.031	1,990	0.010	0.010 ~ 0.030	40,000	125	0.0300	2,400	
		5	0.030	0.300	29,200	92	0.031	1,790	0.010	0.010 ~ 0.030	36,000	113	0.0300	2,160	
		10	0.008	0.300	22,700	71	0.025	1,120	0.010	0.010 ~ 0.030	28,000	87	0.0240	1,340	
		5	0.053	0.550	27,200	128	0.034	1,850	0.010	0.010 ~ 0.030	34,000	162	0.0400	2,720	
1.5		10	0.015	0.550	19,100	90	0.027	1,040	0.010	0.010 ~ 0.030	24,000	113	0.0320	1,540	
		5	0.060	0.800	23,800	150	0.044	2,100	0.010	0.010 ~ 0.030	31,000	194	0.0500	3,100	
2		10	0.049	0.800	21,400	134	0.044	1,890	0.010	0.010 ~ 0.030	28,000	175	0.0500	2,800	
		20	0.013	0.800	16,600	105	0.036	1,190	0.010	0.010 ~ 0.030	21,000	135	0.0400	1,680	

Material			Hardened steels 55~65HRC · 1.2379, 1.3343												
Parameter			<div>▽</div> <div>Roughing</div> (efficiency)						<div>▽▽▽</div> <div>Finishing</div> (surface, tool life)						
D	CR	L <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	
0.2	0.05	0.5	0.004	0.043	40,000	25	0.013	1,070	0.0045	0.0045 ~ 0.0135	50,000	31	0.0119	1,190	
		1	0.003	0.043	37,000	23	0.013	990	0.0045	0.0045 ~ 0.0135	45,000	28	0.0119	1,070	
0.3		0.75	0.006	0.085	40,000	38	0.013	1,070	0.0045	0.0045 ~ 0.0135	50,000	47	0.0119	1,190	
		1.5	0.005	0.085	36,000	34	0.013	960	0.0045	0.0045 ~ 0.0135	45,000	43	0.0119	1,070	
0.4		1	0.010	0.128	37,000	47	0.018	1,320	0.0045	0.0045 ~ 0.0135	46,000	58	0.0119	1,090	
		2	0.008	0.128	33,000	42	0.018	1,180	0.0045	0.0045 ~ 0.0135	42,000	52	0.0119	1,000	
0.5	0.1	1.5	0.016	0.128	37,000	58	0.020	1,490	0.0072	0.0072 ~ 0.0216	46,000	73	0.0190	1,750	
		3	0.013	0.128	33,000	52	0.020	1,330	0.0072	0.0072 ~ 0.0216	41,000	65	0.0190	1,560	
0.6		1.5	0.019	0.170	34,000	65	0.022	1,520	0.0072	0.0072 ~ 0.0216	41,000	78	0.0190	1,560	
		3	0.016	0.170	31,000	58	0.022	1,380	0.0072	0.0072 ~ 0.0216	37,000	70	0.0190	1,410	
0.8		2.5	0.026	0.255	34,000	85	0.025	1,670	0.0072	0.0072 ~ 0.0216	41,000	103	0.0285	2,340	
		5	0.020	0.255	31,000	77	0.025	1,520	0.0072	0.0072 ~ 0.0216	37,000	92	0.0285	2,110	
1	0.2	2.5	0.032	0.255	30,800	97	0.027	1,650	0.0090	0.0090 ~ 0.0270	38,000	119	0.0285	2,170	
		5	0.026	0.255	27,800	87	0.027	1,490	0.0090	0.0090 ~ 0.0270	34,000	107	0.0285	1,940	
		10	0.006	0.255	21,600	68	0.022	930	0.0090	0.0090 ~ 0.0270	26,000	83	0.0228	1,190	
1.5		5	0.045	0.468	25,900	122	0.030	1,540	0.0090	0.0090 ~ 0.0270	33,000	154	0.0380	2,510	
		10	0.013	0.468	18,200	86	0.024	870	0.0090	0.0090 ~ 0.0270	23,000	108	0.0304	1,400	
2			5	0.051	0.680	22,600	142	0.039	1,750	0.0090	0.0090 ~ 0.0270	29,000	184	0.0475	2,760
	10		0.041	0.680	20,300	128	0.039	1,570	0.0090	0.0090 ~ 0.0270	26,000	166	0.0475	2,470	
	20		0.011	0.680	15,800	99	0.031	990	0.0090	0.0090 ~ 0.0270	20,000	128	0.0380	1,520	

