MOLDINO
The Edge To Innovation

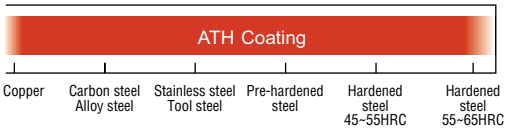
EPDRE-ATH

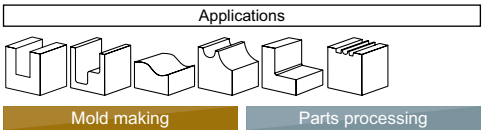
Epoch Deep Radius Evolution

MOLDINO Tool Engineering, Ltd.
New Product News | No.1217E-14 | 2026-2

Total 332 sizes.

Minimum corner R size of 0.02mm also in lineup!





EPDRE-ATH

ϕ0.2～ϕ6 [332 Items]

Features　Improved heat-resistant coating　ATHcoating

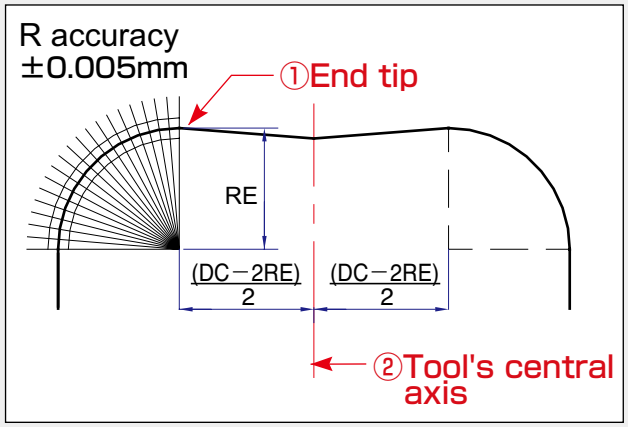
Features and characteristics

- 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

Features　Guaranteed R accuracy for performing high-accuracy processing.

Corner radius accuracy guaranteed with tool center as reference point.
Enables more accurate finishing when finishing molds.

High corner radius accuracy



Accuracy basis
①End tip　②Tool's central axis

Like ball end mills, corner radius accuracy is kept to within ±0.005mm relative to the tool's central axis, achieving a high corner radius accuracy. This enables high-accuracy finish machining to be performed, something which has been difficult to do with previous corner radius end mills.

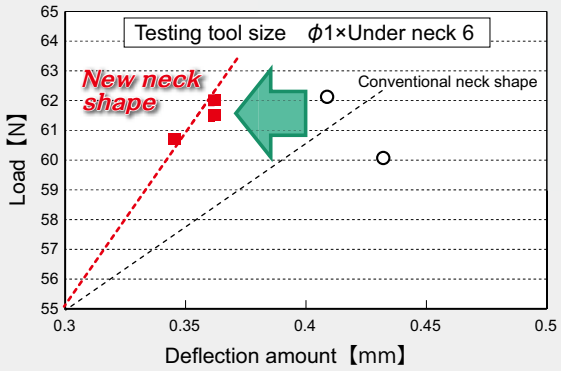
Features Improved compound neck shape

Employs reliable compound neck shape

●Compound shape of tool neck R and taper is further improved to both resist breakage and suppress deflection.

※Since the actual effective under-neck length is shorter than the conventional Deep Radius, be sure to check the interference region before use.

Static load test results



Deflection suppression effect is high even under the same load.

Results for resistance to breakage due to cutting

Work material：SUS420J2Ⓗ(Hardness：52HRC)
Tool dia.：ϕ1(RE0.2)×Under neck length10
Cutting condition：n=12800min^{-1} v_f=200mm/min～
Dry with Air blow a_p×a_e=0.02mm×1mm

	Vf (mm/min)						
	～600	800	1,000	1,200	1,400	1,600	1,800
EPDRE -ATH	○	○	○	○	○	○	○

Although the feed rate for the standard cutting conditions (high performance) is 815mm/min, cutting could be performed without problems even when processing was performed at more than twice that feed rate.

