

# ***EHHBE/EHHRE-TH3***

## ***Epoch High Hard Ball/Radius Evolution***

### ***Multi-purpose Ball Type/Corner Radius End Mill***

#### ***New TH3 Coating***

***D1mm ~ D12mm***

- ***For High Hardened Materials up to and even beyond 68HRC***

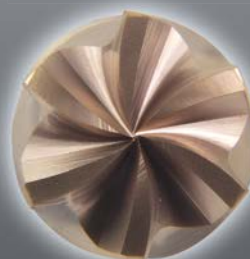
***EHHBE: 4 flutes***

- ***Unequal pitch (anti-vibration)***



***EHHRE: 4 or 6 flutes***

- ***Peripheral clearance geometry (anti-vibration)***



## EHHBE-TH3 | Epoch High Hard Ball Evolution TH3

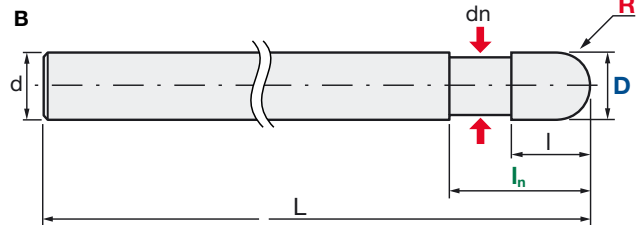
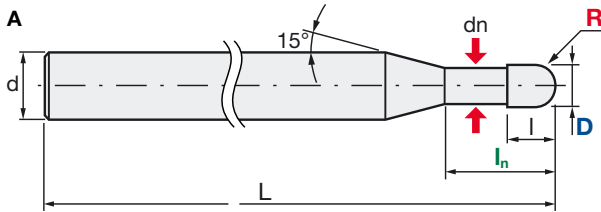
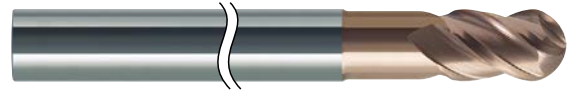
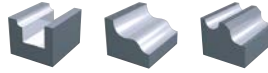
**V max**  
High Speed

**▽**  
Roughing

**▽▽**  
Semi-Finishing

**HRC**  
>68

**No. of Teeth**  
4



**Carbide**  
Micro Grain

**TH3**  
Nano-PVD Coating

**Rake Angle**  
Negative

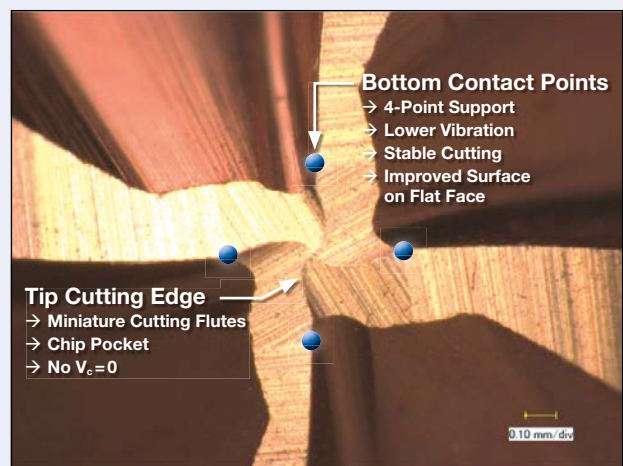
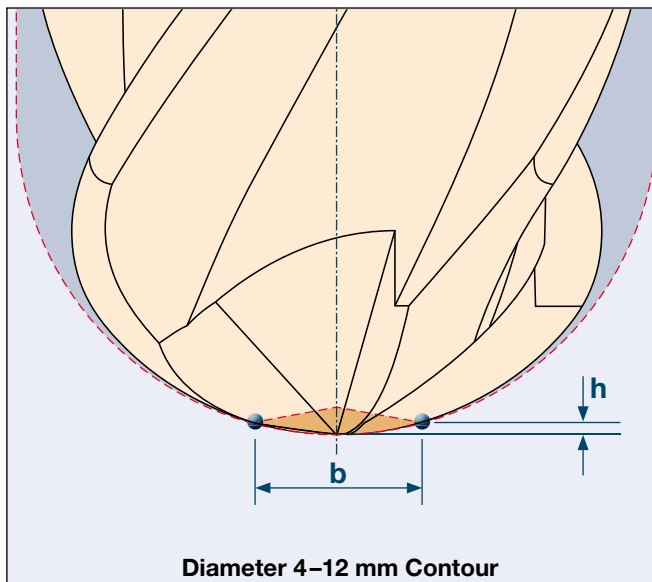
Helix Angle	R Tol. [mm]	D Tol. [mm]	d Tol.
40°	R0.5~R1.5: +/-0.005 R2~R3: +/-0.007 R4~R6: +/-0.01	R0.5~R1.5: 0/-0.01 R2~R3: 0/-0.014 R4~R6: 0/-0.02	h5

