

NEW

Corner radius end mill for high-efficient machining

ETM(LN/P)-TH ***ETR(P)-TH***

Epoch Turbo Series, Epoch Turbo Mill & Epoch Turbo Rib

Addition of 35 free-neck type products
Enables cutting in deeper area!



MOLDINO Tool Engineering, Ltd.

New Product News | No.0801E-18 | 2026-2

Features of ETM(LN/P)-TH, ETR(P)-TH

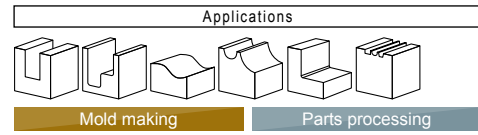
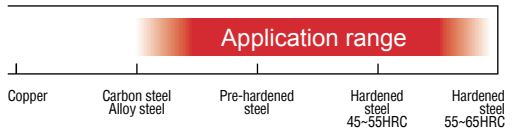
Corner radius end mill for high-efficient machining responds to demands for shortening mold delivery times.



Faster Flute shape of Turbo Mills has proven results for high-efficient machining.

Deeper Neck shape of Deep Series has proven results for small-diameter deep machining.

Strong support for electrodischargeless direct machining!

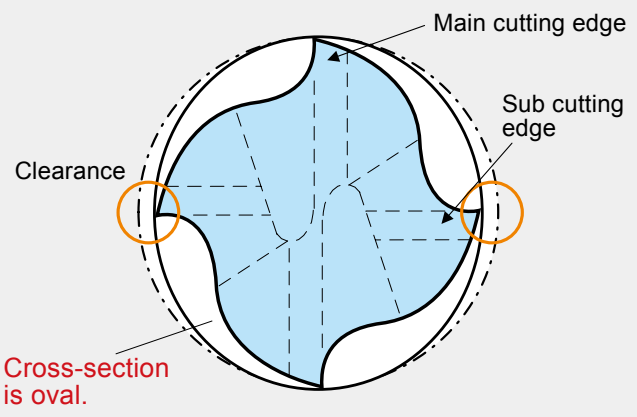


ETR-TH	φ1~φ3	[44 Items]
ETRP-TH	φ1~φ3	[49 Items]
ETM-TH	φ2~φ20	[10 Items]
ETMLN-TH	φ4~φ16	[16 Items]
ETMP-TH	φ1~φ16	[60 Items]

Features 01 Oval effect

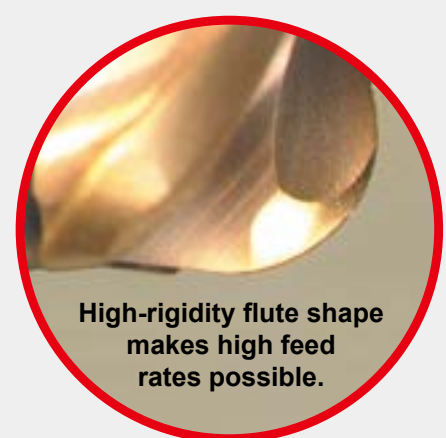
The flute cross-section is the oval shape with results proven by EPOCH Turbo Mills. It suppresses vibrations, particularly when machining corner areas, so that stable high-efficient cutting can be performed.

Reliable oval shape



Features 02 High-rigidity flute shape

The corner R flute shape used is the same chipping-resistant high-rigidity flute type by Epoch Turbo Mills. Because of this, machining with high per-flute feed amounts is possible and high-efficient machining can be achieved.



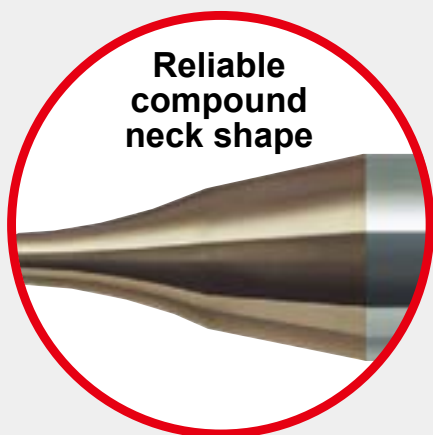
Features

03

Compound neck shape

*Applies to Epoch Turbo Rib (ETR)

The compound neck shape with results proven by the EPOCH Deep Series is used. Breakage resistance is improved even for end mills with long below-neck lengths, so that stable deep machining can be performed.



Features

04

ATH Coating



Features and characteristics

- Hardness and oxidation resistance of TH Coating is further improved. Enables longer life and higher efficient when cutting high-hardness materials. (Si nano composite coating with finer crystal particles)
- Exhibits amazing performance when cutting high-hardness materials (55HRC or higher) Cold-worked die steel, HSS, tool steel.
- Long life for both dry cutting and wet cutting



Line up Index (Tool dia. DC/Under neck length: LH)

Under neck length LH (mm)	Tool dia. DC (mm)													
	1	1.25	1.5	1.75	2	2.5	3	4	5	6	8	10	12	16
5 ≤ LH < 10	●■	●	●		●		●							
10 ≤ LH < 15	●■	●■	●■	●■	●■	●	●	●						
15 ≤ LH < 20	●■	●■	●■	■	●■		■		●					
20 ≤ LH < 25	●■	●■	●■	●■	●■	●■	●■	●■						
25 ≤ LH < 30	●■	●	●		●■			●						
30 ≤ LH < 35	●■	●■	●■	●■	●■	●■	●■	■	■	●				
35 ≤ LH < 40	■				●■	■								
40 ≤ LH < 45	■	■	■	●■	●■	●■	●■	■	■	●■	●			
45 ≤ LH < 50	■■		■		■									
50 ≤ LH < 60	■■	■	■■	■	■	●■	●■		■	●■	●■	●		
60 ≤ LH < 70	■				■■	■	■■	■	■	■			●	
70 ≤ LH < 80						■	■				●■	●■		
80 ≤ LH < 90			■		■			■		■			●■	●
90 ≤ LH < 100							■		■		■	●■		
100 ≤ LH < 110						■	■		■				●■	■
110 ≤ LH < 120						■						■		
120 ≤ LH < 130								■		■	■			●
140 ≤ LH < 150														■

● is Turbo Rib (Straight):P14 ■ is Turbo Rib (Pencil):P15 ● is Turbo Mill (Straight):P10 ■ is Turbo Mill (Pencil):P6
 ■ is Turbo Mill (Free-neck):P6

Features of free-neck type

Exceeds the depth limits involved with solid end mill cutting.

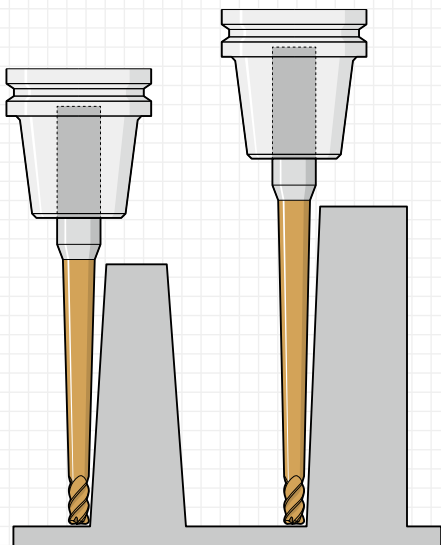
Supports deep milling on all kinds of large die cast molds, casting molds, and plastic molds. Product lineup includes a range of neck tapers and tool diameters for that **“extra little bit of projection.”**

Free-neck type radius end mill enables rough machining of deep areas with L/D ratios of 30 or 40, which was previously difficult to achieve by cutting.



Adjustable projection length to allow tool tips to reach machining areas

Suitable for use across a range of depths, simplifying tool selection



Tool change required for specific depth

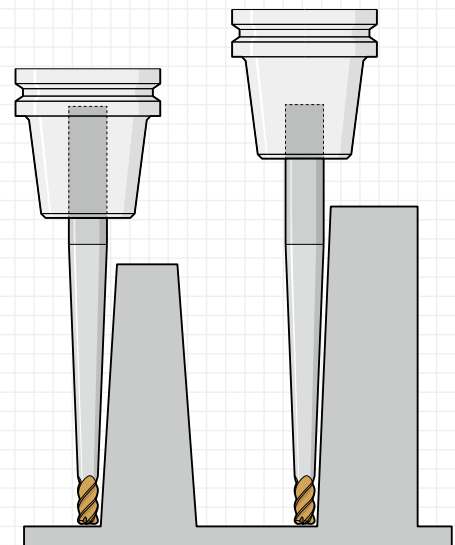
Point!

Gripped lengths can be adjusted to suit different depths.



Point!

Absence of step at the neck minimizes risk of interference at side faces.



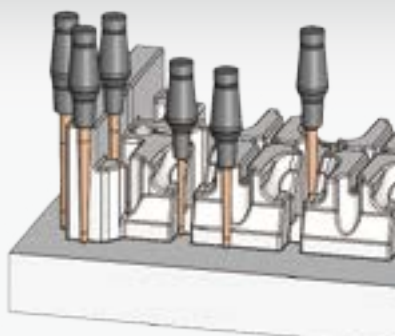
Only one free-neck tool needed!

Die-casting machining example

Cylinder head

[Example of tools]

- ETMP4100-73-20-170-TH (DC10)
- ETMP4080-70-20-150-TH (DC8)
- ETMP4060-86-1515-TH (DC6)
- ETMP4060-67-15-150-TH (DC5)
- ETMP4040-83-1510-TH (DC4)
- ETMP4040-64-10-TH (DC4)



Ball type EPDBPE-ATH is effective for finishing the bottom R.



Examples of Machining with Free-neck Type

Example of large die cast mold

The free neck type can reach areas such as L/D 30 and 40, which were difficult to cut with conventional tools.

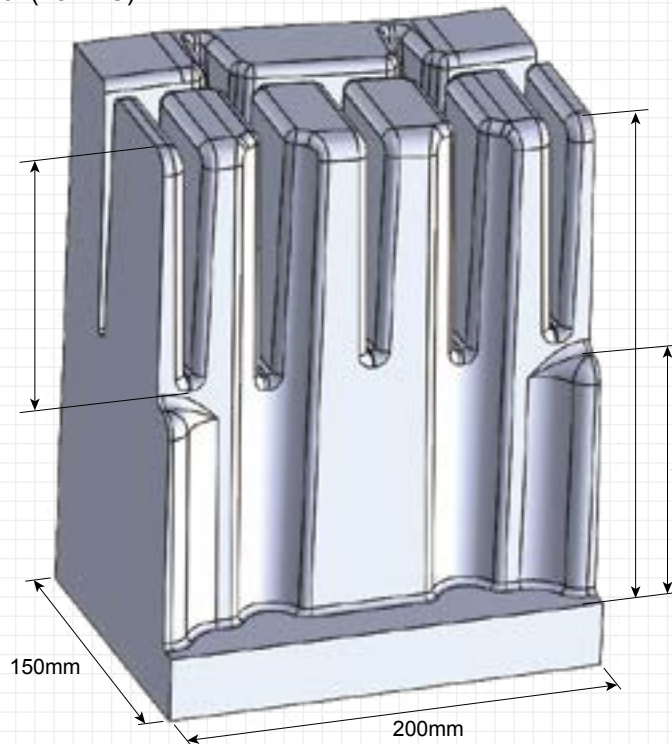
In addition, the radius end mill allows for highly efficient rough machining.