⇒Worries about breakage due to concentration of stress are greatly reduced!

These cutting tests are some cutting examples, and the performance shown in these examples is not guaranteed.

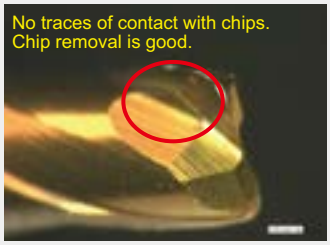
【Caution】 The interference region has changed due to changes in the neck shape. Be sure to check for interference before starting machining.

Features Flute shape that increases stability

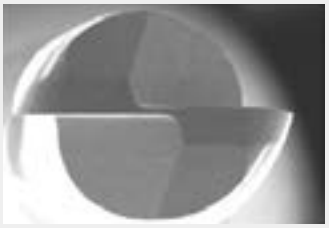
Smooth chip removal flute shape

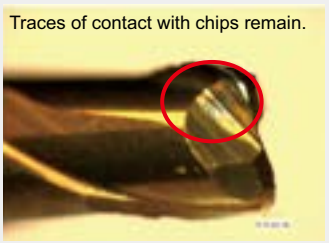
High chip removal characteristics effective when performing deep cutting.

Double-gash shape



Conventional gash shape

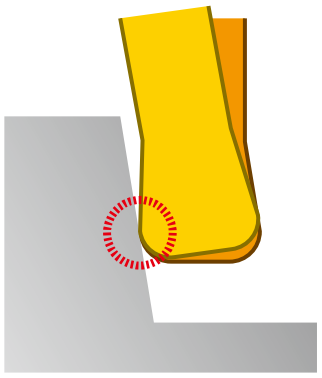




Tool diameter less than φ1 does not have Double-gash shape.

Reliable backdraft shape

Inherits the reliable backdraft shape (Large backtaper)! Can reduce chattering when doing point cutting.



Back draft effect

ATHcoating

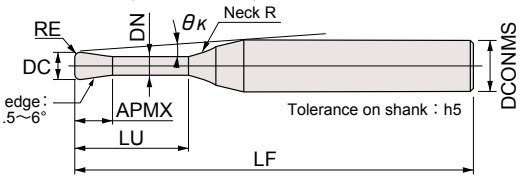
Radius

2 Flutes

Tolerance on corner radius RE：±0.005mm(centerline datum)

Helix angle：30°

Back taper on peripheral edge：1.5～6°



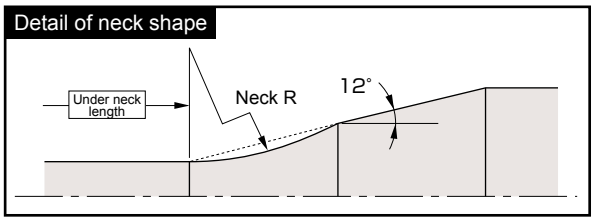
EPDRE2○○○○-○○.○-○○○-ATH

ϕ 4 or higher does not have backdraft shape.