ID Code	Item Code	Z	Size [mm]											
			D	R	I <sub>n</sub>	I	dn	L	d	b	h	Type		
EP1846	EHHBE-4010-S4-TH3	4	1	0.5	3	1.5	0.95	50	4	0	0	A		
EP1847	EHHBE-4010-S6-TH3								6					
EP1848	EHHBE-4015-S4-TH3		1.5	0.75	4.5	2.5	1.43		4					
EP1849	EHHBE-4015-S6-TH3								6					
EP1850	EHHBE-4020-S4-TH3		2	1	6	3	1.9		4					
EP1851	EHHBE-4020-S6-TH3								6					
EP1852	EHHBE-4025-S4-TH3		2.5	1.25	7.5	4	2.38		4					
EP1853	EHHBE-4025-S6-TH3								6					
EP1854	EHHBE-4030-S4-TH3		3	1.5	9	4.5	2.9	70	4	0.26	0.007	B		
EP1855	EHHBE-4030-S6-TH3								6					
EP1856	EHHBE-4040-S4-TH3		4	2	12	6	3.9	4	A					
EP1857	EHHBE-4040-S6-TH3							6						
EP1858	EHHBE-4050-TH3		5	2.5	15	7.5	4.7	80				6	0.28	0.010
EP1859	EHHBE-4060-TH3		6	3	18	9	5.7	90	6			0.33		
EP1860	EHHBE-4080-TH3		8	4	24	12	7.6	100	8			0.45	0.010	B
EP1861	EHHBE-4100-TH3		10	5	30	15	9.5		10					
EP1862	EHHBE-4120-TH3		12	6	36	18	11.5	110	12			0.55		

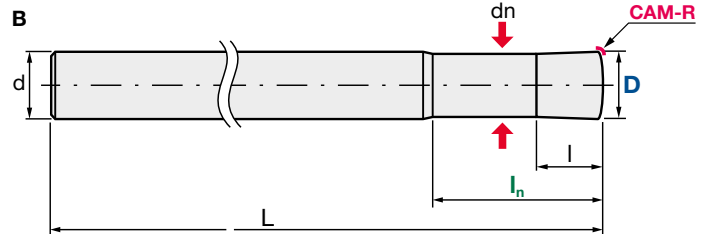
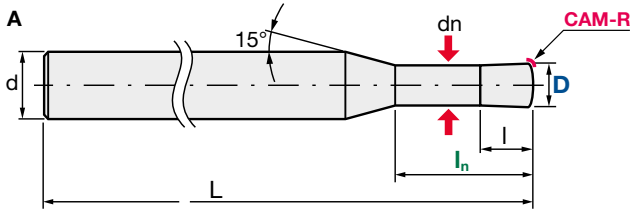
**NOTE:** For precise tool definition for the CAM system please download DXF data (QuickFinder) or contact your local MOLDINO Tool staff for more details.

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

For diameter 1-3 mm, EHHBE has standard ball end mill cutting edge. For diameter 4-12 mm, EHHBE cutting edge geometry is as shown below.