Work material :SKD61(43HRC)
Incline angle : 1.5°

[Rib slot part]
Depth : 120mm

[Overview]
Depth : 230mm

ETMP free-neck type could be available for areas with a depth of approximately 120mm.



For areas with a depth exceeding 120mm, a carbide shank (free-neck type) for modular mills is effective.



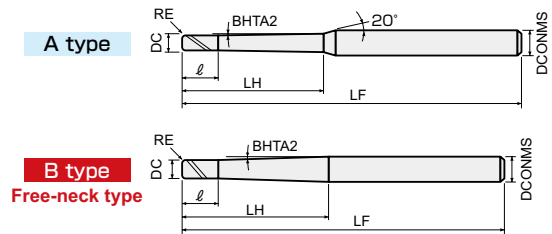
Process : Contour roughing

Tool	Neck shape	Process	Tool dia. (mm)	Projection (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	ap (mm)	ae (mm)	Machining allowance (mm)	Cutting time (h:m)	No. of tools
TR2F2020M-3 BPNW0603ER-05 (JP4120) ASC25T-10.5-300-150Z-09	Straight	Heavy roughing	20	120	1900	4500	0.4	10	0.2	1:40	1
ETM4120-20-TH	Straight	Roughing	12	73	1700	2000	0.2	6	0.35	1:40	1
ETMP4080-70-20-150-TH	Free-neck	Roughing	8	73	2000	3200	0.14	4	0.35	2:28	2
ETMP4060-86-1515-TH	Free-neck	Roughing	6	73	2700	3200	0.1	3	0.35	1:37	1
ETMP4040-83-1510-TH	Free-neck	Roughing	4	73	4000	2400	0.03	2	0.35	1:53	1
ETMP4040-83-1510-TH	Free-neck	Finishing	4	73	4000	2400	0.25	-	0.05	2:33	1
ETMP4060-86-1515-TH	Free-neck	Roughing	6	98	2700	2600	0.05	3	0.35	4:43	2
ETMP4040-83-1510-TH	Free-neck	Roughing	4	98	4000	2600	0.02	2	0.35	6:22	2
ETMP4040-83-1510-TH	Free-neck	Finishing	4	98	4000	2400	0.25	-	0.05	1:33	1
ETMP4040-121-1510-TH	Free-neck	Roughing	4	123	4000	2200	0.015	2	0.35	16:13	4
ETMP4030-101-1508-TH	Free-neck	Roughing	3	123	4300	1500	0.01	1.5	0.35	5:50	2
ETMP4040-121-1510-TH	Free-neck	Finishing	4	123	4000	2400	0.25	-	0.05	1:33	1

Total cutting time : 48 hr. 25 min.

Line Up, Epoch Turbo Mill

Pencil neck type



ETMP4○○○-○○○-○○○○-TH



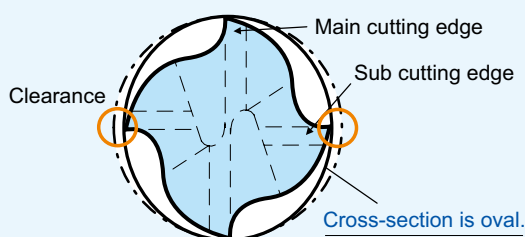
Item code	Stock	Size(mm)							Shape
		Tool dia.	Corner radius	Under neck length	Flute length	Neck angle	Overall length	Shank dia.	
		DC	RE	LH	ℓ	BHTA2	LF	DCONMS	
ETMP4010-59-1502-TH	★	1	0.2	59	1	1.5°	120	4	B
ETMP4010-49-3002-TH	★			49	1	3.0°	100	6	B
ETMP4010-68-3002-TH	★			68	1	3.0°	150	8	B
ETMP4015-50-1503-TH	★	1.5	0.3	50	1.5	1.5°	110	4	B
ETMP4015-45-3003-TH	★			45	1.5	3.0°	100	6	B
ETMP4015-83-3003-TH	★			83	1.5	3.0°	150	10	B
ETMP4020-12-05-TH	●	2	0.5	12	3	1°	70	6	A
ETMP4020-16-05-TH	●			16	3	1°	70	6	A
ETMP4020-20-05-TH	●			20	3	1°	70	6	A
ETMP4020-61-05-TH	★			61	3	1°	120	4	B
ETMP4020-42-1505-TH	★			42	3	1.5°	100	4	B
ETMP4020-42-3005-TH	★			42	3	3.0°	100	6	B
ETMP4020-80-3005-TH	★			80	3	3.0°	150	10	B
ETMP4025-105-05-TH	★			2.5	0.5	105	3.75	1°	150
ETMP4025-71-1505-TH	★	71	3.75			1.5°	130	6	B
ETMP4025-110-1505-TH	★	110	3.75			1.5°	170	8	B
ETMP4025-38-3005-TH	★	38	3.75			3.0°	100	6	B
ETMP4025-76-3005-TH	★	76	3.75			3.0°	150	10	B
ETMP4030-18-08-TH	●	3	0.8	18	4.5	1°	80	6	A
ETMP4030-24-08-TH	●			24	4.5	1°	80	6	A
ETMP4030-30-08-TH	●			30	4.5	1°	80	6	A
ETMP4030-92-08-TH	★			92	4.5	1°	150	6	B
ETMP4030-63-1508-TH	★			63	4.5	1.5°	130	6	B
ETMP4030-101-1508-TH	★			101	4.5	1.5°	170	8	B
ETMP4030-34-3008-TH	★			34	4.5	3.0°	100	6	B
ETMP4030-72-3008-TH	★			72	4.5	3.0°	150	10	B
ETMP4040-24-10-TH	●	4	1	24	6	1°	90	6	A
ETMP4040-32-10-TH	●			32	6	1°	90	6	A
ETMP4040-40-10-TH	●			40	6	1°	90	6	A
ETMP4040-64-10-TH	★			64	6	1°	130	6	B
ETMP4040-122-10-TH	★			122	6	1°	170	8	B
ETMP4040-83-1510-TH	★			83	6	1.5°	140	8	B
ETMP4040-121-1510-TH	★			121	6	1.5°	170	10	B
ETMP4040-83-3010-TH	★			83	6	3.0°	150	12	B

★ : Stocked items of new products. ● : Stocked items.

ETMP4○○○-○○○-○○-TH

Item code	Stock	Size(mm)							Shape
		Tool dia.	Corner radius	Under neck length	Flute length	Neck angle	Overall length	Shank dia.	
		DC	RE	LH	ℓ	BHTA2	LF	DCONMS	
ETMP4050-30-12-TH	●	5	1.2	30	7.5	1°	90	6	A
ETMP4050-40-12-TH	●			40	7.5	1°	100	8	A
ETMP4050-50-12-TH	●			50	7.5	1°	110	8	A
ETMP4050-95-12-TH	★			95	7.5	1°	150	8	B
ETMP4050-66-1512-TH	★			66	7.5	1.5°	130	8	B
ETMP4050-104-1512-TH	★			104	7.5	1.5°	170	10	B
ETMP4060-40-15-TH	●	6	1.5	40	9	1°	100	8	A
ETMP4060-55-15-TH	●			55	9	1°	110	8	A
ETMP4060-67-15-TH	●			67	9	1°	125	8	B
ETMP4060-67-15-150-TH	★			67	9	1°	150	8	B
ETMP4060-125-15-TH	★			125	9	1°	170	10	B
ETMP4060-86-1515-TH	★			86	9	1.5°	140	10	B
ETMP4060-124-1515-TH	★	124	9	1.5°	170	12	B		
ETMP4080-55-20-TH	●	8	2	55	12	1°	110	10	A
ETMP4080-70-20-TH	●			70	12	1°	130	10	B
ETMP4080-70-20-150-TH	★			70	12	1°	150	10	B
ETMP4080-90-20-TH	●			90	12	1°	145	12	A
ETMP4080-128-20-TH	★			128	12	1°	170	12	B
ETMP4100-73-20-TH	●	10	2	73	15	1°	135	12	B
ETMP4100-73-20-170-TH	★			73	15	1°	170	12	B
ETMP4100-95-20-TH	●			95	15	1°	150	16	A
ETMP4100-115-20-TH	●			115	15	1°	170	16	A
ETMP4120-80-20-TH	●	12	2	80	18	1°	135	16	A
ETMP4120-105-20-TH	●			105	18	1°	160	16	A
ETMP4160-105-30-TH	●	16	3	105	24	1°	160	20	A
ETMP4160-140-30-TH	●			140	24	1°	200	20	B


Attention



Be careful when measuring the tool diameter or runout of tools as the cutting edge cross section is oval shaped.

The tool is designed with a smaller outer diameter connected to end sub cutting edge. When measuring tool diameter or run out, measure the main cutting edge.

Re-grinding compatibility range table

Item code	Product name	Shape	Re-grinding compatibility range (mm)	
			Outer dia.	End
ETMP-TH	Epoch Turbo Mill -Pencil neck type		X (N/A)	2~16

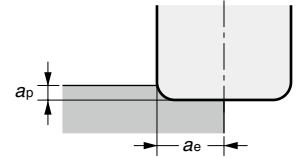
[Note]

Contact our sales office regarding whether or not regrinding is possible for tools where L/D(under neck length / tool diameter) more than 10DC