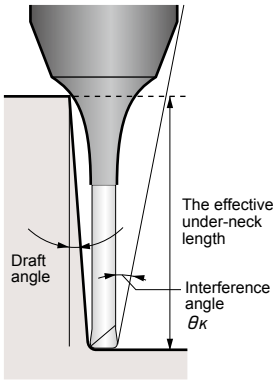
Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θK	0.5°	1°	1.5°	2°	3°
EPDRE2002-0.5-002-ATH	●	0.2	0.02	0.5	0.15	0.17	50	4	1	11.33	0.70	0.73	0.75	0.78	0.83
EPDRE2002-1-002-ATH	●			1						10.77	1.22	1.26	1.30	1.34	1.41
EPDRE2002-2-002-ATH	●			2						9.81	2.26	2.32	2.38	2.47	2.74
EPDRE2002-0.5-005-ATH	●		0.05	0.5						11.36	0.70	0.73	0.75	0.78	0.82
EPDRE2002-1-005-ATH	●			1						10.81	1.22	1.26	1.30	1.34	1.40
EPDRE2002-1.5-005-ATH	●			1.5						10.30	1.74	1.79	1.84	1.89	2.06
EPDRE2002-2-005-ATH	●			2						9.84	2.25	2.32	2.38	2.46	2.73
EPDRE2003-1-002-ATH	●	0.3	0.02	1	0.25	0.27	50	4	2	10.74	1.32	1.39	1.45	1.51	1.62
EPDRE2003-2-002-ATH	●			2						9.77	2.37	2.47	2.56	2.64	2.78
EPDRE2003-3-002-ATH	●			3						8.95	3.42	3.54	3.65	3.74	4.06
EPDRE2003-1-005-ATH	●		0.05	1						10.78	1.32	1.39	1.45	1.50	1.61
EPDRE2003-1.5-005-ATH	●			1.5						10.26	1.84	1.93	2.01	2.07	2.20
EPDRE2003-2-005-ATH	●			2						9.79	2.37	2.47	2.56	2.64	2.77
EPDRE2003-2.5-005-ATH	●			2.5						9.36	2.89	3.01	3.10	3.19	3.39
EPDRE2003-3-005-ATH	●			3						8.97	3.41	3.54	3.65	3.74	4.05
EPDRE2004-1-002-ATH	●	0.4	0.02	1	0.3	0.37	50	4	2	10.71	1.32	1.39	1.45	1.51	1.62
EPDRE2004-2-002-ATH	●			2						9.72	2.37	2.47	2.56	2.64	2.78
EPDRE2004-3-002-ATH	●			3						8.89	3.42	3.54	3.65	3.74	4.06
EPDRE2004-4-002-ATH	●			4						8.19	4.46	4.60	4.73	4.86	5.39
EPDRE2004-1-005-ATH	●		0.05	1						10.75	1.32	1.39	1.45	1.50	1.61
EPDRE2004-1.5-005-ATH	●			1.5						10.22	1.84	1.93	2.01	2.07	2.20
EPDRE2004-2-005-ATH	●			2						9.74	2.37	2.47	2.56	2.64	2.77
EPDRE2004-2.5-005-ATH	●			2.5						9.31	2.89	3.01	3.10	3.19	3.39
EPDRE2004-3-005-ATH	●			3						8.91	3.41	3.54	3.65	3.74	4.05
EPDRE2004-3.5-005-ATH	●			3.5						8.54	3.93	4.07	4.19	4.29	4.72
EPDRE2004-4-005-ATH	●			4						8.21	4.45	4.60	4.72	4.86	5.38
EPDRE2004-1-01-ATH	●		0.1	1						10.80	1.31	1.38	1.44	1.50	1.60
EPDRE2004-2-01-ATH	●			2						9.79	2.37	2.47	2.55	2.63	2.77
EPDRE2004-3-01-ATH	●			3						8.95	3.41	3.54	3.64	3.74	4.04
EPDRE2004-4-01-ATH	●			4						8.24	4.45	4.60	4.72	4.85	5.37
EPDRE2005-1-002-ATH	●	0.5	0.02	1	0.35	0.47	50	4	2	10.68	1.32	1.39	1.45	1.51	1.62
EPDRE2005-2-002-ATH	●			2						9.66	2.37	2.47	2.56	2.64	2.78
EPDRE2005-3-002-ATH	●			3						8.82	3.42	3.54	3.65	3.74	4.06
EPDRE2005-4-002-ATH	●			4						8.11	4.46	4.60	4.73	4.86	5.39
EPDRE2005-6-002-ATH	●			6						6.99	6.53	6.71	6.92	7.26	8.05
EPDRE2005-1-005-ATH	●		0.05	1						10.71	1.32	1.39	1.45	1.50	1.61
EPDRE2005-2-005-ATH	●			2						9.69	2.37	2.47	2.56	2.64	2.77
EPDRE2005-3-005-ATH	●			3						8.84	3.41	3.54	3.65	3.74	4.05
EPDRE2005-4-005-ATH	●			4						8.13	4.45	4.60	4.72	4.86	5.38
EPDRE2005-5-005-ATH	●			5						7.53	5.49	5.66	5.79	6.05	6.71
EPDRE2005-6-005-ATH	●			6						7.00	6.53	6.71	6.91	7.25	8.04
EPDRE2005-1-01-ATH	●		0.1	1						10.77	1.31	1.38	1.44	1.50	1.60
EPDRE2005-2-01-ATH	●			2						9.74	2.37	2.47	2.55	2.63	2.77
EPDRE2005-3-01-ATH	●			3						8.88	3.41	3.54	3.64	3.74	4.04
EPDRE2005-4-01-ATH	●			4						8.17	4.45	4.60	4.72	4.85	5.37
EPDRE2005-5-01-ATH	●			5						7.55	5.49	5.66	5.79	6.04	6.69
EPDRE2005-6-01-ATH	●			6						7.03	6.52	6.71	6.90	7.24	8.02

