

Advanced
Engineering

Hitachi Tool

HITACHI
Inspire the Next

MINIATURE

Nano-PVD Coating
TH45+

No. 423

ETRP Epoch Turbo Rib Pencil Neck

Ø 1-3 mm **Deeper+Faster**

NEW

- 4-Flute Deep Cutting End Mill
- Diameters:
1.0 · 1.25 · 1.5 · 1.75
2.0 · 2.5 · 3.0 mm

CR:
0.2
0.3
0.5
0.8

Neck angle $\theta = 0.9^\circ$

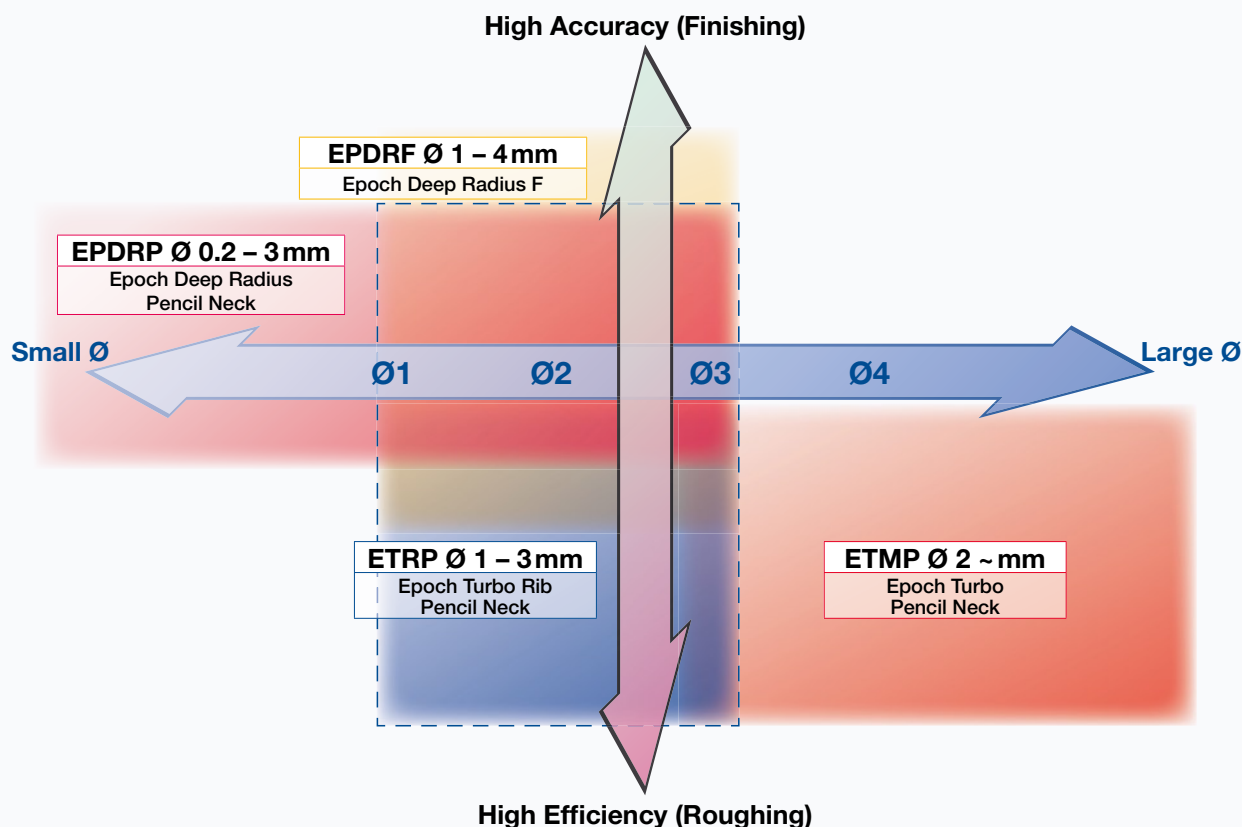
Carbide End Mills · Nano PVD Coated

Ø 1x50D



High Speed Deep Precision Machining

Positioning of small diameter deep cutting Corner R End mills



OVAL EFFECT

- The special oval shape with reduced diameter connects to end cutting flutes, vibrations are reduced when cutting corner or deep sections. This gives a higher level of cutting efficiency than previously achieved.
- Please be careful when measuring the tool to take the diameter of the main flute and not the diameter of the reduced slave flute.