Recommended Cutting Condition, Epoch Turbo Mill

ETMP

Pencil neck type



Item code	Size (mm)			Cast irons Carbon steels, Alloy steels (150~250HB) FC S50C				Alloy steels Tool steels (25~35HRC) SCM SKD				Pre-hardened steels Hardened steels (35~45HRC) NAK80 CENA1 SKD61			
	Tool dia.	Under neck length	Neck angle	Revolution n min ⁻¹	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min ⁻¹	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min ⁻¹	Feed rate v_f mm/min	a_p mm	a_e mm
	DC	LH	BHTA2												
ETMP4010-59-1502-TH	1	59	1.5°	11,900	830	0.004	0.4	10,500	520	0.004	0.4	8,000	400	0.001	0.4
ETMP4010-49-3002-TH		49	3.0°	11,900	2,500	0.036	0.4	10,500	1,580	0.036	0.4	8,000	1,200	0.025	0.4
ETMP4010-68-3002-TH		68	3.0°	11,900	2,500	0.032	0.4	10,500	1,580	0.032	0.4	8,000	1,200	0.022	0.4
ETMP4015-50-1503-TH	1.5	50	1.5°	9,500	2,130	0.019	0.45	8,400	1,340	0.019	0.45	6,400	1,020	0.009	0.45
ETMP4015-45-3003-TH		45	3.0°	11,100	3,730	0.076	0.45	9,800	2,350	0.076	0.45	7,400	1,780	0.053	0.45
ETMP4015-83-3003-TH		83	3.0°	8,000	2,690	0.056	0.45	7,000	1,680	0.056	0.45	5,300	1,270	0.039	0.45
ETMP4020-12-05-TH	2	12	1°	11,900	5,380	0.135	0.5	10,500	3,200	0.135	0.5	8,000	2,560	0.095	0.5
ETMP4020-16-05-TH		16	1°	11,900	5,380	0.115	0.5	10,500	3,200	0.115	0.5	8,000	2,560	0.081	0.5
ETMP4020-20-05-TH		20	1°	11,900	5,380	0.075	0.5	10,500	3,200	0.075	0.5	8,000	2,560	0.053	0.5
ETMP4020-61-05-TH		61	1°	7,200	1,630	0.005	0.5	6,300	960	0.005	0.5	4,800	770	0.002	0.5
ETMP4020-42-1505-TH		42	1.5°	8,400	3,800	0.032	0.5	7,400	2,260	0.032	0.5	5,600	1,790	0.022	0.5
ETMP4020-42-3005-TH		42	3.0°	8,400	3,800	0.096	0.5	7,400	2,260	0.096	0.5	5,600	1,790	0.067	0.5
ETMP4020-80-3005-TH		80	3.0°	7,200	3,250	0.063	0.5	6,300	2,840	0.063	0.5	4,800	1,540	0.044	0.5
ETMP4025-105-05-TH	2.5	105	1°	5,700	1,800	0.009	0.75	5,000	1,130	0.009	0.75	3,800	860	0.003	0.75
ETMP4025-71-1505-TH		71	1.5°	6,700	4,220	0.043	0.75	5,900	2,660	0.043	0.75	4,500	2,030	0.030	0.75
ETMP4025-110-1505-TH		110	1.5°	4,800	2,010	0.040	0.75	4,200	1,260	0.040	0.75	3,200	960	0.018	0.75
ETMP4025-38-3005-TH		38	3.0°	9,500	5,990	0.132	0.75	8,400	3,780	0.132	0.75	6,400	2,880	0.092	0.75
ETMP4025-76-3005-TH		76	3.0°	5,700	3,590	0.075	0.75	5,000	2,250	0.075	0.75	3,800	1,710	0.052	0.75
ETMP4030-18-08-TH	3	18	1°	8,000	6,050	0.216	0.7	7,000	3,730	0.216	0.7	5,300	2,860	0.151	0.7
ETMP4030-24-08-TH		24	1°	8,000	6,050	0.184	0.7	7,000	3,730	0.184	0.7	5,300	2,860	0.129	0.7
ETMP4030-30-08-TH		30	1°	8,000	6,050	0.120	0.7	7,000	3,730	0.120	0.7	5,300	2,860	0.084	0.7
ETMP4030-92-08-TH		92	1°	4,800	2,420	0.011	0.7	4,200	1,490	0.011	0.7	3,200	1,150	0.005	0.7
ETMP4030-63-1508-TH		63	1.5°	5,600	4,230	0.050	0.7	4,900	2,610	0.050	0.7	3,700	2,000	0.035	0.7
ETMP4030-101-1508-TH		101	1.5°	4,800	3,630	0.028	0.7	4,200	2,240	0.028	0.7	3,200	1,730	0.020	0.7
ETMP4030-34-3008-TH		34	3.0°	8,000	6,050	0.290	0.7	7,000	3,730	0.290	0.7	5,300	2,860	0.203	0.7
ETMP4030-72-3008-TH		72	3.0°	5,600	4,230	0.136	0.7	4,900	2,610	0.136	0.7	3,700	2,000	0.095	0.7
ETMP4040-24-10-TH	4	24	1°	6,000	6,380	0.270	1	5,300	3,950	0.270	1	4,000	3,040	0.189	1
ETMP4040-32-10-TH		32	1°	6,000	6,380	0.230	1	5,300	3,950	0.230	1	4,000	3,040	0.161	1
ETMP4040-40-10-TH		40	1°	6,000	6,380	0.150	1	5,300	3,950	0.150	1	4,000	3,040	0.105	1
ETMP4040-64-10-TH		64	1°	4,800	5,110	0.059	1	4,200	3,130	0.059	1	3,200	2,430	0.041	1
ETMP4040-122-10-TH		122	1°	4,200	2,980	0.013	1	3,700	1,840	0.013	1	2,800	1,420	0.006	1
ETMP4040-83-1510-TH		83	1.5°	4,200	4,470	0.062	1	3,700	2,760	0.062	1	2,800	2,130	0.043	1
ETMP4040-121-1510-TH		121	1.5°	4,200	4,470	0.038	1	3,700	2,760	0.038	1	2,800	2,130	0.027	1
ETMP4040-83-3010-TH		83	3.0°	4,200	4,470	0.190	1	3,700	2,760	0.190	1	2,800	2,130	0.133	1

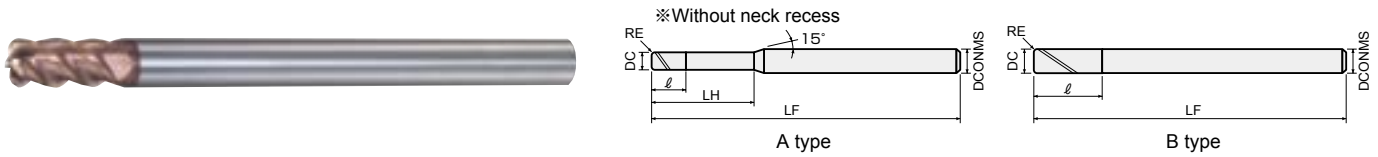
Item code	Size (mm)			Cast irons Carbon steels, Alloy steels (150~250HB) FC S50C				Alloy steels Tool steels (25~35HRC) SCM SKD				Pre-hardened steels Hardened steels (35~45HRC) NAK80 CENA1 SKD61			
	Tool dia.	Under neck length	Neck angle	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm
	DC	LH	BHTA2												
ETMP4050-30-12-TH	5	30	1°	4,800	6,370	0.324	1.3	4,200	3,900	0.324	1.3	3,200	3,040	0.227	1.3
ETMP4050-40-12-TH		40	1°	4,800	6,370	0.276	1.3	4,200	3,900	0.276	1.3	3,200	3,040	0.193	1.3
ETMP4050-50-12-TH		50	1°	4,800	6,370	0.180	1.3	4,200	3,900	0.180	1.3	3,200	3,040	0.126	1.3
ETMP4050-95-12-TH		95	1°	3,800	5,050	0.052	1.3	3,400	3,160	0.052	1.3	2,500	2,380	0.037	1.3
ETMP4050-66-1512-TH		66	1.5°	4,800	6,370	0.153	1.3	4,200	3,900	0.153	1.3	3,200	3,040	0.107	1.3
ETMP4050-104-1512-TH		104	1.5°	3,300	4,380	0.074	1.3	2,900	2,690	0.074	1.3	2,200	2,090	0.052	1.3
ETMP4060-40-15-TH	6	40	1°	4,000	6,720	0.375	1.5	3,500	4,080	0.375	1.5	2,700	3,240	0.263	1.5
ETMP4060-55-15-TH		55	1°	4,000	6,720	0.285	1.5	3,500	4,080	0.285	1.5	2,700	3,240	0.200	1.5
ETMP4060-67-15-TH		67	1°	4,000	6,720	0.188	1.5	3,500	4,080	0.188	1.5	2,700	3,240	0.132	1.5
ETMP4060-67-15-150-TH		67	1°	4,000	6,720	0.186	1.5	3,500	4,080	0.186	1.5	2,700	3,240	0.130	1.5
ETMP4060-125-15-TH		125	1°	2,800	4,700	0.055	1.5	2,500	2,910	0.055	1.5	1,900	2,280	0.039	1.5
ETMP4060-86-1515-TH		86	1.5°	4,000	6,720	0.165	1.5	3,500	4,080	0.165	1.5	2,700	3,240	0.115	1.5
ETMP4060-124-1515-TH		124	1.5°	2,800	4,700	0.093	1.5	2,500	2,910	0.093	1.5	1,900	2,280	0.065	1.5
ETMP4080-55-20-TH	8	55	1°	3,000	6,720	0.540	2	2,600	4,160	0.540	2	2,000	3,200	0.378	2
ETMP4080-70-20-TH		70	1°	3,000	6,720	0.380	2	2,600	4,160	0.380	2	2,000	3,200	0.266	2
ETMP4080-70-20-150-TH		70	1°	3,000	6,720	0.375	2	2,600	4,160	0.375	2	2,000	3,200	0.263	2
ETMP4080-90-20-TH		90	1°	3,000	6,720	0.207	2	2,600	4,160	0.207	2	2,000	3,200	0.145	2
ETMP4080-128-20-TH		128	1°	2,400	5,380	0.104	2	2,100	3,360	0.104	2	1,600	2,560	0.073	2
ETMP4100-73-20-TH	10	73	1°	2,400	6,720	0.500	3	2,100	4,200	0.500	3	1,600	3,200	0.350	3
ETMP4100-73-20-170-TH		73	1°	2,400	6,720	0.500	3	2,100	4,200	0.500	3	1,600	3,200	0.350	3
ETMP4100-95-20-TH		95	1°	2,400	6,720	0.300	3	2,100	4,200	0.300	3	1,600	3,200	0.210	3
ETMP4100-115-20-TH		115	1°	2,400	6,720	0.202	3	2,100	4,200	0.202	3	1,600	3,200	0.141	3
ETMP4120-80-20-TH	12	80	1°	2,000	6,380	0.500	4	1,800	3,880	0.500	4	1,300	2,960	0.350	4
ETMP4120-105-20-TH		105	1°	2,000	6,380	0.380	4	1,800	3,880	0.380	4	1,300	2,960	0.266	4
ETMP4160-105-30-TH	16	105	1°	1,500	5,380	0.750	5	1,300	3,330	0.750	5	1,000	2,560	0.525	5
ETMP4160-140-30-TH		140	1°	1,500	5,380	0.570	5	1,300	3,330	0.570	5	1,000	2,560	0.399	5

[Note]

- ① Use a machine having as high rigidity and high accuracy as possible.
- ② Use the appropriate coolant for the work material and machining shape.
- ③ The cutting conditions shown in this table are intended as general criteria and are assumed as a shortest projection length. It should be adjusted according to the cutting shape, purpose, machined used, etc.
- ④ If the rotation speed of the machine is insufficient, reduce the rotation speed and feed rate by the same ratios.
- ⑤ For cutting in, set the ramp introduction angle to 1° and set the feed rate to 60 to 70% of the above values.
- ⑥ In the case of using tools with L/D = 15 or more length from the first process, in order to suppress the chattering vibration of the tools and stabilize the cutting, it is recommended to make suitable guides by using short neck type or ball end mills.
- ⑦ When rough machining, set a sufficient machining allowance before use. (Guideline: 0.3mm or more)

Line Up, Epoch Turbo Mill

Straight neck type

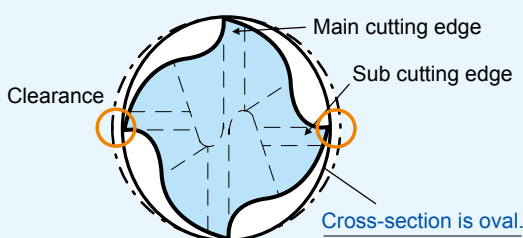


ETM4○○○-○○-TH



Item code	Stock	Size(mm)						Shape
		Tool dia.	Corner radius	Under neck length	Flute length	Overall length	Shank dia.	
		DC	RE	LH	l	LF	DCONMS	
ETM4020-05-TH	●	2	0.5	6	4	70	6	A
ETM4030-08-TH	●	3	0.8	9	6	70	6	
ETM4040-10-TH	●	4	1.0	12	8	70	6	
ETM4050-12-TH	●	5	1.2	15	10	70	6	
ETM4060-15-TH	●	6	1.5	—	12	90	6	B
ETM4080-20-TH	●	8	2.0	—	16	100	8	
ETM4100-20-TH	●	10	2.0	—	20	110	10	
ETM4120-20-TH	●	12	2.0	—	24	120	12	
ETM4160-30-TH	●	16	3.0	—	32	140	16	
ETM4200-30-TH	●	20	3.0	—	40	150	20	

Attention

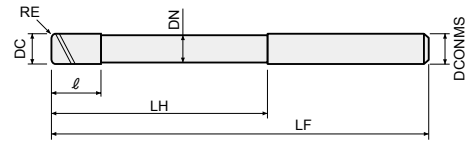


Be careful when measuring the tool diameter or runout of tools as the cutting edge cross section is oval shaped.