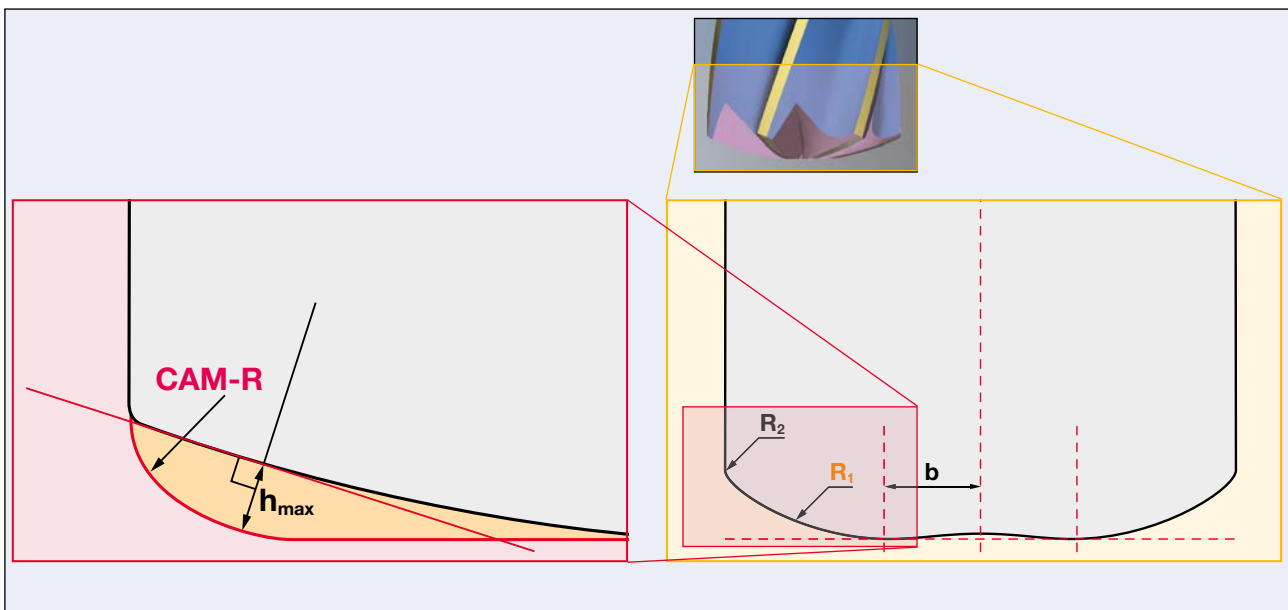
## EHHRE-TH3 | Epoch High Hard Radius Evolution TH3



Helix Angle	D Tol. [mm]	d Tol.
20°	D1~D12: 0/-0.02	h5


ID Code	Item Code	Z	Size [mm]											Type
			D	CAM-R (R <sub>p</sub> )	I <sub>n</sub>	I	dn	L	d	R <sub>1</sub>	R <sub>2</sub>	Lowest point to centre (b)	Max. remaining stock (h <sub>max</sub> )	
EP1863	EHHRE-4010-S4-TH3	4	1	0.134	3	1	0.95	50	4	1.1	0.1	0.14	0.026	A
EP1864	EHHRE-4010-S6-TH3								6					
EP1865	EHHRE-4020-S4-TH3		2	0.194	6	2	1.9		4	2.2		0.28	0.068	
EP1866	EHHRE-4020-S6-TH3								6		0.2	0.42	0.094	A
EP1867	EHHRE-4030-S4-TH3		3	0.328	9	3	2.9		4	3.3				
EP1868	EHHRE-4030-S6-TH3								6					
EP1869	EHHRE-6040-S4-TH3	6	4	0.387	12	4	3.9	60	4	4.4	0.3	0.56	0.136	A
EP1870	EHHRE-6040-S6-TH3								6	5.5		0.70	0.162	
EP1871	EHHRE-6050-TH3		5	0.521	15	5	4.7		6	6.6		0.84	0.204	
EP1872	EHHRE-6060-TH3		6	0.581	18	6	5.7				0.5	1.12	0.255	B
EP1873	EHHRE-6080-TH3		8	0.849	24	8	7.6	75	8	8.8		1.40	0.340	
EP1874	EHHRE-6100-TH3		10	0.968	30	10	9.5	80	10	11.0				
EP1875	EHHRE-6120-TH3		12	1.088	36	12	11.5	100	12	13.2		1.68	0.424	


<b>NOTE:</b>	Please use CAM-R for your programming corner radius.
	For precise tool definition for the CAM system please download DXF data (QuickFinder) or contact your local MOLDINO Tool staff for more details.
	Specifications for the products listed in this catalog are subject to change without notice due to replacement or modification.