POCH TURBO RIB AXIAL CROSS SECTION DIAGRAM

- Main flute (nominal diameter)
- Slave flute (reduced diameter)
- Clearance (free space between main- and slave flute)
- Cross-section is oval

DER OVAL-EFFEKT

- Durch die spezielle ovale Geometrie mit zwei im Durchmesser reduzierten Schneiden werden Vibrationen vermindert, speziell bei Bearbeitungen in Ecken / Umschlingungen und in tiefen Einsatzbereichen. Dies steigert die Effizienz Ihrer Fräsbearbeitungen auf ein vorher nicht erreichbares Niveau
- Bitte achten Sie bei der Werkzeugeinmessung darauf, dass der Nenndurchmesser gemessen wird und nicht der Durchmesser der reduzierten Schneiden

QUERSCHNITT DES EPOCH TURBO RIB

- Hauptschneide (Nenndurchmesser)
- Nebenschneide (Reduzierter Durchmesser)
- Differenzbereich (Freiraum zwischen Haupt- und Nebenschneide)
- Querschnitt (Ovale Form)

EFFETTO OVALE

- La speciale affilatura con riduzione di diametro su due taglienti, consente la diminuzione delle vibrazioni quando con il percorso utensile si arriva sugli spigoli e nelle lavorazioni in profondità. Questo porta ad avere un'efficienza in fresatura mai vista precedentemente.
- Occorre fare attenzione quando si misura il diametro della fresa, in quanto due denti formano un diametro mentre gli altri due sono scaricati.

SEZIONE ASSIALE DI UNA FRESE EPOCH TURBO RIB

- Tagliante principale (Diametro nominale)
- Tagliante secondario (Diametro scaricato)
- Scarico (Differenza tra diametro principale e secondario)
- La sezione risultante è ovale

EFECTO OVAL

- La especial geometría oval reduce las vibraciones tanto en las esquinas como en las zonas profundas. Esto permite conseguir un elevado nivel de eficiencia nunca antes logrado.
- Al medir el diámetro de la herramienta hay que tener la precaución de hacerlo en los labios principales y no en los secundarios.

DIAGRAMA DE LA SECCIÓN AXIAL.

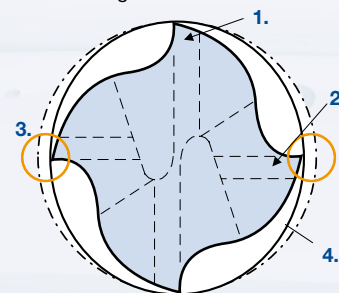
- Labios principales (Diámetro nominal)
- Labios secundarios (Diámetro reducido)
- Diferencial entre labios
- La sección es ovalada

EFFET DE L'OVALE

- La double forme ovale due au diamètre réduit des dents esclaves ajoutées aux rayons suppriment les vibrations lors d'usinage instables d'angles ou d'opération de fraisage profond, ceci permet d'être plus efficace que jamais.
- Faites attention en mesurant l'oscillation et le diamètre de l'outil.

DIAGRAMME AXIAL DE COUPE DE LA FRAISE EPOCH TURBO RIB

- Dent principale
- Dent esclave
- Dégagement
- La forme croisée ovale

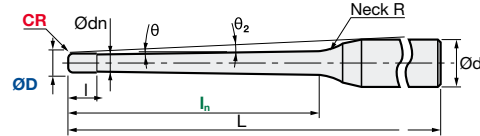
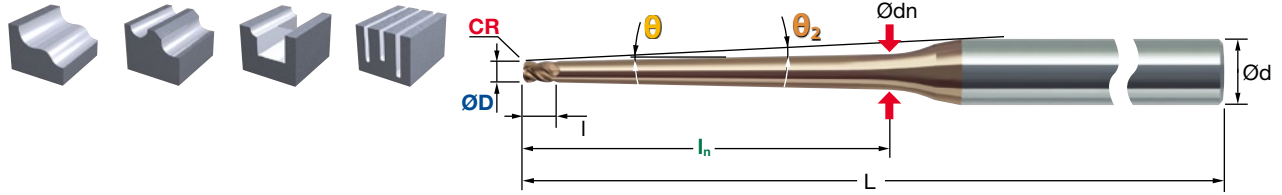