● : Stocked items.

Detail of neck shape



【Note】
The effective under-neck length is different from Epoch Deep Radius EPDR. Please recheck the interference region.



EPDRE2○○○○-○○.○-○○○-ATH

Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θK	0.5°	1°	1.5°	2°	3°
EPDRE2006-2-002-ATH	●	0.6	0.02	2	0.4	0.57	50	4	4	9.61	2.54	2.70	2.83	2.96	3.19
EPDRE2006-4-002-ATH	●			4						8.04	4.66	4.88	5.07	5.24	5.52
EPDRE2006-6-002-ATH	●			6						6.90	6.76	7.03	7.26	7.45	8.05
EPDRE2006-2-005-ATH	●		0.05	2						9.64	2.54	2.69	2.83	2.95	3.18
EPDRE2006-4-005-ATH	●			4						8.06	4.66	4.88	5.07	5.23	5.52
EPDRE2006-6-005-ATH	●			6						6.92	6.76	7.03	7.26	7.45	8.04
EPDRE2006-8-005-ATH	●			8						6.06	8.85	9.16	9.41	9.64	10.69
EPDRE2006-10-005-ATH	●			10						5.39	10.93	11.28	11.55	12.04	13.35
EPDRE2006-2-01-ATH	●		0.1	2						9.68	2.53	2.69	2.82	2.95	3.17
EPDRE2006-4-01-ATH	●			4						8.09	4.65	4.88	5.06	5.23	5.51
EPDRE2006-6-01-ATH	●			6						6.94	6.76	7.03	7.25	7.44	8.02
EPDRE2006-8-01-ATH	●			8						6.08	8.85	9.16	9.41	9.63	10.67
EPDRE2006-10-01-ATH	●			10						5.41	10.92	11.27	11.55	12.03	13.33
EPDRE2007-2-005-ATH	●	0.7	0.05	2	0.45	0.67	50	4	4	9.58	2.54	2.69	2.83	2.95	3.18
EPDRE2007-4-005-ATH	●			4						7.98	4.66	4.88	5.07	5.23	5.52
EPDRE2007-6-005-ATH	●			6						6.83	6.76	7.03	7.26	7.45	8.04
EPDRE2007-2-01-ATH	●		0.1	2						9.63	2.53	2.69	2.82	2.95	3.17
EPDRE2007-4-01-ATH	●			4						8.01	4.65	4.88	5.06	5.23	5.51
EPDRE2007-6-01-ATH	●			6						6.86	6.76	7.03	7.25	7.44	8.02
EPDRE2008-2-002-ATH	●	0.8	0.02	2	0.5	0.77	50	4	4	9.49	2.54	2.70	2.83	2.96	3.19
EPDRE2008-4-002-ATH	●			4						7.87	4.66	4.88	5.07	5.24	5.52
EPDRE2008-6-002-ATH	●			6						6.73	6.76	7.03	7.26	7.45	8.05
EPDRE2008-2-005-ATH	●		0.05	2						9.52	2.54	2.69	2.83	2.95	3.18
EPDRE2008-4-005-ATH	●			4						7.89	4.66	4.88	5.07	5.23	5.52
EPDRE2008-6-005-ATH	●			6						6.74	6.76	7.03	7.26	7.45	8.04
EPDRE2008-8-005-ATH	●			8						5.88	8.85	9.16	9.41	9.64	10.69
EPDRE2008-12-005-ATH	●			12			55			4.68	13.00	13.38	13.75	14.43	16.00