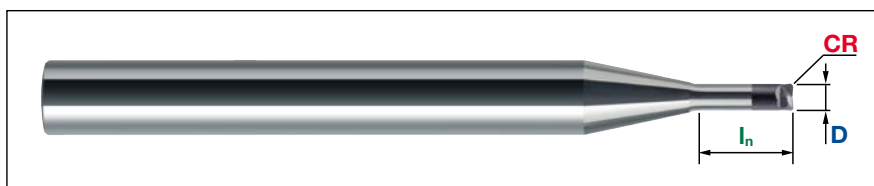
### PLEASE NOTE:

The values in these tables are only recommended under the following conditions:

1. The use of a machining centre and toolholder with highest precision, concentricity and rigidity
2. All components – including machine and controller – are of the latest technology



## CBN-EPSR | Epoch CBN Radius End Mill | Recommended Cutting Conditions



Material			Hardened steels 65~68HRC · High speed steel												
Parameter			<div>▽ Roughing</div> (efficiency)						<div>▽▽ Finishing</div> (surface, tool life)						
D	CR	I <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	
0.2	0.05	0.5	0.003	0.035	38,000	24	0.011	870	0.004	0.004 ~ 0.012	47,000	30	0.0106	1,000	
		1	0.003	0.035	35,000	22	0.011	800	0.004	0.004 ~ 0.012	43,000	27	0.0106	910	
0.3		0.75	0.005	0.070	38,000	36	0.011	870	0.004	0.004 ~ 0.012	47,000	45	0.0106	1,000	
		1.5	0.004	0.070	34,000	32	0.011	780	0.004	0.004 ~ 0.012	43,000	41	0.0106	910	
0.4		1	0.008	0.105	35,000	44	0.015	1,070	0.004	0.004 ~ 0.012	44,000	55	0.0106	940	
		2	0.006	0.105	32,000	40	0.015	980	0.004	0.004 ~ 0.012	39,000	49	0.0106	830	
0.5	0.1	1.5	0.013	0.105	35,000	55	0.017	1,200	0.006	0.006 ~ 0.019	44,000	69	0.0170	1,500	
		3	0.011	0.105	32,000	50	0.017	1,100	0.006	0.006 ~ 0.019	39,000	62	0.0170	1,330	
0.6		1.5	0.016	0.140	32,000	61	0.019	1,220	0.006	0.006 ~ 0.019	39,000	74	0.0170	1,330	
		3	0.013	0.140	29,000	55	0.019	1,110	0.006	0.006 ~ 0.019	35,000	66	0.0170	1,190	
0.8		2.5	0.021	0.210	32,000	80	0.021	1,350	0.006	0.006 ~ 0.019	39,000	97	0.0255	1,990	
		5	0.017	0.210	29,000	73	0.021	1,220	0.006	0.006 ~ 0.019	35,000	87	0.0255	1,790	
1	0.2	2.5	0.026	0.210	29,000	92	0.023	1,330	0.008	0.008 ~ 0.024	36,000	113	0.0255	1,840	
		5	0.021	0.210	26,000	83	0.023	1,190	0.008	0.008 ~ 0.024	32,000	101	0.0255	1,630	
		10	0.005	0.210	20,000	64	0.018	740	0.008	0.008 ~ 0.024	25,000	79	0.0204	1,020	
1.5		5	0.037	0.385	25,000	116	0.026	1,280	0.008	0.008 ~ 0.024	31,000	146	0.0340	2,110	
		10	0.011	0.385	17,000	81	0.020	690	0.008	0.008 ~ 0.024	22,000	102	0.0272	1,200	
2		5	0.042	0.560	21,000	135	0.033	1,390	0.008	0.008 ~ 0.024	28,000	174	0.0425	2,380	
	10	0.034	0.560	19,000	121	0.033	1,260	0.008	0.008 ~ 0.024	25,000	157	0.0425	2,130		
	20	0.009	0.560	15,000	94	0.027	800	0.008	0.008 ~ 0.024	19,000	122	0.0340	1,290		