Recommended Cutting Conditions: p. 3 – 4

High Speed Deep Precision Machining

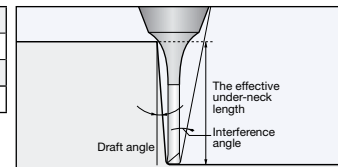
ETRP | Epoch Turbo Rib Pencil Neck

V max High Speed
Roughing
Semi-Finishing
Finishing
HRC 65
Rib. Miniature
No. of Teeth 4



Carbide Micro Grain
TH45+ Nano-PVD Coating
Rake Angle Negative

D	(0 / -0.02)
CR	± 0.01
ød	h5
Helix angle	45°



ID Code	Item Code	Z	Size										Actual Effective Length in Incline Angles				
			ØD	CR	l _n	l	dn	L	d	Neck R	θ°	θ ₂ °	0°	1°	1.5°	2°	3°
EP676	ETRP-4010-5-0902-TH	4	1	0.2	5	1	1.066	60	4	8.67	0.9°	2.91	5.70	5.96	6.17	6.51	
EP677	ETRP-4010-10-0902-TH				10	1.223	70	7	6.78	11.04			11.60	12.03	12.70		
EP678	ETRP-4010-15-0902-TH				15	1.380	70	7	5.57	16.35			17.25	17.89	18.89		
EP679	ETRP-4010-20-0902-TH				20	1.537	70	7	4.72	21.42			22.49	23.22	24.80		
EP680	ETRP-4010-25-0902-TH				25	1.694	80	10	4.10	26.49			27.70	28.52	30.95		
EP681	ETRP-4010-30-0902-TH				30	1.851	80	10	3.62	31.55			32.90	33.79	37.09		
EP682	ETRP-4010-35-0902-TH				35	2.008	80	10	3.24	36.61			38.08	39.03	43.24		
EP683	ETRP-4010-40-0902-TH				40	2.165	90	10	2.94	41.67			43.25	44.54	x		
EP684	ETRP-4010-45-0902-TH				45	2.322	90	10	2.68	46.73			48.41	50.08	x		
EP685	ETRP-4010-50-0902-TH				50	2.480	100	10	2.47	51.78			53.56	55.62	x		
EP686	ETRP-40125-10-0902-TH				1.25	0.2	10	1.455	60	7			6.62	11.10	11.65	12.06	12.73
EP687	ETRP-40125-20-0902-TH						20	1.769	70	7			4.57	21.49	22.52	23.25	24.86
EP688	ETRP-40125-30-0902-TH						30	2.083	80	10			3.49	31.61	32.93	33.81	37.15
EP689	ETRP-40125-40-0902-TH				1.5	0.3	40	2.397	90	10			2.82	41.73	43.28	44.59	x
EP690	ETRP-40125-50-0902-TH						50	2.712	100	10			2.37	51.83	53.59	55.67	x
EP691	ETRP-4015-10-0903-TH	10	1.687	60			7	6.47	11.15	11.67	12.08	12.74					
EP692	ETRP-4015-20-0903-TH	1.75	0.3	20	2.001	70	7	4.43	21.54	22.55	23.27	24.88					
EP693	ETRP-4015-30-0903-TH			30	2.315	80	10	3.36	31.66	32.95	33.83	37.17					
EP694	ETRP-4015-40-0903-TH			40	2.630	90	10	2.71	41.77	43.30	44.62	x					
EP695	ETRP-4015-50-0903-TH	1.75	0.3	50	2.944	100	6	2.27	51.88	53.60	55.70	x					
EP696	ETRP-40175-10-0903-TH			10	1.909	60	7	6.28	11.24	11.74	12.13	12.77					
EP697	ETRP-40175-20-0903-TH			20	2.223	70	7	4.26	21.64	22.61	23.32	24.97					
EP698	ETRP-40175-30-0903-TH	2	0.5	30	2.538	80	10	3.22	31.75	33.00	33.86	37.26					
EP699	ETRP-40175-40-0903-TH			40	2.852	90	10	2.59	41.86	43.34	44.70	x					
EP700	ETRP-40175-50-0903-TH			50	3.166	100	10	2.16	51.95	53.64	55.78	x					
EP701	ETRP-4020-20-0905-TH	2	0.5	20	2.486	70	7	4.12	21.29	22.10	22.67	24.86					
EP702	ETRP-4020-30-0905-TH			30	2.800	80	10	3.10	31.69	32.96	33.83	37.16					
EP703	ETRP-4020-40-0905-TH			40	3.114	90	10	2.48	41.80	43.31	44.63	x					
EP704	ETRP-4020-50-0905-TH	2.5	0.5	50	3.428	100	10	2.07	51.90	53.16	55.71	x					
EP705	ETRP-4020-60-0905-TH			60	3.742	110	7	1.77	62.00	63.89	x	x					
EP706	ETRP-4025-20-0905-TH			20	2.950	70	7	3.76	21.39	22.16	22.72	24.98					
EP707	ETRP-4025-30-0905-TH	2.5	0.5	30	3.264	80	7	2.79	31.80	33.02	33.88	x					
EP708	ETRP-4025-40-0905-TH			40	3.578	90	10	2.22	41.90	43.36	44.73	x					
EP709	ETRP-4025-50-0905-TH			50	3.892	100	10	1.85	52.00	53.66	x	x					
EP710	ETRP-4025-60-0905-TH	3	0.8	60	4.207	110	7	1.58	62.09	63.93	x	x					
EP711	ETRP-4030-20-0908-TH			20	3.394	70	7	3.39	21.50	22.22	22.76	25.05					
EP712	ETRP-4030-30-0908-TH			30	3.708	80	7	2.49	31.59	32.54	33.74	x					
EP713	ETRP-4030-40-0908-TH	3	0.8	40	4.022	90	7	1.96	42.03	43.42	x	x					
EP714	ETRP-4030-50-0908-TH			50	4.337	100	10	1.62	52.12	53.72	x	x					
EP715	ETRP-4030-60-0908-TH			60	4.651	110	10	1.37	62.20	x	x	x					