The tool is designed with a smaller outer diameter connected to end sub cutting edge. When measuring tool diameter or run out, measure the main cutting edge.

● : Stocked items.

Long neck type



ETMLN4○○○-○○○-○○○-TH



Item code	Stock	Size(mm)						
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.
		DC	RE	LH	ℓ	DN	LF	DCONMS
ETMLN4040-20-10-TH	●	4	1.0	20	6	3.8	70	4
ETMLN4040-28-10-TH	●			28	6	3.8	70	4
ETMLN4060-30-15-TH	●	6	1.5	30	9	5.7	75	6
ETMLN4060-42-15-TH	●			42	9	5.7	90	6
ETMLN4060-54-15-TH	●			54	9	5.7	100	6
ETMLN4080-40-20-TH	●	8	2.0	40	12	7.6	85	8
ETMLN4080-56-20-TH	●			56	12	7.6	100	8
ETMLN4080-72-20-TH	●			72	12	7.6	120	8
ETMLN4100-50-20-TH	●	10	2.0	50	15	9.5	100	10
ETMLN4100-70-20-TH	●			70	15	9.5	120	10
ETMLN4100-90-20-TH	●			90	15	9.5	140	10
ETMLN4120-60-20-TH	●	12	2.0	60	18	11.5	110	12
ETMLN4120-84-20-TH	●			84	18	11.5	135	12
ETMLN4120-108-20-TH	●			108	18	11.5	160	12
ETMLN4160-80-30-TH	●	16	3.0	80	24	15.5	140	16
ETMLN4160-120-30-TH	●			120	24	15.5	175	16

○ Re-grinding compatibility range table

Item code	Product name	Shape	Re-grinding compatibility range (mm)	
			Outer dia.	End
ETM-TH	Epoch Turbo Mill -Straight neck type		×	2~20
ETMLN-TH	Epoch Turbo Mill -Long neck type		×	4~16

Recommended Cutting Condition, Epoch Turbo Mill

ETM Straight neck type

ETMLN Long neck type

Standard conditions (Low revolution, High feed)

Work material	Cast Irons Carbon steels, Alloy steels (150~250HB) FC, S50C, SCM			Tool steels (25~35HRC) SKD			Pre-hardened steels (35~45HRC) NAK80, CENA1			Hardened steels (45~55HRC) SKD61,SKT4			Hardened steels (55~60HRC) SKD11,SKH51		
	100%			100%			100%			70%			50%		
Ratio to standard depth of cut	100%			100%			100%			70%			50%		
Tool dia DC (mm)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)
φ2	12,000	0.11	5,380	11,000	0.1	4,510	10,000	0.08	3,200	8,000	0.08	2,560	8,000	0.03	1,020
φ3	8,000	0.19	6,050	7,400	0.17	5,110	6,900	0.14	3,730	5,300	0.14	2,860	5,300	0.05	1,140
φ4	6,000	0.27	6,380	5,600	0.24	5,450	5,200	0.19	3,950	4,000	0.19	3,040	4,000	0.08	1,220
φ5	4,800	0.33	6,380	4,500	0.3	5,470	4,100	0.24	3,900	3,200	0.24	3,040	3,200	0.1	1,220
φ6	4,000	0.42	6,720	3,700	0.38	5,680	3,400	0.3	4,080	2,700	0.3	3,240	2,700	0.12	1,300
φ8	3,000	0.56	6,720	2,800	0.51	5,730	2,600	0.4	4,160	2,000	0.4	3,200	2,000	0.16	1,280
φ10	2,400	0.7	6,720	2,200	0.64	5,630	2,100	0.5	4,200	1,600	0.5	3,200	1,600	0.2	1,280
φ12	2,000	0.8	6,380	1,900	0.73	5,540	1,700	0.57	3,880	1,300	0.57	2,960	1,300	0.23	1,190
φ16	1,500	0.9	5,380	1,400	0.82	4,590	1,300	0.64	3,330	1,000	0.64	2,560	1,000	0.26	1,020
φ20	1,200	0.91	4,370	1,100	0.83	3,660	1,000	0.65	2,600	800	0.65	2,080	800	0.26	830

High speed conditions (High revolution, High feed)

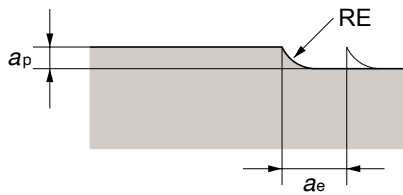
Work material	Cast Irons Carbon steels, Alloy steels (150~250HB) FC, S50C, SCM			Tool steels (25~35HRC) SKD			Pre-hardened steels (35~45HRC) NAK80, CENA1			Hardened steels (45~55HRC) SKD61,SKT4			Hardened steels (55~60HRC) SKD11,SKH51		
	80%			80%			70%			60%			40%		
Ratio to standard depth of cut	80%			80%			70%			60%			40%		
Tool dia DC (mm)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)
φ2	20,000	0.11	8,960	18,000	0.1	7,370	16,000	0.08	5,120	12,700	0.08	4,060	11,100	0.03	1,420
φ3	13,300	0.19	10,050	11,700	0.17	8,090	10,600	0.14	5,720	8,500	0.14	4,590	7,400	0.05	1,600
φ4	9,900	0.27	10,530	8,800	0.24	8,560	8,000	0.19	6,080	6,400	0.19	4,860	5,600	0.08	1,700
φ5	8,000	0.33	10,640	7,000	0.3	8,510	6,400	0.24	6,080	5,100	0.24	4,850	4,500	0.1	1,710
φ6	6,600	0.42	11,090	5,800	0.38	8,910	5,300	0.3	6,360	4,200	0.3	5,040	3,700	0.12	1,780
φ8	5,000	0.56	11,200	4,400	0.51	9,010	4,000	0.4	6,400	3,200	0.4	5,120	2,800	0.16	1,790
φ10	4,000	0.7	11,200	3,500	0.64	8,960	3,200	0.5	6,400	2,500	0.5	5,000	2,200	0.2	1,760
φ12	3,300	0.8	10,530	2,900	0.73	8,460	2,700	0.57	6,160	2,100	0.57	4,790	1,900	0.23	1,730
φ16	2,500	0.9	8,960	2,200	0.82	7,210	2,000	0.64	5,120	1,600	0.64	4,100	1,400	0.26	1,430
φ20	2,000	0.91	7,280	1,800	0.83	5,990	1,600	0.65	4,160	1,300	0.65	3,380	1,100	0.26	1,140

- [Note]**
- ① Use a highly rigid and accurate machine as possible.
 - ② These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
 - ③ If the rpm available is lower than that recommended please reduce the feed rate to the same ratio.

Low load conditions (Medium revolution, high feed)

Work material	Cast Irons Carbon steels, Alloy steels (150~250HB) FC, S50C, SCM			Tool steels (25~35HRC) SKD			Pre-hardened steels (35~45HRC) NAK80, CENA1			Hardened steels (45~55HRC) SKD61,SKT4			Hardened steels (55~60HRC) SKD11,SKH51		
	100%			100%			100%			70%			50%		
Ratio to standard depth of cut	100%			100%			100%			70%			50%		
Tool dia DC (mm)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)	Revolution n (min ⁻¹)	Feed per tooth f_z (mm/t)	Feed rate v_f (mm/min)
φ2	15,000	0.09	5,180	14,000	0.08	4,300	14,000	0.06	3,400	10,300	0.06	2,310	9,500	0.02	910
φ3	10,100	0.15	5,890	9,500	0.13	4,920	9,000	0.1	3,690	6,900	0.09	2,610	6,400	0.04	1,040
φ4	7,600	0.21	6,240	7,200	0.18	5,250	6,800	0.14	3,930	5,200	0.13	2,770	4,800	0.06	1,090
φ5	6,000	0.26	6,160	5,700	0.23	5,200	5,400	0.18	3,900	4,100	0.17	2,730	3,800	0.07	1,080
φ6	5,000	0.32	6,480	4,800	0.29	5,530	4,500	0.23	4,100	3,400	0.21	2,860	3,200	0.09	1,150
φ8	3,800	0.43	6,570	3,600	0.38	5,530	3,400	0.3	4,130	2,600	0.28	2,910	2,400	0.12	1,150
φ10	3,000	0.54	6,480	2,900	0.48	5,570	2,700	0.38	4,100	2,100	0.35	2,940	1,900	0.15	1,140
φ12	2,500	0.62	6,160	2,400	0.55	5,250	2,300	0.43	3,990	1,700	0.4	2,710	1,600	0.17	1,090
φ16	1,900	0.69	5,250	1,800	0.61	4,420	1,700	0.49	3,310	1,300	0.45	2,330	1,200	0.19	920
φ20	1,500	0.7	4,210	1,400	0.62	3,490	1,400	0.49	2,770	1,000	0.46	1,820	1,000	0.2	780

Relation between the depth of cut and overhang.



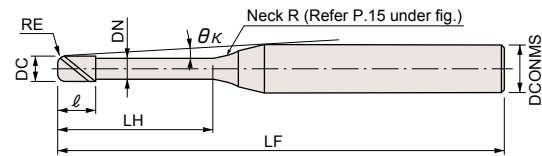
a_e : Half of flat length on bottom edge = (Tool dia.DC/2) - Corner radius RE
 a_p : Below table

Overhang	a_p : Z pick mm	Overhang	a_p : Z pick mm
5DC or less	$0.3 \times RE \times \text{Cutting depth ratio}$	8DC	$0.20 \times RE \times \text{Cutting depth ratio}$
6DC	$0.24 \times RE \times \text{Cutting depth ratio}$	9DC	$0.17 \times RE \times \text{Cutting depth ratio}$
7DC	$0.22 \times RE \times \text{Cutting depth ratio}$	10DC	$0.13 \times RE \times \text{Cutting depth ratio}$

- ① Use for cutting contour lines or down cutting. In Z direction, cut at an incline (incline angle: 1°) and reduce feed rate to between 60% and 70%.
- ② It is recommended that speed reduction for corners be set. The speed reduction distance should be approximately 1/2 the diameter of the tool being used, and the feed rate should be reduced to between 50% and 60%.