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## EHHBE-TH3 | Recommended Cutting Conditions


Application													
Workpiece Material		Hardened Steels (45–51 HRC)						Hardened Steels (52–57 HRC)					
D	R	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm
1	0.5	130	41380	0.019	3190	0.091	0.19	130	41380	0.019	3190	0.076	0.19
1.5	0.75	195	41380	0.026	4340	0.137	0.29	195	41380	0.026	4340	0.114	0.29
2	1	235	37401	0.035	5240	0.182	0.38	195	31035	0.035	4340	0.152	0.38
2.5	1.25	235	29921	0.041	4920	0.228	0.48	195	24828	0.041	4080	0.190	0.48
3	1.5	235	24934	0.049	4920	0.274	0.57	195	20690	0.049	4080	0.228	0.57
4	2	235	18701	0.067	4970	0.365	0.76	195	15518	0.067	4130	0.304	0.76
5	2.5	235	14961	0.085	5080	0.456	0.95	195	12414	0.085	4210	0.380	0.95
6	3	235	12467	0.102	5080	0.547	1.14	195	10345	0.102	4210	0.456	1.14
8	4	235	9350	0.140	5240	0.730	1.52	195	7759	0.140	4340	0.608	1.52
10	5	235	7480	0.175	5240	0.912	1.90	195	6207	0.175	4340	0.760	1.90
12	6	235	6234	0.200	4970	1.094	2.28	195	5173	0.200	4130	0.912	2.28

Application													
Workpiece Material		Hardened Steels (45–51 HRC)						Hardened Steels (52–57 HRC)					
D	R	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	Pitch mm		V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	Pitch mm	
1	0.5	130	41380	0.021	3500	0.05–0.10		130	41380	0.021	3500	0.05–0.10	
1.5	0.75	195	41380	0.029	4780	0.08–0.15		195	41380	0.029	4780	0.08–0.15	
2	1	260	41380	0.039	6370	0.08–0.15		260	41380	0.039	6370	0.08–0.15	
2.5	1.25	300	38197	0.045	6910	0.10–0.20		275	35014	0.045	6340	0.10–0.20	
3	1.5	300	31831	0.054	6910	0.10–0.20		275	29178	0.054	6340	0.10–0.20	
4	2	300	23873	0.073	6990	0.13–0.25		275	21884	0.073	6400	0.13–0.25	
5	2.5	300	19099	0.093	7130	0.13–0.25		275	17507	0.093	6540	0.13–0.25	
6	3	300	15915	0.112	7130	0.15–0.30		275	14589	0.112	6540	0.15–0.30	
8	4	300	11937	0.154	7350	0.20–0.40		275	10942	0.154	6740	0.20–0.40	
10	5	300	9549	0.193	7350	0.20–0.40		275	8754	0.193	6740	0.20–0.40	
12	6	300	7958	0.219	6990	0.20–0.40		275	7295	0.219	6400	0.20–0.40	

<b>NOTE:</b>	Use a highly rigid and accurate machine as possible. If the rpm available is lower than recommended please reduce the feed rate by the same ratio.
	For finishing and precise tool definition in CAM systems, please download DXF data (QuickFinder) or contact your local MOLDINO Tool Process Optimizer for more details.
	Please set up ramping angle to less than 0.5°.
	Please set up hole diameter of interpolation cutting in the range of 0.5D to 0.8D for safety.
	For side milling please take V <sub>c</sub> & f <sub>z</sub> same with above standard cutting condition, and setup a <sub>p</sub> = 1.0–1.5xD, a <sub>e</sub> = 0.01–0.05xD.
	For Finishing please notice special Tip Geometry for D4–12mm. Please adjust your machining environment with perspective towards the given values of b and h.
	Use the appropriate coolant for the work material and machining shape. We recommend air blow as first choice for cooling system.
	These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and workpiece conditions.