x = no contact

ETRP | Epoch Turbo Rib Pencil Neck | Recommended Cutting Conditions

Workpiece Material	I Copper							II Cast iron, Carbon steels, Alloy steels (150-250HB)					III Tool steels (25-35HRC)											
	ØD	CR	ln	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _r mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _r mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _r mm/min						
	Roughing	1	0.2	5	0.060	0.500	35,000	0.055	7,680	0.060	0.500	31,800	0.046	5,820	0.060	0.500	27,100	0.042	4,510					
10				0.030	0.030					24,400					0.030					4,060				
15				0.020	0.020					21,700					0.020					3,610				
1.25				0.2	0.625	20	0.015	31,500	0.055	6,910	0.015	0.625	28,700	0.060	5,240	0.015	0.625	18,900	0.056	3,160				
						25	0.012				0.012					20,300					0.012	3,380		
						30	0.010				0.010					18,900					0.010	3,160		
					1.5	0.3	0.750	35	0.009	28,000	0.072	5,760	0.009	0.750	25,500	0.078	5,960	0.009	0.750	16,200	0.072	4,660		
								40	0.008				0.008					20,300					0.008	3,380
								45	0.007				0.007					18,900					0.007	3,160
		1.75	0.3				0.875	50	0.006	26,300	0.093	6,140	0.006	0.875	21,200	0.097	6,620	0.006	0.875	13,500	0.090	5,560		
								10	0.047				0.047					16,600					0.047	4,290
								20	0.023				0.023					15,000					0.023	3,980
2				0.5			1.000	30	0.016	22,400	0.117	8,390	0.016	1.000	19,100	0.120	6,860	0.016	1.000	12,200	0.109	5,290		
								40	0.012				0.012					14,300					0.012	4,700
								50	0.009				0.009					13,100					0.009	4,410
					2.5	0.5	1.250	20	0.026	17,500	0.144	10,060	0.026	1.250	15,900	0.161	7,370	0.026	1.250	9,700	0.144	5,600		
								30	0.053				0.053					14,300					0.053	4,700
								40	0.045				0.045					13,100					0.045	4,410
	3	0.8	1.500				50	0.030	14,000	0.193	9,720	0.030	1.500	12,700	0.200	8,460	0.030	1.500	8,100	0.183	5,910			
							60	0.020				0.020					11,900					0.020	7,610	
							20	0.094				0.094					10,800					0.094	8,190	