Line Up, Epoch Turbo Rib

Straight neck type



ETR4 ○○○○ - ○○○ - ○○○ -TH



Item code	Stock	Size (mm)										The effective under-neck length for the various draft angles				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R	Interference angle						
		DC	RE	LU	ℓ	DN	LF	DCONMS	θ _K		0.5°	1°	1.5°	2°	3°	
ETR4010-5-02-TH	●	1	0.2	5	1	0.94	50	6	4	8.52	5.79	6.01	6.21	6.38	6.75	
ETR4010-7.5-02-TH	●			7.5	1	0.94	50	6	4	7.42	8.39	8.68	8.91	9.11	10.07	
ETR4010-10-02-TH	●			10	1	0.94	50	6	4	6.58	10.98	11.32	11.58	12.09	13.39	
ETR4010-12.5-02-TH	●			12.5	1	0.94	60	6	4	5.90	13.57	13.94	14.38	15.08	16.71	
ETR4010-15-02-TH	●			15	1	0.94	60	6	4	5.35	16.15	16.55	17.24	18.07	20.03	
ETR4010-17.5-02-TH	●			17.5	1	0.94	60	6	4	4.90	18.72	19.20	20.09	21.07	23.35	
ETR4010-20-02-TH	●			20	1	0.94	60	6	4	4.51	21.29	21.92	22.94	24.06	26.66	
ETR4010-22.5-02-TH	●			22.5	1	0.94	70	6	4	4.19	23.85	24.64	25.79	27.05	29.98	
ETR4010-25-02-TH	●			25	1	0.94	70	6	4	3.90	26.41	27.37	28.64	30.04	33.30	
ETR4010-27.5-02-TH	●			27.5	1	0.94	70	6	4	3.65	28.97	30.09	31.49	33.03	36.62	
ETR4010-30-02-TH	●	30	1	0.94	70	6	4	3.44	31.52	32.82	34.34	36.02	39.94			
ETR40125-5-02-TH	●	1.25	0.2	5	1.25	1.18	50	6	4	8.38	5.81	6.03	6.22	6.39	6.79	
ETR40125-10-02-TH	●			10	1.25	1.18	50	6	4	6.42	11.00	11.33	11.59	12.12	13.42	
ETR40125-15-02-TH	●			15	1.25	1.18	60	6	4	5.20	16.16	16.56	17.26	18.10	20.06	
ETR40125-20-02-TH	●			20	1.25	1.18	60	6	4	4.37	21.30	21.95	22.97	24.09	26.69	
ETR40125-25-02-TH	●			25	1.25	1.18	70	6	4	3.77	26.42	27.39	28.67	30.07	33.33	
ETR40125-30-02-TH	●			30	1.25	1.18	70	6	4	3.31	31.54	32.84	34.37	36.05	39.97	
ETR4015-5-03-TH	●	1.5	0.3	5	1.5	1.42	50	6	4	8.28	5.83	6.05	6.23	6.40	6.79	
ETR4015-10-03-TH	●			10	1.5	1.42	50	6	4	6.28	11.02	11.34	11.60	12.13	13.42	
ETR4015-15-03-TH	●			15	1.5	1.42	60	6	4	5.05	16.18	16.57	17.28	18.11	20.06	
ETR4015-20-03-TH	●			20	1.5	1.42	60	6	4	4.23	21.31	21.96	22.98	24.09	26.69	
ETR4015-25-03-TH	●			25	1.5	1.42	70	6	4	3.63	26.43	27.41	28.68	30.08	33.33	
ETR4015-30-03-TH	●			30	1.5	1.42	70	6	4	3.19	31.55	32.86	34.38	36.06	39.97	
ETR40175-10-03-TH	●	1.75	0.3	10	1.75	1.65	50	6	4	6.09	11.06	11.37	11.63	12.18	13.48	
ETR40175-20-03-TH	●			20	1.75	1.65	60	6	4	4.07	21.34	22.01	23.03	24.15	26.76	
ETR40175-30-03-TH	●			30	1.75	1.65	70	6	4	3.05	31.57	32.91	34.44	36.12	40.03	
ETR40175-40-03-TH	●			40	1.75	1.65	80	6	4	2.44	41.94	43.80	45.84	48.08	No interference	
ETR4020-10-05-TH	●	2	0.5	10	2	1.92	50	6	4	5.98	11.01	11.33	11.59	12.09	13.36	
ETR4020-15-05-TH	●			15	2	1.92	60	6	4	4.75	16.17	16.56	17.25	18.07	19.99	
ETR4020-20-05-TH	●			20	2	1.92	60	6	4	3.94	21.31	21.95	22.95	24.06	26.63	
ETR4020-25-05-TH	●			25	2	1.92	70	6	4	3.36	26.43	27.39	28.65	30.04	33.27	
ETR4020-30-05-TH	●			30	2	1.92	70	6	4	2.93	31.54	32.84	34.36	36.02	No interference	
ETR4020-35-05-TH	●			35	2	1.92	80	6	4	2.60	36.67	38.29	40.06	42.00	No interference	
ETR4020-40-05-TH	●			40	2	1.92	80	6	4	2.34	41.88	43.73	45.76	47.99	No interference	
ETR4025-10-05-TH	●	2.5	0.5	10	2.5	2.4	50	6	4	5.57	11.05	11.36	11.61	12.15	13.42	
ETR4025-20-05-TH	●			20	2.5	2.4	60	6	4	3.59	21.34	22.00	23.00	24.11	26.69	
ETR4025-30-05-TH	●			30	2.5	2.4	70	6	4	2.64	31.57	32.89	34.41	36.08	No interference	
ETR4025-40-05-TH	●			40	2.5	2.4	80	6	4	2.09	41.93	43.79	45.81	48.04	No interference	
ETR4025-50-05-TH	●			50	2.5	2.4	90	6	4	1.73	52.36	54.68	57.22	No interference	No interference	
ETR4030-10-08-TH	●	3	0.8	10	3	2.86	50	6	4	5.17	11.12	11.40	11.66	12.20	13.45	
ETR4030-20-08-TH	●			20	3	2.86	60	6	4	3.23	21.39	22.07	23.07	24.17	26.72	
ETR4030-30-08-TH	●			30	3	2.86	70	6	4	2.35	31.61	32.97	34.47	36.13	No interference	
ETR4030-40-08-TH	●			40	3	2.86	80	6	4	1.85	42.02	43.86	45.88	No interference	No interference	
ETR4030-50-08-TH	●			50	3	2.86	90	6	4	1.52	52.45	54.76	57.28	No interference	No interference	

● : Stocked items.

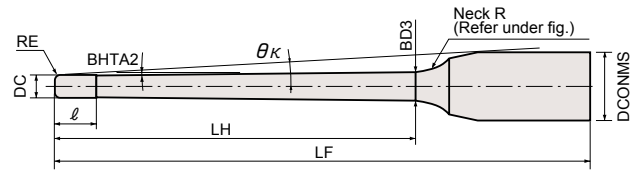
Re-grinding compatibility range table

Item code	Product name	Shape	Re-grinding compatibility range (mm)	
			Outer dia.	End
ETR-TH	Epoch Turbo Rib -Straight neck type		X (N/A)	2~3
ETRP-TH	Epoch Turbo Rib -Pencil neck type		X (N/A)	2~3

[Note]

Contact our sales office regarding whether or not regrinding is possible for tools where L/D(under neck length / tool diameter) more than 10DC