EPDRE2008-2-01-ATH	●		0.1	2			50			9.57	2.53	2.69	2.82	2.95	3.17
EPDRE2008-4-01-ATH	●			4						7.93	4.65	4.88	5.06	5.23	5.51
EPDRE2008-6-01-ATH	●			6						6.77	6.76	7.03	7.25	7.44	8.02
EPDRE2008-8-01-ATH	●			8						5.90	8.85	9.16	9.41	9.63	10.67
EPDRE2008-12-01-ATH	●			12			55			4.70	13.00	13.38	13.75	14.42	15.98
EPDRE2008-2-02-ATH	●		0.2	2			50			9.67	2.53	2.68	2.81	2.93	3.15
EPDRE2008-4-02-ATH	●			4						8.00	4.65	4.87	5.05	5.21	5.50
EPDRE2008-6-02-ATH	●			6						6.82	6.75	7.02	7.24	7.43	7.99
EPDRE2008-8-02-ATH	●			8						5.94	8.84	9.15	9.40	9.62	10.64
EPDRE2008-12-02-ATH	●			12			55			4.72	12.99	13.37	13.73	14.40	15.95
EPDRE2010-2-002-ATH	●	1	0.02	2	0.8	0.94	50	4	4	9.29	2.64	2.78	2.91	3.03	3.24
EPDRE2010-4-002-ATH	●			4						7.65	4.75	4.95	5.13	5.29	5.56
EPDRE2010-6-002-ATH	●			6						6.50	6.84	7.09	7.31	7.49	8.14
EPDRE2010-8-002-ATH	●			8						5.65	8.92	9.21	9.46	9.73	10.79
EPDRE2010-10-002-ATH	●			10						5.00	10.99	11.32	11.59	12.13	13.45
EPDRE2010-12-002-ATH	●			12			55			4.48	13.06	13.42	13.84	14.52	16.10
EPDRE2010-2-005-ATH	●		0.05	2			50			9.32	2.64	2.78	2.91	3.02	3.24
EPDRE2010-3-005-ATH	●			3						8.41	3.70	3.87	4.02	4.16	4.41
EPDRE2010-4-005-ATH	●			4						7.67	4.75	4.95	5.13	5.28	5.56
EPDRE2010-5-005-ATH	●			5						7.04	5.79	6.02	6.22	6.39	6.80
EPDRE2010-6-005-ATH	●			6						6.51	6.84	7.09	7.30	7.49	8.13
EPDRE2010-8-005-ATH	●			8						5.66	8.92	9.21	9.46	9.73	10.78
EPDRE2010-10-005-ATH	●			10						5.00	10.99	11.32	11.59	12.12	13.44
EPDRE2010-12-005-ATH	●			12			55			4.48	13.06	13.42	13.84	14.51	16.09
EPDRE2010-16-005-ATH	●			16			60			3.71	17.18	17.60	18.40	19.30	21.40
EPDRE2010-20-005-ATH	●			20						3.17	21.29	21.93	22.96	24.09	26.71

Radius

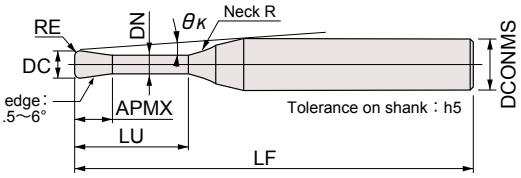
2 Flutes

ATHCoating

Tolerance on corner radius RE：±0.005mm(centerline datum)

Helix angle：30°

Back taper on peripheral edge：1.5～6°



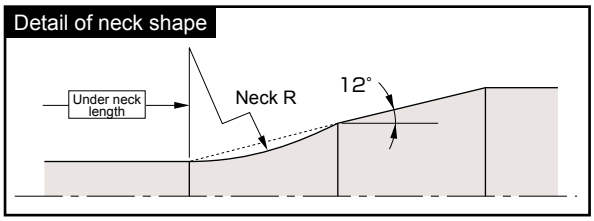
EPDRE2○○○○-○○.○-○○○-ATH

ϕ 4 or higher does not have backdraft shape.