Workpiece Material	I Copper							II Cast iron, Carbon steels, Alloy steels (150-250HB)					III Tool steels (25-35HRC)														
	ØD	CR	ln	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _r mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _r mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _r mm/min									
	Finishing	1	0.2	5	0.026	0.026 ~ 0.078	25,500	0.016	1,670	0.026	0.026 ~ 0.078	22,300	0.015	1,330	0.026	0.026 ~ 0.078	20,700	0.014	1,180								
10				0.013	0.013 ~ 0.039	22,900				0.013	1,500				0.013	0.013 ~ 0.039				18,600	0.013	1,060					
15				0.009	0.009 ~ 0.026	20,400				0.009	1,340				0.009	0.009 ~ 0.026				17,800	0.009	1,000					
1.25				0.2	0.625	20	0.007	0.007 ~ 0.020	19,100	0.022	1,250	0.007	0.007 ~ 0.020	16,700	0.021	1,200	0.007	0.007 ~ 0.020	15,500	0.020	1,060						
						25	0.005	0.005 ~ 0.016				17,800	0.005				1,090	0.005				0.005 ~ 0.016	14,500	0.005	940		
						30	0.004	0.004 ~ 0.013				17,800	0.004				1,250	0.004				0.004 ~ 0.013	13,400	0.004	890		
					1.5	0.3	0.750	35	0.004	0.004 ~ 0.011	17,800	0.029	1,170	0.004	0.004 ~ 0.011	15,600	0.027	1,470	0.004	0.004 ~ 0.011	14,500	0.026	1,310				
								40	0.003	0.003 ~ 0.010				16,600	0.003				1,090	0.003				0.003 ~ 0.010	13,500	0.003	940
								45	0.003	0.003 ~ 0.009				15,300	0.003				1,000	0.003				0.003 ~ 0.009	12,400	0.003	800
		1.75	0.3				0.875	50	0.003	0.003 ~ 0.008	12,700	0.037	840	0.003	0.003 ~ 0.008	11,100	0.035	1,790	0.003	0.003 ~ 0.008	10,400	0.034	1,440				
								10	0.016	0.016 ~ 0.049				20,400	0.016				1,800	0.016				0.016 ~ 0.049	17,800	0.016	1,590
								20	0.008	0.008 ~ 0.024				18,300	0.008				1,650	0.008				0.008 ~ 0.024	16,100	0.008	1,190
2				0.5			1.000	30	0.005	0.005 ~ 0.016	16,300	0.046	1,460	0.005	0.005 ~ 0.016	14,300	0.044	1,760	0.005	0.005 ~ 0.016	13,200	0.042	1,060				
								40	0.004	0.004 ~ 0.012				14,300	0.004				1,280	0.004				0.004 ~ 0.012	12,500	0.004	920
								50	0.003	0.003 ~ 0.010				13,200	0.003				1,190	0.003				0.003 ~ 0.010	11,600	0.003	860
					2.5	0.5	1.250	10	0.026	0.026 ~ 0.077	17,000	0.061	1,990	0.026	0.026 ~ 0.077	14,900	0.059	1,890	0.026	0.026 ~ 0.077	13,800	0.057	1,690				
								20	0.013	0.013 ~ 0.038				15,300	0.013				1,790	0.013				0.013 ~ 0.038	13,400	0.013	1,100
								30	0.009	0.009 ~ 0.026				12,700	0.009				1,490	0.009				0.009 ~ 0.026	11,100	0.009	1,020
	3	0.8	1.500				40	0.006	0.006 ~ 0.019	11,900	0.079	1,390	0.006	0.006 ~ 0.019	10,400	0.076	2,100	0.006	0.006 ~ 0.019	9,700	0.073	1,880					
							50	0.005	0.005 ~ 0.015				11,900	0.005				1,390	0.005				0.005 ~ 0.015	9,700	0.005	1,200	
							10	0.040	0.040 ~ 0.121				14,600	0.040				2,150	0.040				0.040 ~ 0.121	12,700	0.040	1,600	

PLEASE NOTE: All a_p -values are maximum, please do not exceed!