Pencil neck type

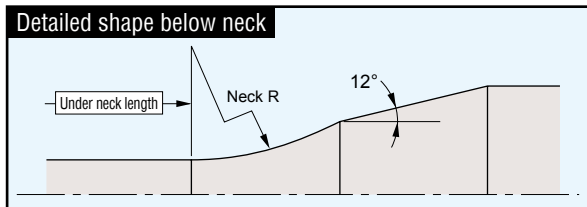


ETRP4○○○○-○○-○○○○-TH



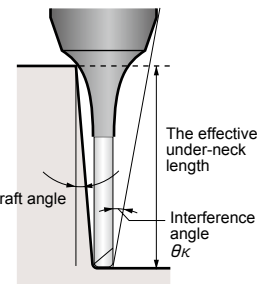
Item code	Stock	Size (mm)										The effective under-neck length for the various draft angles				
		Tool dia.	Corner radius	Under neck length	Neck angle	Flute length	Under neck dia.	Overall length	Shank dia.	Neck R	Interference angle	0°	1°	1.5°	2°	3°
		DC	RE	LU	BHTA2	ℓ	BD2	LF	DCONMS	θκ						
ETRP4010-5-0902-TH	●	1	0.2	5	0.9	1	1.066	60	6	4	8.67	2.91	5.70	5.96	6.17	6.51
ETRP4010-7.5-0902-TH	●			7.5	0.9	1	1.144	60	6	7	7.61	2.91	8.50	8.97	9.34	9.93
ETRP4010-10-0902-TH	●			10	0.9	1	1.223	60	6	7	6.78	2.91	11.04	11.60	12.03	12.70
ETRP4010-15-0902-TH	●			15	0.9	1	1.380	60	6	10	5.57	2.91	16.35	17.25	17.89	18.89
ETRP4010-20-0902-TH	●			20	0.9	1	1.537	70	6	10	4.72	2.91	21.42	22.49	23.22	24.80
ETRP4010-25-0902-TH	●			25	0.9	1	1.694	70	6	10	4.10	2.91	26.49	27.70	28.52	30.95
ETRP4010-30-0902-TH	●			30	0.9	1	1.851	80	6	10	3.62	2.91	31.55	32.90	33.79	37.09
ETRP4010-35-0902-TH	●			35	0.9	1	2.008	80	6	10	3.24	2.91	36.61	38.08	39.03	43.24
ETRP4010-40-0902-TH	●			40	0.9	1	2.165	90	6	10	2.94	2.91	41.67	43.25	44.54	No interference
ETRP4010-45-0902-TH	●			45	0.9	1	2.322	90	6	10	2.68	2.91	46.73	48.41	50.08	No interference
ETRP4010-50-0902-TH	●	50	0.9	1	2.480	100	6	10	2.47	2.91	51.78	53.56	55.62	No interference		
ETRP40125-10-0902-TH	●	1.25	0.2	10	0.9	1.25	1.455	60	6	7	6.62	3.47	11.10	11.65	12.06	12.73
ETRP40125-15-0902-TH	●			15	0.9	1.25	1.612	60	6	10	5.41	3.47	16.42	17.29	17.92	18.91
ETRP40125-20-0902-TH	●			20	0.9	1.25	1.769	70	6	10	4.57	3.47	21.49	22.52	23.25	24.86
ETRP40125-30-0902-TH	●			30	0.9	1.25	2.083	80	6	10	3.49	3.47	31.61	32.93	33.81	37.15
ETRP40125-40-0902-TH	●			40	0.9	1.25	2.397	90	6	10	2.82	3.47	41.73	43.28	44.59	No interference
ETRP40125-50-0902-TH	●			50	0.9	1.25	2.712	100	6	10	2.37	3.47	51.83	53.59	55.67	No interference
ETRP4015-10-0903-TH	●	1.5	0.3	10	0.9	1.5	1.687	60	6	7	6.47	4.04	11.15	11.67	12.08	12.74
ETRP4015-15-0903-TH	●			15	0.9	1.5	1.844	60	6	7	5.26	4.04	16.21	16.89	17.40	18.73
ETRP4015-20-0903-TH	●			20	0.9	1.5	2.001	70	6	10	4.43	4.04	21.54	22.55	23.27	24.88
ETRP4015-30-0903-TH	●			30	0.9	1.5	2.315	80	6	10	3.36	4.04	31.66	32.95	33.83	37.17
ETRP4015-40-0903-TH	●			40	0.9	1.5	2.630	90	6	10	2.71	4.04	41.77	43.30	44.62	No interference
ETRP4015-50-0903-TH	●			50	0.9	1.5	2.944	100	6	10	2.27	4.04	51.88	53.60	55.70	No interference
ETRP40175-10-0903-TH	●	1.75	0.3	10	0.9	1.75	1.909	60	6	7	6.28	4.93	11.24	11.74	12.13	12.77
ETRP40175-15-0903-TH	●			15	0.9	1.75	2.066	60	6	7	5.07	4.93	16.29	16.95	17.44	18.82
ETRP40175-20-0903-TH	●			20	0.9	1.75	2.223	70	6	10	4.26	4.93	21.64	22.61	23.32	24.97
ETRP40175-30-0903-TH	●			30	0.9	1.75	2.538	80	6	10	3.22	4.93	31.75	33.00	33.86	37.26
ETRP40175-40-0903-TH	●			40	0.9	1.75	2.852	90	6	10	2.59	4.93	41.86	43.34	44.70	No interference
ETRP40175-50-0903-TH	●			50	0.9	1.75	3.166	100	6	10	2.16	4.93	51.95	53.64	55.78	No interference
ETRP4020-15-0905-TH	●	2	0.5	15	0.9	2	2.328	60	6	7	4.95	4.54	16.23	16.91	17.40	18.72
ETRP4020-20-0905-TH	●			20	0.9	2	2.486	70	6	7	4.12	4.54	21.29	22.10	22.67	24.86
ETRP4020-25-0905-TH	●			25	0.9	2	2.643	70	6	10	3.54	4.54	26.63	27.77	28.57	31.01
ETRP4020-30-0905-TH	●			30	0.9	2	2.800	80	6	10	3.1	4.54	31.69	32.96	33.83	37.16
ETRP4020-35-0905-TH	●			35	0.9	2	2.957	80	6	10	2.75	4.54	36.75	38.14	39.09	No interference
ETRP4020-40-0905-TH	●			40	0.9	2	3.114	90	6	10	2.48	4.54	41.80	43.31	44.63	No interference
ETRP4020-45-0905-TH	●			45	0.9	2	3.271	90	6	10	2.25	4.54	46.85	48.46	50.17	No interference
ETRP4020-50-0905-TH	●			50	0.9	2	3.428	100	6	10	2.07	4.54	51.90	53.61	55.71	No interference
ETRP4020-55-0905-TH	●			55	0.9	2	3.585	100	6	10	1.91	4.54	56.95	58.75	No interference	No interference
ETRP4020-60-0905-TH	●			60	0.9	2	3.742	110	6	10	1.77	4.54	62.00	63.89	No interference	No interference
ETRP4025-20-0905-TH	●	2.5	0.5	20	0.9	2.5	2.950	70	6	7	3.76	5.68	21.39	22.16	22.72	24.98
ETRP4025-30-0905-TH	●			30	0.9	2.5	3.264	80	6	10	2.79	5.68	31.80	33.02	33.88	No interference
ETRP4025-40-0905-TH	●			40	0.9	2.5	3.578	90	6	10	2.22	5.68	41.90	43.36	44.73	No interference
ETRP4025-50-0905-TH	●			50	0.9	2.5	3.892	100	6	10	1.85	5.68	52.00	53.66	No interference	No interference
ETRP4025-60-0905-TH	●			60	0.9	2.5	4.207	110	6	10	1.58	5.68	62.09	63.93	No interference	No interference
ETRP4030-20-0908-TH	●	3	0.8	20	0.9	3	3.394	70	6	7	3.39	7.45	21.50	22.22	22.76	25.05
ETRP4030-30-0908-TH	●			30	0.9	3	3.708	80	6	7	2.49	7.45	31.59	32.54	33.74	No interference
ETRP4030-40-0908-TH	●			40	0.9	3	4.022	90	6	10	1.96	7.45	42.03	43.42	No interference	No interference
ETRP4030-50-0908-TH	●			50	0.9	3	4.337	100	6	10	1.62	7.45	52.12	53.72	No interference	No interference
ETRP4030-60-0908-TH	●			60	0.9	3	4.651	110	6	10	1.37	7.45	62.20	No interference	No interference	No interference

Detailed shape below neck



[Note]

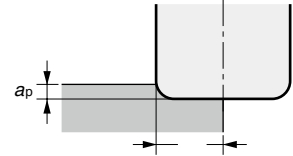
If the workpiece has draft angle, the interference length will be longer than the under-neck length. Please refer to the effective under-neck length for the various draft angles. In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle $\theta\kappa$ ", and should also be referred to.



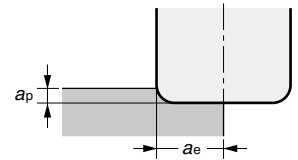
Recommended Cutting Condition, Epoch Turbo Rib

ETR

Straight neck type



Work material		Cast irons, Carbon steels, Alloy steels (150~250HB) FC S50C SCM					Tool steels (25~35HRC) SKD				Pre-hardened steels (35~45HRC) NAK80 CENA1				Hardened steels (45~55HRC) SKD61 SKT4				Hardened steels (55~60HRC) SKD11 SKH51			
Tool dia. mm	Under neck length mm	Revolution min ⁻¹	Feed rate mm/min	a _p mm	a _e mm	Revolution min ⁻¹	Feed rate mm/min	a _p mm	a _e mm	Revolution min ⁻¹	Feed rate mm/min	a _p mm	a _e mm	Revolution min ⁻¹	Feed rate mm/min	a _p mm	a _e mm	Revolution min ⁻¹	Feed rate mm/min	a _p mm	a _e mm	
1	5	32,000	5,820	0.040	0.50	27,100	4,510	0.040	0.50	22,300	2,900	0.032	0.50	19,100	2,480	0.020	0.50	15,900	830	0.012	0.50	
	7.5	32,000	5,820	0.027	0.50	27,100	4,510	0.027	0.50	22,300	2,900	0.021	0.50	19,100	2,480	0.013	0.50	15,900	830	0.008	0.50	
	10	32,000	5,820	0.020	0.50	27,100	4,510	0.020	0.50	22,300	2,900	0.016	0.50	19,100	2,480	0.010	0.50	15,900	830	0.006	0.50	
	12.5	28,800	5,240	0.016	0.50	24,400	4,060	0.016	0.50	20,100	2,610	0.013	0.50	17,200	2,230	0.008	0.50	14,300	750	0.005	0.50	
	15	28,800	5,240	0.013	0.50	24,400	4,060	0.013	0.50	20,100	2,610	0.011	0.50	17,200	2,230	0.007	0.50	14,300	750	0.004	0.50	
	17.5	25,600	4,660	0.011	0.50	21,700	3,610	0.011	0.50	17,800	2,320	0.009	0.50	15,300	1,980	0.006	0.50	12,700	660	0.003	0.50	
	20	25,600	4,660	0.010	0.50	21,700	3,610	0.010	0.50	17,800	2,320	0.008	0.50	15,300	1,980	0.005	0.50	12,700	660	0.003	0.50	
	22.5	22,400	4,070	0.009	0.50	19,000	3,160	0.009	0.50	15,600	2,030	0.007	0.50	13,400	1,740	0.004	0.50	11,100	580	0.003	0.50	
	25	22,400	4,070	0.008	0.50	19,000	3,160	0.008	0.50	15,600	2,030	0.006	0.50	13,400	1,740	0.004	0.50	11,100	580	0.002	0.50	
	27.5	19,200	3,490	0.007	0.50	16,300	2,710	0.007	0.50	13,400	1,740	0.006	0.50	11,500	1,490	0.004	0.50	9,500	500	0.002	0.50	
30	19,200	3,490	0.007	0.50	16,300	2,710	0.007	0.50	13,400	1,740	0.005	0.50	11,500	1,490	0.003	0.50	9,500	500	0.002	0.50		
1.25	5	25,000	6,130	0.063	0.62	21,600	4,840	0.063	0.62	17,800	3,120	0.050	0.62	15,300	2,680	0.031	0.62	12,700	890	0.019	0.62	
	10	25,000	6,130	0.031	0.62	21,600	4,840	0.031	0.62	17,800	3,120	0.025	0.62	15,300	2,680	0.016	0.62	12,700	890	0.009	0.62	
	15	22,500	5,520	0.021	0.62	19,400	4,360	0.021	0.62	16,000	2,810	0.017	0.62	13,800	2,410	0.010	0.62	11,400	800	0.006	0.62	
	20	20,000	4,900	0.016	0.62	17,300	3,870	0.016	0.62	14,200	2,500	0.013	0.62	12,200	2,140	0.008	0.62	10,200	710	0.005	0.62	
	25	20,000	4,900	0.013	0.62	17,300	3,870	0.013	0.62	14,200	2,500	0.010	0.62	12,200	2,140	0.006	0.62	10,200	710	0.004	0.62	
30	17,500	4,290	0.010	0.62	15,100	3,390	0.010	0.62	12,500	2,180	0.008	0.62	10,700	1,880	0.005	0.62	8,900	620	0.003	0.62		
1.5	5	21,000	6,620	0.090	0.75	18,000	5,180	0.090	0.75	14,900	3,350	0.072	0.75	12,700	2,860	0.045	0.75	10,600	950	0.027	0.75	
	10	21,000	6,620	0.045	0.75	18,000	5,180	0.045	0.75	14,900	3,350	0.036	0.75	12,700	2,860	0.023	0.75	10,600	950	0.014	0.75	
	15	21,000	6,620	0.030	0.75	18,000	5,180	0.030	0.75	14,900	3,350	0.024	0.75	12,700	2,860	0.015	0.75	10,600	950	0.009	0.75	
	20	18,900	5,960	0.023	0.75	16,200	4,660	0.023	0.75	13,400	3,020	0.018	0.75	11,400	2,570	0.011	0.75	9,500	860	0.007	0.75	
	25	16,800	5,300	0.018	0.75	14,400	4,140	0.018	0.75	11,900	2,680	0.014	0.75	10,200	2,290	0.009	0.75	8,500	760	0.005	0.75	
30	16,800	5,300	0.015	0.75	14,400	4,140	0.015	0.75	11,900	2,680	0.012	0.75	10,200	2,290	0.008	0.75	8,500	760	0.005	0.75		
1.75	10	18,000	7,060	0.061	0.87	15,500	5,560	0.061	0.87	12,700	3,560	0.049	0.87	10,900	3,050	0.031	0.87	9,100	1,020	0.018	0.87	
	20	16,200	6,350	0.031	0.87	14,000	5,000	0.031	0.87	11,400	3,200	0.025	0.87	9,800	2,750	0.015	0.87	8,200	920	0.009	0.87	
	30	14,400	5,650	0.020	0.87	12,400	4,450	0.020	0.87	10,200	2,850	0.016	0.87	8,700	2,440	0.010	0.87	7,300	820	0.006	0.87	
	40	12,600	4,940	0.015	0.87	10,900	3,890	0.015	0.87	8,900	2,490	0.012	0.87	7,600	2,140	0.008	0.87	6,400	710	0.005	0.87	
2	10	16,000	7,620	0.080	1.00	13,500	5,880	0.080	1.00	11,100	3,770	0.064	1.00	9,500	3,230	0.040	1.00	8,000	1,090	0.024	1.00	
	15	16,000	7,620	0.053	1.00	13,500	5,880	0.053	1.00	11,100	3,770	0.043	1.00	9,500	3,230	0.027	1.00	8,000	1,090	0.016	1.00	
	20	16,000	7,620	0.040	1.00	13,500	5,880	0.040	1.00	11,100	3,770	0.032	1.00	9,500	3,230	0.020	1.00	8,000	1,090	0.012	1.00	
	25	14,400	6,860	0.032	1.00	12,200	5,290	0.032	1.00	10,000	3,390	0.026	1.00	8,600	2,910	0.016	1.00	7,200	980	0.010	1.00	
	30	14,400	6,860	0.027	1.00	12,200	5,290	0.027	1.00	10,000	3,390	0.021	1.00	8,600	2,910	0.013	1.00	7,200	980	0.008	1.00	
	35	12,800	6,100	0.023	1.00	10,800	4,700	0.023	1.00	8,900	3,020	0.018	1.00	7,600	2,580	0.011	1.00	6,400	870	0.007	1.00	
	40	12,800	6,100	0.020	1.00	10,800	4,700	0.020	1.00	8,900	3,020	0.016	1.00	7,600	2,580	0.010	1.00	6,400	870	0.006	1.00	
2.5	10	13,000	8,190	0.125	1.25	10,800	6,220	0.125	1.25	8,900	4,010	0.100	1.25	7,600	3,420	0.063	1.25	6,400	1,150	0.038	1.25	
	20	13,000	8,190	0.063	1.25	10,800	6,220	0.063	1.25	8,900	4,010	0.050	1.25	7,600	3,420	0.031	1.25	6,400	1,150	0.019	1.25	
	30	11,700	7,370	0.042	1.25	9,700	5,600	0.042	1.25	8,000	3,610	0.033	1.25	6,800	3,080	0.021	1.25	5,800	1,040	0.013	1.25	
	40	10,400	6,550	0.031	1.25	8,600	4,980	0.031	1.25	7,100	3,210	0.025	1.25	6,100	2,740	0.016	1.25	5,100	920	0.009	1.25	
	50	10,400	6,550	0.025	1.25	8,600	4,980	0.025	1.25	7,100	3,210	0.020	1.25	6,100	2,740	0.013	1.25	5,100	920	0.008	1.25	
3	10	10,600	8,460	0.180	1.40	9,000	6,570	0.180	1.40	7,400	4,220	0.144	1.40	6,400	3,650	0.090	1.40	5,300	1,210	0.054	1.40	
	20	10,600	8,460	0.090	1.40	9,000	6,570	0.090	1.40	7,400	4,220	0.072	1.40	6,400	3,650	0.045	1.40	5,300	1,210	0.027	1.40	
	30	10,600	8,460	0.060	1.40	9,000	6,570	0.060	1.40	7,400	4,220	0.048	1.40	6,400	3,650	0.030	1.40	5,300	1,210	0.018	1.40	
	40	9,540	7,610	0.045	1.40	8,100	5,910	0.045	1.40	6,700	3,800	0.036	1.40	5,800	3,290	0.023	1.40	4,800	1,090	0.014	1.40	
	50	8,480	6,770	0.036	1.40	7,200	5,260	0.036	1.40	5,900	3,380	0.029	1.40	5,100	2,920	0.018	1.40	4,200	970	0.011	1.40	