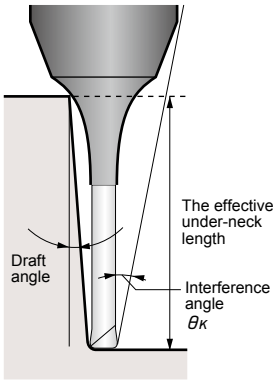
Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θK	0.5°	1°	1.5°	2°	3°
EPDRE2010-2-01-ATH	●	1	0.1	2	0.8	0.94	50	4	4	9.37	2.64	2.78	2.90	3.01	3.23
EPDRE2010-3-01-ATH	●			3						8.45	3.69	3.87	4.02	4.15	4.40
EPDRE2010-4-01-ATH	●			4						7.70	4.74	4.95	5.12	5.28	5.55
EPDRE2010-5-01-ATH	●			5						7.07	5.79	6.02	6.21	6.39	6.79
EPDRE2010-6-01-ATH	●			6						6.54	6.83	7.09	7.30	7.49	8.11
EPDRE2010-8-01-ATH	●			8						5.68	8.91	9.21	9.45	9.72	10.77
EPDRE2010-10-01-ATH	●			10						5.02	10.99	11.32	11.59	12.11	13.42
EPDRE2010-12-01-ATH	●			12			55			4.50	13.06	13.42	13.83	14.50	16.08
EPDRE2010-16-01-ATH	●			16			60			3.72	17.18	17.60	18.39	19.29	21.39
EPDRE2010-20-01-ATH	●			20						3.17	21.29	21.93	22.95	24.08	26.70
EPDRE2010-2-02-ATH	●		0.2	2			50			9.47	2.63	2.77	2.89	3.00	3.21
EPDRE2010-3-02-ATH	●			3						8.54	3.69	3.86	4.01	4.14	4.39
EPDRE2010-4-02-ATH	●			4						7.77	4.74	4.94	5.11	5.27	5.54
EPDRE2010-5-02-ATH	●			5						7.13	5.79	6.01	6.21	6.38	6.75
EPDRE2010-6-02-ATH	●			6						6.59	6.83	7.08	7.29	7.48	8.08
EPDRE2010-8-02-ATH	●			8						5.72	8.91	9.20	9.45	9.70	10.74
EPDRE2010-10-02-ATH	●			10						5.05	10.98	11.32	11.58	12.09	13.39
EPDRE2010-12-02-ATH	●			12			55			4.52	13.05	13.42	13.81	14.48	16.05
EPDRE2010-16-02-ATH	●			16			60			3.74	17.18	17.59	18.38	19.27	21.35
EPDRE2010-20-02-ATH	●			20						3.19	21.29	21.92	22.94	24.06	26.66
EPDRE2010-2-03-ATH	●		0.3	2			50			9.57	2.63	2.76	2.87	2.98	3.19
EPDRE2010-3-03-ATH	●			3						8.62	3.68	3.85	3.99	4.13	4.37
EPDRE2010-4-03-ATH	●			4						7.84	4.73	4.93	5.10	5.25	5.53
EPDRE2010-5-03-ATH	●			5						7.19	5.78	6.01	6.20	6.37	6.72
EPDRE2010-6-03-ATH	●			6						6.64	6.82	7.07	7.28	7.47	8.05
EPDRE2010-8-03-ATH	●			8						5.75	8.91	9.20	9.44	9.68	10.70
EPDRE2010-10-03-ATH	●			10						5.08	10.98	11.31	11.58	12.07	13.36
EPDRE2010-12-03-ATH	●			12			55			4.54	13.05	13.41	13.80	14.46	16.01
EPDRE2010-16-03-ATH	●			16			60			3.75	17.17	17.59	18.36	19.25	21.32
EPDRE2010-20-03-ATH	●			20						3.20	21.28	21.91	22.92	24.04	26.63
EPDRE20125-5-01-ATH	●	1.25	0.1	5	1.15	1.18	50	4	4	6.80	5.81	6.04	6.23	6.40	6.82
EPDRE20125-10-01-ATH	●			10						4.76	11.01	11.34	11.60	12.14	13.45
EPDRE20125-15-01-ATH	●			15			55			3.66	16.17	16.57	17.28	18.12	20.09
EPDRE20125-20-01-ATH	●			20			60			2.97	21.30	21.95	22.98	24.10	No interference
EPDRE20125-5-02-ATH	●		0.2	5			50			6.86	5.81	6.03	6.22	6.39	6.79
EPDRE20125-10-02-ATH	●			10						4.79	11.00	11.33	11.59	12.12	13.42
EPDRE20125-15-02-ATH	●			15			55			3.68	16.16	16.56	17.26	18.10	20.06
EPDRE20125-20-02-ATH	●			20			60			2.98	21.30	21.95	22.97	24.09	No interference
EPDRE20125-5-03-ATH	●		0.3	5			50			6.92	5.81	6.03	6.21	6.38	6.75
EPDRE20125-10-03-ATH	●			10						4.82	11.00	11.32	11.59	12.10	13.39
EPDRE20125-15-03-ATH	●			15			55			3.69	16.16	16.56	17.25	18.08	20.03
EPDRE20125-20-03-ATH	●			20			60			2.99	21.30	21.94	22.95	24.07	No interference
EPDRE2015-4-01-ATH	●	1.5	0.1	4	1.35	1.42	50	4	4	7.15	4.80	4.99	5.16	5.31	5.58
EPDRE2015-6-01-ATH	●			6						5.97	6.88	7.12	7.33	7.51	8.18
EPDRE2015-8-01-ATH	●			8						5.12	8.96	9.24	9.48	9.77	10.83
EPDRE2015-12-01-ATH	●			12			55			3.98	13.09	13.45	13.88	14.56	16.14
EPDRE2015-15-01-ATH	●			15						3.42	16.18	16.58	17.30	18.15	20.12
EPDRE2015-20-01-ATH	●			20			60			2.76	21.32	21.98	23.01	24.13	No interference