## EHHBE-TH3 | Recommended Cutting Conditions

Application		<div><div></div><div></div><div>Roughing</div></div>																	
Workpiece Material		Hardened Steels (58–62 HRC)						Hardened Steels (63–66 HRC)						Hardened Steels (≥ 67 HRC)					
D	R	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm
1	0.5	130	41380	0.015	2500	0.052	0.18	130	41380	0.012	2030	0.050	0.13	100	31831	0.007	860	0.022	0.10
1.5	0.75	160	33953	0.021	2800	0.078	0.26	130	27587	0.017	1850	0.074	0.19	100	21221	0.009	780	0.033	0.15
2	1	160	25465	0.028	2800	0.104	0.35	130	20690	0.022	1850	0.099	0.25	100	15915	0.012	780	0.044	0.20
2.5	1.25	160	20372	0.032	2630	0.130	0.44	130	16552	0.026	1740	0.124	0.31	100	12732	0.014	730	0.055	0.25
3	1.5	160	16977	0.039	2630	0.156	0.53	130	13793	0.031	1740	0.149	0.38	100	10610	0.017	730	0.066	0.30
4	2	160	12732	0.052	2660	0.208	0.70	130	10345	0.042	1750	0.198	0.50	100	7958	0.023	740	0.088	0.40
5	2.5	160	10186	0.067	2720	0.260	0.88	130	8276	0.054	1790	0.248	0.63	100	6366	0.030	760	0.110	0.50
6	3	160	8488	0.080	2720	0.312	1.05	130	6897	0.065	1790	0.297	0.75	100	5305	0.036	760	0.132	0.60
8	4	160	6366	0.110	2800	0.416	1.40	130	5173	0.089	1850	0.396	1.00	100	3979	0.049	780	0.176	0.80
10	5	160	5093	0.138	2800	0.520	1.76	130	4138	0.112	1850	0.495	1.25	100	3183	0.061	780	0.220	1.00
12	6	160	4244	0.157	2660	0.624	2.11	130	3448	0.127	1750	0.594	1.50	100	2653	0.070	740	0.264	1.20

Application		 Semi Finishing																
Workpiece Material		Hardened Steels (58–62 HRC)					Hardened Steels (63–66 HRC)					Hardened Steels (≥ 67 HRC)						
D	R	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	Pitch mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	Pitch mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	Pitch mm		
1	0.5	130	41380	0.017	2750	0.05–0.10	130	41380	0.013	2230	0.05–0.10	130	41380	0.007	1120	0.05–0.10		
1.5	0.75	195	41380	0.023	3760	0.08–0.15	190	40319	0.018	2970	0.08–0.15	140	29709	0.009	1090	0.08–0.15		
2	1	215	34218	0.030	4140	0.08–0.15	190	30239	0.025	2970	0.08–0.15	140	22282	0.012	1090	0.08–0.15		
2.5	1.25	215	27375	0.036	3890	0.10–0.20	190	24192	0.029	2790	0.10–0.20	140	17825	0.014	1030	0.10–0.20		
3	1.5	215	22812	0.043	3890	0.10–0.20	190	20160	0.035	2790	0.10–0.20	140	14854	0.017	1030	0.10–0.20		
4	2	215	17109	0.057	3930	0.13–0.25	190	15120	0.047	2820	0.13–0.25	140	11141	0.023	1040	0.13–0.25		
5	2.5	215	13687	0.073	4020	0.13–0.25	190	12096	0.060	2880	0.13–0.25	140	8913	0.030	1060	0.13–0.25		
6	3	215	11406	0.088	4020	0.15–0.30	190	10080	0.071	2880	0.15–0.30	140	7427	0.036	1060	0.15–0.30		
8	4	215	8555	0.121	4140	0.20–0.40	190	7560	0.098	2970	0.20–0.40	140	5570	0.049	1090	0.20–0.40		
10	5	215	6844	0.151	4140	0.20–0.40	190	6048	0.123	2970	0.20–0.40	140	4456	0.061	1090	0.20–0.40		
12	6	215	5703	0.172	3930	0.20–0.40	190	5040	0.140	2820	0.20–0.40	140	3714	0.070	1040	0.20–0.40		