Material			Hardened steels 68~72HRC · High speed steel												
Parameter			<div>▽ Roughing</div> (efficiency)						<div>▽▽ Finishing</div> (surface, tool life)						
D	CR	L <sub>n</sub>	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	n (min <sup>-1</sup> )	V <sub>c</sub> (m/min)	f <sub>z</sub> (mm/t)	V <sub>f</sub> (mm/min)	
0.2	0.05	0.5	0.003	0.030	36,000	23	0.010	690	0.0035	0.0035 ~ 0.0105	44,000	28	0.0094	830	
		1	0.002	0.030	33,000	21	0.010	630	0.0035	0.0035 ~ 0.0105	40,000	25	0.0094	750	
0.3		0.75	0.005	0.060	36,000	34	0.010	690	0.0035	0.0035 ~ 0.0105	45,000	42	0.0094	840	
		1.5	0.004	0.060	32,000	30	0.010	610	0.0035	0.0035 ~ 0.0105	41,000	38	0.0094	770	
0.4		1	0.007	0.090	33,000	42	0.013	840	0.0035	0.0035 ~ 0.0105	41,000	52	0.0094	770	
		2	0.005	0.090	30,000	38	0.013	770	0.0035	0.0035 ~ 0.0105	37,000	47	0.0094	690	
0.5	0.1	1.5	0.011	0.090	33,000	52	0.014	950	0.0060	0.0056 ~ 0.0168	41,000	65	0.0150	1,230	
		3	0.009	0.090	30,000	47	0.014	860	0.0060	0.0056 ~ 0.0168	37,000	58	0.0150	1,110	
0.6		1.5	0.014	0.120	31,000	58	0.016	990	0.0060	0.0056 ~ 0.0168	37,000	70	0.0150	1,110	
		3	0.011	0.120	28,000	52	0.016	890	0.0060	0.0056 ~ 0.0168	33,000	63	0.0150	990	
0.8		2.5	0.018	0.180	30,000	76	0.018	1,050	0.0060	0.0056 ~ 0.0168	37,000	92	0.0225	1,670	
		5	0.014	0.180	27,000	69	0.018	950	0.0060	0.0056 ~ 0.0168	33,000	83	0.0225	1,490	
1	0.2	2.5	0.023	0.180	28,000	87	0.019	1,070	0.0070	0.0070 ~ 0.0210	34,000	106	0.0225	1,530	
		5	0.018	0.180	25,000	78	0.019	960	0.0070	0.0070 ~ 0.0210	30,000	96	0.0225	1,350	
		10	0.005	0.180	19,000	61	0.015	590	0.0070	0.0070 ~ 0.0210	24,000	74	0.0180	860	
1.5		5	0.032	0.330	23,000	109	0.021	980	0.0070	0.0070 ~ 0.0210	29,000	138	0.0300	1,740	
		10	0.009	0.330	16,000	77	0.017	540	0.0070	0.0070 ~ 0.0210	20,000	96	0.0240	960	
2		5	0.036	0.480	20,000	127	0.028	1,110	0.0070	0.0070 ~ 0.0210	26,000	164	0.0375	1,950	
	10	0.029	0.480	18,000	114	0.028	990	0.0070	0.0070 ~ 0.0210	24,000	148	0.0375	1,800		
	20	0.008	0.480	14,000	89	0.022	620	0.0070	0.0070 ~ 0.0210	18,000	115	0.0300	1,080		

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- All components – including machine and controller – are of the latest technology



**Always up to date: Please check our P50 QuickFinder**



### **Attentions on Safety**

#### **1. Cautions regarding handling**

- (1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
- (2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

#### **2. Cautions regarding mounting**

- (1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
- (2) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

#### **3. Cautions during use**

- (1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
- (2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
- (3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
- (4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. Please caution of fire while using oil base coolant, fire prevention is necessary.
- (5) Do not use the tool for any purpose other than that for which it is intended.

#### **4. Cautions regarding regrinding**

- (1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
- (2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
- (3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with the local laws and regulations regarding prevention of hazards due to specified chemical substances.

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**Specifications for the products listed in this catalog are subject to change without notice due to replacement or modification.**

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