Work material	Cast irons, Carbon steels, Alloy steels (150~250HB) FC S50C SCM					Tool steels (25~35HRC) SKD				Pre-hardened steels (35~45HRC) NAK80 CENA1				Hardened steels (45~55HRC) SKD61 SKT4				Hardened steels (55~60HRC) SKD11 SKH51				
	Tool dia. mm	Under neck length mm	Revolution min ⁻¹	Feed rate mm/min	ap mm	ae mm	Revolution min ⁻¹	Feed rate mm/min	ap mm	ae mm	Revolution min ⁻¹	Feed rate mm/min	ap mm	ae mm	Revolution min ⁻¹	Feed rate mm/min	ap mm	ae mm	Revolution min ⁻¹	Feed rate mm/min	ap mm	ae mm
1	5		32,000	5,820	0.060	0.50	27,100	4,510	0.060	0.50	22,300	2,900	0.048	0.50	19,100	2,480	0.030	0.50	15,900	830	0.018	0.50
	7.5		32,000	5,820	0.045	0.50	27,100	4,510	0.045	0.50	22,300	2,900	0.036	0.50	19,100	2,480	0.023	0.50	15,900	830	0.013	0.50
	10		32,000	5,820	0.030	0.50	27,100	4,510	0.030	0.50	22,300	2,900	0.024	0.50	19,100	2,480	0.015	0.50	15,900	830	0.009	0.50
	15		28,800	5,240	0.020	0.50	24,400	4,060	0.020	0.50	20,100	2,610	0.016	0.50	17,200	2,230	0.010	0.50	14,300	750	0.006	0.50
	20		28,800	5,240	0.015	0.50	24,400	4,060	0.015	0.50	20,100	2,610	0.012	0.50	17,200	2,230	0.008	0.50	14,300	750	0.005	0.50
	25		25,600	4,660	0.012	0.50	21,700	3,610	0.012	0.50	17,800	2,320	0.010	0.50	15,300	1,980	0.006	0.50	12,700	660	0.004	0.50
	30		24,000	4,370	0.010	0.50	20,300	3,380	0.010	0.50	16,700	2,180	0.008	0.50	14,300	1,860	0.005	0.50	11,900	620	0.003	0.50
	35		22,400	4,070	0.009	0.50	19,000	3,160	0.009	0.50	15,600	2,030	0.007	0.50	13,400	1,740	0.004	0.50	11,100	580	0.003	0.50
	40		20,800	3,780	0.008	0.50	17,600	2,930	0.008	0.50	14,500	1,890	0.006	0.50	12,400	1,610	0.004	0.50	10,300	540	0.002	0.50
	45		19,200	3,490	0.007	0.50	16,300	2,710	0.007	0.50	13,400	1,740	0.005	0.50	11,500	1,490	0.003	0.50	9,500	500	0.002	0.50
1.25	10		25,000	6,130	0.047	0.62	21,600	4,840	0.047	0.62	17,800	3,120	0.038	0.62	15,300	2,680	0.023	0.62	12,700	890	0.014	0.62
	15		23,800	5,830	0.035	0.62	20,500	4,600	0.035	0.62	16,900	2,965	0.029	0.62	14,550	2,545	0.018	0.62	12,050	845	0.011	0.62
	20		22,500	5,520	0.023	0.62	19,400	4,360	0.023	0.62	16,000	2,810	0.019	0.62	13,800	2,410	0.012	0.62	11,400	800	0.007	0.62
	30		20,000	4,900	0.016	0.62	17,300	3,870	0.016	0.62	14,200	2,500	0.013	0.62	12,200	2,140	0.008	0.62	10,200	710	0.005	0.62
	40		17,500	4,290	0.012	0.62	15,100	3,390	0.012	0.62	12,500	2,180	0.009	0.62	10,700	1,880	0.006	0.62	8,900	620	0.004	0.62
1.5	10		21,000	6,620	0.068	0.75	18,000	5,180	0.068	0.75	14,900	3,350	0.054	0.75	12,700	2,860	0.034	0.75	10,600	950	0.020	0.75
	15		21,000	6,620	0.051	0.75	18,000	5,180	0.051	0.75	14,900	3,350	0.041	0.75	12,700	2,860	0.026	0.75	10,600	950	0.015	0.75
	20		18,900	5,960	0.034	0.75	16,200	4,660	0.034	0.75	13,400	3,020	0.027	0.75	11,400	2,570	0.017	0.75	9,500	860	0.010	0.75
	30		18,900	5,960	0.023	0.75	16,200	4,660	0.023	0.75	13,400	3,020	0.018	0.75	11,400	2,570	0.011	0.75	9,500	860	0.007	0.75
	40		15,800	4,970	0.017	0.75	13,500	3,890	0.017	0.75	11,200	2,510	0.014	0.75	9,500	2,150	0.008	0.75	8,000	710	0.005	0.75
1.75	10		18,000	7,060	0.092	0.87	15,500	5,560	0.092	0.87	12,700	3,560	0.074	0.87	10,900	3,050	0.046	0.87	9,100	1,020	0.028	0.87
	15		18,000	7,060	0.069	0.87	15,500	5,560	0.069	0.87	12,700	3,560	0.056	0.87	10,900	3,050	0.035	0.87	9,100	1,020	0.021	0.87
	20		16,200	6,350	0.046	0.87	14,000	5,000	0.046	0.87	11,400	3,200	0.037	0.87	9,800	2,750	0.023	0.87	8,200	920	0.014	0.87
	30		16,200	6,350	0.031	0.87	14,000	5,000	0.031	0.87	11,400	3,200	0.025	0.87	9,800	2,750	0.015	0.87	8,200	920	0.009	0.87
	40		14,400	5,650	0.023	0.87	12,400	4,450	0.023	0.87	10,200	2,850	0.018	0.87	8,700	2,440	0.011	0.87	7,300	820	0.007	0.87
2	15		16,000	7,620	0.080	1.00	13,500	5,880	0.080	1.00	11,100	3,770	0.064	1.00	9,500	3,230	0.040	1.00	8,000	1,090	0.024	1.00
	20		16,000	7,620	0.060	1.00	13,500	5,880	0.060	1.00	11,100	3,770	0.048	1.00	9,500	3,230	0.030	1.00	8,000	1,090	0.018	1.00
	25		14,400	6,860	0.048	1.00	12,200	5,290	0.048	1.00	10,000	3,390	0.038	1.00	8,600	2,910	0.024	1.00	7,200	980	0.014	1.00
	30		14,400	6,860	0.040	1.00	12,200	5,290	0.040	1.00	10,000	3,390	0.032	1.00	8,600	2,910	0.020	1.00	7,200	980	0.012	1.00
	35		14,400	6,860	0.034	1.00	12,200	5,290	0.034	1.00	10,000	3,390	0.027	1.00	8,600	2,910	0.017	1.00	7,200	980	0.010	1.00
	40		14,400	6,860	0.030	1.00	12,200	5,290	0.030	1.00	10,000	3,390	0.024	1.00	8,600	2,910	0.015	1.00	7,200	980	0.009	1.00
	45		12,800	6,100	0.027	1.00	10,800	4,700	0.027	1.00	8,900	3,020	0.021	1.00	7,600	2,580	0.013	1.00	6,400	870	0.008	1.00
	50		12,800	6,100	0.024	1.00	10,800	4,700	0.024	1.00	8,900	3,020	0.019	1.00	7,600	2,580	0.012	1.00	6,400	870	0.007	1.00
	55		12,000	5,720	0.022	1.00	10,100	4,410	0.022	1.00	8,300	2,830	0.017	1.00	7,100	2,420	0.011	1.00	6,000	820	0.007	1.00
	60		12,000	5,720	0.020	1.00	10,100	4,410	0.020	1.00	8,300	2,830	0.016	1.00	7,100	2,420	0.010	1.00	6,000	820	0.006	1.00
2.5	20		13,000	8,190	0.094	1.25	10,800	6,220	0.094	1.25	8,900	4,010	0.075	1.25	7,600	3,420	0.047	1.25	6,400	1,150	0.028	1.25
	30		11,700	7,370	0.063	1.25	9,700	5,600	0.063	1.25	8,000	3,610	0.050	1.25	6,800	3,080	0.031	1.25	5,800	1,040	0.019	1.25
	40		11,700	7,370	0.047	1.25	9,700	5,600	0.047	1.25	8,000	3,610	0.038	1.25	6,800	3,080	0.023	1.25	5,800	1,040	0.014	1.25
	50		11,700	7,370	0.038	1.25	9,700	5,600	0.038	1.25	8,000	3,610	0.030	1.25	6,800	3,080	0.019	1.25	5,800	1,040	0.011	1.25
	60		10,400	6,550	0.031	1.25	8,600	4,980	0.031	1.25	7,100	3,210	0.025	1.25	6,100	2,740	0.016	1.25	5,100	920	0.009	1.25
3	20		10,600	8,460	0.135	1.40	9,000	6,570	0.135	1.40	7,400	4,220	0.108	1.40	6,400	3,650	0.068	1.40	5,300	1,210	0.041	1.40
	30		10,600	8,460	0.090	1.40	9,000	6,570	0.090	1.40	7,400	4,220	0.072	1.40	6,400	3,650	0.045	1.40	5,300	1,210	0.027	1.40
	40		9,500	7,610	0.068	1.40	8,100	5,910	0.068	1.40	6,700	3,800	0.054	1.40	5,800	3,290	0.034	1.40	4,800	1,090	0.020	1.40
	50		9,500	7,610	0.054	1.40	8,100	5,910	0.054	1.40	6,700	3,800	0.043	1.40	5,800	3,290	0.027	1.40	4,800	1,090	0.016	1.40
	60		9,500	7,610	0.045	1.40	8,100	5,910	0.045	1.40	6,700	3,800	0.036	1.40	5,800	3,290	0.023	1.40	4,800	1,090	0.014	1.40