## EHHRE-TH3 | Recommended Cutting Conditions

Application		▽ Roughing											
Workpiece Material		Hardened Steels (45–51 HRC)						Hardened Steels (52–57 HRC)					
D	Z	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm
1	4	130	41380	0.041	6790	0.040	0.55	110	35014	0.034	4790	0.038	0.55
2		130	20690	0.082	6790	0.079	1.10	110	17507	0.068	4790	0.076	1.10
3		130	13793	0.129	7090	0.119	1.65	110	11671	0.107	5000	0.114	1.65
4	6	130	10345	0.173	10760	0.158	2.20	110	8754	0.144	7580	0.152	2.20
5		130	8276	0.221	10980	0.198	2.75	110	7003	0.184	7740	0.190	2.75
6		130	6897	0.265	10980	0.200	3.30	110	5836	0.221	7740	0.192	3.30
8		130	5173	0.365	11320	0.266	4.40	110	4377	0.304	7980	0.256	4.40
10		130	4138	0.456	11320	0.333	5.50	110	3501	0.380	7980	0.320	5.50
12		130	3448	0.520	10760	0.400	6.60	110	2918	0.433	7580	0.384	6.60

<b>NOTE:</b>	Use a highly rigid and accurate machine as possible. If the rpm available is lower than recommended, please reduce the feed rate by the same ratio.
	Please use CAM-R for your programming corner radius. For finishing and precise tool definition in CAM systems, please download DXF data (QuickFinder) or contact your local MOLDINO Tool Process Optimizer for more details.
	Please set up ramping angle to less than 0.5°.
	Use the appropriate coolant for the work material and machining shape. We recommend air blow as first choice for cooling system.
	These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and workpiece conditions.
	Use EHHRE with $a_e \leq 0.75 \times D$ . With increasing material hardness, please reduce $a_e$ limitation accordingly to prevent from unnecessary heat.



## EHHRE-TH3 | Recommended Cutting Conditions

Application																			
Workpiece Material		Hardened Steels (58–62 HRC)						Hardened Steels (63–66 HRC)						Hardened Steels (≥67 HRC)					
D	Z	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	V <sub>c</sub> m/min	n min <sup>-1</sup>	f <sub>z</sub> mm/t	V <sub>f</sub> mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm
1	4	80	25465	0.022	2230	0.022	0.55	55	17507	0.016	1120	0.018	0.55	40	12732	0.010	530	0.012	0.40
2		80	12732	0.043	2180	0.044	1.10	55	8754	0.032	1120	0.036	1.10	40	6366	0.022	560	0.025	0.80
3		80	8488	0.067	2290	0.066	1.65	55	5836	0.050	1170	0.054	1.65	40	4244	0.033	560	0.037	1.20
4	6	80	6366	0.090	3450	0.087	2.20	55	4377	0.068	1780	0.072	2.20	40	3183	0.046	870	0.049	1.60
5		80	5093	0.115	3510	0.109	2.75	55	3501	0.086	1810	0.090	2.75	40	2546	0.058	890	0.062	2.00
6		80	4244	0.139	3530	0.110	3.30	55	2918	0.104	1810	0.091	3.30	40	2122	0.069	880	0.062	2.40
8		80	3183	0.190	3630	0.147	4.40	55	2188	0.143	1870	0.122	4.40	40	1592	0.095	910	0.083	3.20
10		80	2546	0.238	3630	0.184	5.50	55	1751	0.178	1870	0.152	5.50	40	1273	0.119	910	0.104	4.00
12		80	2122	0.271	3450	0.221	6.60	55	1459	0.203	1780	0.182	6.60	40	1061	0.136	860	0.125	4.80

**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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