IV Pre-hardened steels (35-45HRC)					V Hardened steels (45-55HRC)					VI Hardened steels (55-65HRC)										
a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _f mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _f mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _f mm/min						
0.048	0.500	22,300	0.033	2,900	0.039	0.500	19,100	0.032	2,480	0.030	0.500	16,200	0.028	1,800						
0.024					0.020					0.010					0.008	0.006	0.004	0.003	0.002	0.001
0.016					0.013					0.010					0.008	0.006	0.004	0.003	0.002	0.001
0.012					0.010					0.008					0.006	0.004	0.003	0.002	0.001	0.000
0.010					0.008					0.006					0.004	0.003	0.002	0.001	0.000	0.000
0.008					0.007					0.006					0.004	0.003	0.002	0.001	0.000	0.000
0.007					0.006					0.005					0.004	0.003	0.002	0.001	0.000	0.000
0.006					0.005					0.004					0.003	0.002	0.001	0.000	0.000	0.000
0.005					0.004					0.003					0.002	0.001	0.000	0.000	0.000	0.000
0.005					0.003					0.002					0.001	0.000	0.000	0.000	0.000	0.000
0.038	0.625	17,800	0.044	3,120	0.030	0.625	15,300	0.044	2,680	0.023	0.625	13,000	0.037	1,900						
0.019					0.015					0.012					0.008	0.006	0.004	0.003	0.002	0.001
0.013					0.010					0.008					0.006	0.004	0.003	0.002	0.001	0.000
0.009					0.007					0.006					0.004	0.003	0.002	0.001	0.000	0.000
0.008					0.006					0.005					0.004	0.003	0.002	0.001	0.000	0.000
0.007					0.006					0.005					0.004	0.003	0.002	0.001	0.000	0.000
0.006					0.005					0.004					0.003	0.002	0.001	0.000	0.000	0.000
0.005					0.004					0.003					0.002	0.001	0.000	0.000	0.000	0.000
0.005					0.003					0.002					0.001	0.000	0.000	0.000	0.000	0.000
0.005					0.002					0.001					0.000	0.000	0.000	0.000	0.000	0.000
0.027	0.750	13,400	0.056	3,020	0.022	0.750	11,400	0.056	2,570	0.017	0.750	9,700	0.046	1,800						
0.018					0.015					0.011					0.007	0.005	0.003	0.002	0.001	
0.014					0.011					0.009					0.007	0.005	0.003	0.002	0.001	
0.011					0.009					0.007					0.005	0.003	0.002	0.001	0.000	
0.007					0.006					0.005					0.004	0.003	0.002	0.001	0.000	
0.007					0.005					0.004					0.003	0.002	0.001	0.000	0.000	
0.006					0.005					0.004					0.003	0.002	0.001	0.000	0.000	
0.005					0.004					0.003					0.002	0.001	0.000	0.000	0.000	
0.005					0.003					0.002					0.001	0.000	0.000	0.000	0.000	
0.005					0.002					0.001					0.000	0.000	0.000	0.000	0.000	
0.074	0.875	12,700	0.070	3,560	0.060	0.875	10,900	0.070	3,050	0.046	0.875	9,300	0.055	2,050						
0.037					0.030					0.023					0.015	0.011	0.009	0.007	0.005	
0.025					0.020					0.015					0.011	0.008	0.006	0.004	0.003	
0.018					0.015					0.012					0.009	0.007	0.005	0.003	0.002	
0.015					0.012					0.009					0.007	0.005	0.003	0.002	0.001	
0.015					0.011					0.009					0.007	0.005	0.003	0.002	0.001	
0.015					0.010					0.008					0.006	0.004	0.003	0.002	0.001	
0.015					0.009					0.007					0.005	0.003	0.002	0.001	0.000	
0.015					0.008					0.006					0.004	0.003	0.002	0.001	0.000	
0.015					0.007					0.005					0.003	0.002	0.001	0.000	0.000	
0.052	1.000	11,100	0.085	3,770	0.042	1.000	9,500	0.085	3,230	0.033	1.000	8,100	0.060	1,950						
0.042					0.034					0.027					0.023	0.015	0.011	0.009	0.007	
0.036					0.029					0.023					0.015	0.011	0.009	0.007	0.005	
0.024					0.020					0.015					0.011	0.008	0.006	0.004	0.003	
0.016					0.013					0.010					0.007	0.005	0.003	0.002	0.001	
0.016					0.012					0.009					0.007	0.005	0.003	0.002	0.001	
0.016					0.011					0.008					0.006	0.004	0.003	0.002	0.001	
0.016					0.010					0.007					0.005	0.003	0.002	0.001	0.000	
0.016					0.009					0.007					0.005	0.003	0.002	0.001	0.000	
0.016					0.008					0.006					0.004	0.003	0.002	0.001	0.000	
0.075	1.250	8,900	0.113	4,010	0.061	1.250	7,600	0.113	3,420	0.047	1.250	6,500	0.067	1,580						
0.050					0.041					0.031					0.023	0.019	0.016	0.011	0.009	
0.038					0.030					0.023					0.015	0.011	0.009	0.007	0.005	
0.030					0.024					0.019					0.014	0.010	0.008	0.006	0.004	
0.025					0.020					0.016					0.012	0.009	0.007	0.005	0.003	
0.018					0.014					0.011					0.008	0.006	0.004	0.003	0.002	
0.018					0.013					0.010					0.007	0.005	0.003	0.002	0.001	
0.018					0.012					0.009					0.007	0.005	0.003	0.002	0.001	
0.018					0.011					0.008					0.006	0.004	0.003	0.002	0.001	
0.018					0.010					0.007					0.005	0.003	0.002	0.001	0.000	
0.108	1.500	7,400	0.143	4,220	0.088	1.500	6,400	0.143	3,650	0.068	1.500	5,400	0.072	1,550						
0.080					0.065					0.050					0.034	0.027	0.023	0.015	0.011	
0.054					0.044					0.034					0.027	0.023	0.015	0.011	0.009	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.043					0.035					0.027					0.023	0.015	0.011	0.009	0.007	
0.036	1.500	6,700	0.143	3,800	0.044	1.500	5,800	0.143	3,290	0.034	1.500	4,900	0.072	1,400						
0.036					0.029					0.023					0.015	0.011	0.009	0.007	0.005	