[Note]

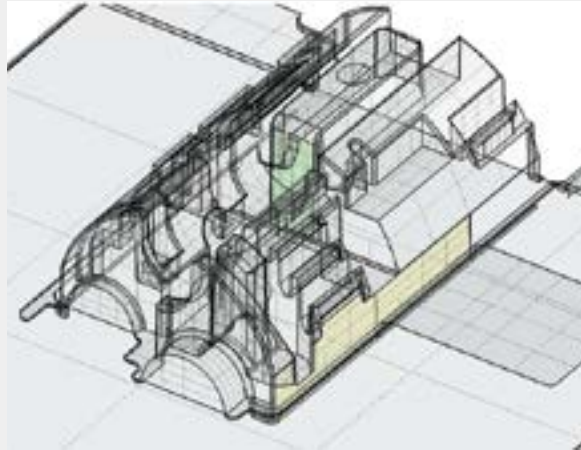
- ① Use a machine having as high rigidity and high accuracy as possible.
- ② Use the appropriate coolant for the work material and machining shape.
- ③ The cutting conditions shown in this table are intended as general criteria and should be adjusted according to the cutting shape, purpose, machine used, etc.
- ④ If the rotation speed of the machine is insufficient, reduce the rotation speed and feed rate by the same ratios.
- ⑤ For cutting in, set the ramp introduction angle to 1° and set the feed rate to 60 to 70% of the above values.
- ⑥ In the case of using tools with L/D = 15 or more length from the first process, in order to suppress the chattering vibration of the tools and stabilize the cutting, it is recommended to make suitable guides by using short neck type or ball end mills.

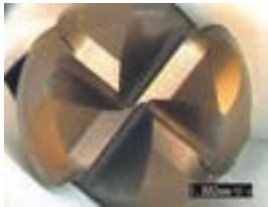

○ Cutting example 1

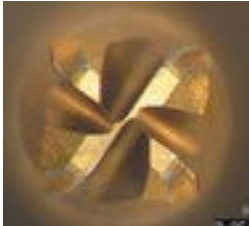
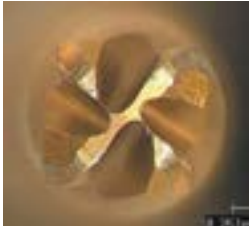
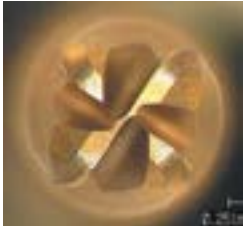
Work material : DAC(48HRC) 60mm×70mm×50mm

Incline angle:1° Groove width :2.7mm Groove depth :30mm

Cutting work shape

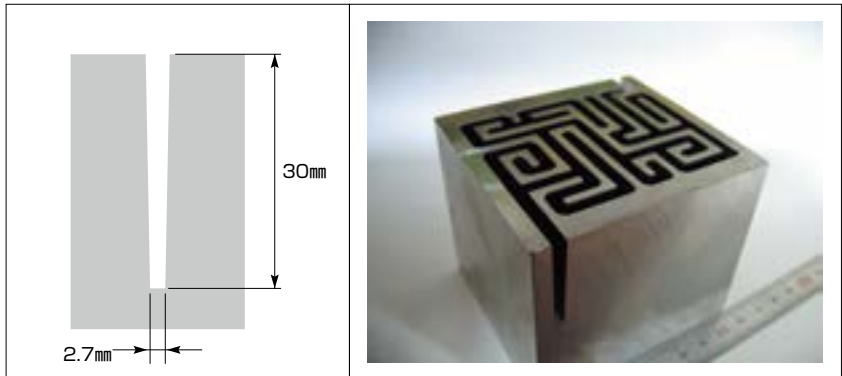


	Process 1	Process 2
Tool	ETM4120-20-TH	ETM4060-15-TH
Revolution	2100min ⁻¹ (79m/min)	4200min ⁻¹ (79m/min)
Feed rate	4790mm/min (0.57mm/t)	5040mm/min (0.3mm/t)
Depth of cut	$a_p \times a_e = 0.35\text{mm} \times 6\text{mm}$	$a_p \times a_e = 0.25\text{mm} \times 1\text{mm}$
Cutting time	25 min.	15 min.
		

	Process 3	Process 4	Process 5
Tool	ETRP4020-15-0905-TH	ETRP4020-20-0905-TH	ETRP4020-30-0905-TH
Revolution	12700min ⁻¹ (80m/min)	12700min ⁻¹ (80m/min)	12700min ⁻¹ (80m/min)
Feed rate	4060mm/min(0.08mm/t)	4060mm/min (0.08mm/t)	4060mm/min (0.08mm/t)
Depth of cut	$a_p \times a_e = 0.07\text{mm} \times 1\text{mm}$	$a_p \times a_e = 0.04\text{mm} \times 1\text{mm}$	$a_p \times a_e = 0.03\text{mm} \times 1\text{mm}$
Cutting time	55 min.	75 min.	45 min.
			

Cutting example 2

Work material:
 DAC (48HRC)
 80mm×70mm×50mm
 Incline angle: 1°
 Groove width : 2.7 (Bottom)
 Groove depth : 30mm



No.	Tool name	Tool dia.	Corner radius RE	Under neck	Revolution min ⁻¹	Feed rate mm/min	ap	ae	Cooling method	Cutting depth	Cutting time
1	ETR4025-10-05-TH	2.5	0.5	10	10,200	4,340	0.063	1.250	Water base	-10.0	54min.
2	ETRP4025-20-0905-TH	2.5	0.5	20	10,200	4,340	0.047	1.250	Water base	-20.0	1hr.10min.
3	ETRP4025-30-0905-TH	2.5	0.5	30	10,200	4,340	0.031	1.250	Water base	-25.0	54min.
4	ETRP4025-30-0905-TH	2.5	0.5	30	10,200	4,340	0.031	1.250	Water base	-30.0	54min.

Total machining time : **3hr. 52min.**

Comparison of machining cost compared to ball end mills

When using a ball end mill

Process 1 RE1.25×under neck 10

$n=16000\text{min}^{-1}$, $v_f=2500\text{mm/min}$, $a_p \times a_e=0.2\text{mm} \times 0.35\text{mm}$
 Cutting time : 1hr. 25min. Cutting cost : ¥9,989

Process 2 RE1.25×under neck 20

$n=12000\text{min}^{-1}$, $v_f=1500\text{mm/min}$, $a_p \times a_e=0.08\text{mm} \times 0.15\text{mm}$
 Cutting time : 8hr. 51min. Cutting cost : ¥62,392

Process 3 RE1.25×under neck 25

$n=10000\text{min}^{-1}$, $v_f=930\text{mm/min}$, $a_p \times a_e=0.05\text{mm} \times 0.1\text{mm}$
 Cutting time : 12hr. 56min. Cutting cost : ¥91,183

Process 4 RE1.25×under neck 30

$n=8000\text{min}^{-1}$, $v_f=680\text{mm/min}$, $a_p \times a_e=0.02\text{mm} \times 0.06\text{mm}$
 Cutting time : 57hr. 14min. Cutting cost : ¥403,496

Total machining time: 80 hr. 26 min.
Total machining cost: ¥567,060

Because using a ball end mill takes too much time, in reality electrodischarge machining is used.

When using Epoch Turbo Rib

Process 1 φ2.5×RE0.5×under neck 10

$n=10200\text{min}^{-1}$, $v_f=4340\text{mm/min}$, $a_p \times a_e=0.063\text{mm} \times 1.25\text{mm}$
 Cutting time : 54min. Cutting cost : ¥8,148

Process 2 φ2.5×RE0.5×under neck 20

$n=10200\text{min}^{-1}$, $v_f=4340\text{mm/min}$, $a_p \times a_e=0.047\text{mm} \times 1.25\text{mm}$
 Cutting time : 1hr.10min. Cutting cost : ¥10,559

Process 3 φ2.5×RE0.5×under neck 30

$n=10200\text{min}^{-1}$, $v_f=4340\text{mm/min}$, $a_p \times a_e=0.031\text{mm} \times 1.25\text{mm}$
 Cutting time : 54min. Cutting cost : ¥8,145

Process 4 φ2.5×RE0.5×under neck 30

$n=10200\text{min}^{-1}$, $v_f=4340\text{mm/min}$, $a_p \times a_e=0.031\text{mm} \times 1.25\text{mm}$
 Cutting time : 54min. Cutting cost : ¥8,145

Total machining time: 3 hr. 52 min.
Total machining cost: ¥34,997

Cutting can be performed with Turbo Rib!
Machining time is reduced!

※Processing cost is calculated by our Production 50 Solution sheet.



The diagrams and table data are examples of test results, and are not guaranteed values.
 "MOLDINO" is a registered trademark of MOLDINO Tool Engineering, Ltd.



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) 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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