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



Modification if too high:
• Keep f_z stable
• Reduce rpm to set best result on non-HQ machines

IV Pre-hardened steels (35-45HRC)					V Hardened steels (45-55HRC)					VI Hardened steels (55-65HRC)									
a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _f mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _f mm/min	a _p mm	a _e mm	n min ⁻¹	f _z (mm/t)	V _f mm/min					
0.020	0.020 ~ 0.059	19,100	0.015	1,130	0.018	0.018 ~ 0.055	17,500	0.013	920	0.016	0.016 ~ 0.047	14,300	0.012	690					
0.010					0.009					0.008					0.005	0.004	0.003	0.002	0.001
0.007					0.006					0.005					0.004	0.003	0.002	0.001	0.000
0.005					0.005					0.004					0.003	0.002	0.001	0.000	0.000
0.004					0.004					0.003					0.002	0.001	0.000	0.000	0.000
0.003					0.003					0.002					0.001	0.000	0.000	0.000	0.000
0.003					0.003					0.002					0.001	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.012	0.012 ~ 0.037	15,300	0.020	1,250	0.011	0.011 ~ 0.034	14,000	0.018	1,020	0.010	0.010 ~ 0.029	11,500	0.017	760					
0.006					0.006					0.005					0.004	0.003	0.002	0.001	0.000
0.004					0.004					0.003					0.002	0.001	0.000	0.000	0.000
0.003					0.003					0.002					0.001	0.000	0.000	0.000	0.000
0.003					0.003					0.002					0.001	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.012	0.012 ~ 0.037	13,800	0.020	1,130	0.006	0.006 ~ 0.017	12,600	0.024	1,000	0.005	0.005 ~ 0.015	10,300	0.021	740					
0.004					0.004					0.003					0.002	0.001	0.000	0.000	0.000
0.003					0.003					0.002					0.001	0.000	0.000	0.000	0.000
0.003					0.003					0.002					0.001	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.002					0.002					0.001					0.000	0.000	0.000	0.000	0.000
0.00																			

Product Range

Solid Carbide End Mills



Indexable Milling Tools



ESM Speed End Mills
EMC Power Drills



Milling Chucks



• 4-Flute Deep Cutting End Mill
• Diameters:
1.0 · 1.25 · 1.5 · 1.75
2.0 · 2.5 · 3.0 mm

CR:
0.2
0.3
0.5
0.8

Neck angle $\theta = 0.5^\circ$