● : Stocked items.

Detail of neck shape



【Note】
The effective under-neck length is different from Epoch Deep Radius EPDR. Please recheck the interference region.



EPDRE2○○○○-○○.○-○○○-ATH

Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θκ	0.5°	1°	1.5°	2°	3°
EPDRE2015-4-02-ATH	●	1.5	0.2	4	1.35	1.42	50	4	4	7.22	4.79	4.98	5.15	5.30	5.57
EPDRE2015-6-02-ATH	●			6						6.02	6.88	7.12	7.32	7.50	8.14
EPDRE2015-8-02-ATH	●			8						5.16	8.95	9.24	9.47	9.75	10.80
EPDRE2015-12-02-ATH	●			12			55			4.01	13.09	13.44	13.87	14.54	16.11
EPDRE2015-15-02-ATH	●			15						3.43	16.18	16.58	17.29	18.13	20.09
EPDRE2015-20-02-ATH	●			20			60			2.77	21.32	21.97	22.99	24.11	No interference
EPDRE2015-4-03-ATH	●		0.3	4			50			7.30	4.79	4.97	5.14	5.29	5.55
EPDRE2015-6-03-ATH	●			6						6.07	6.87	7.11	7.31	7.49	8.11
EPDRE2015-8-03-ATH	●			8						5.19	8.95	9.23	9.47	9.73	10.77
EPDRE2015-12-03-ATH	●			12			55			4.03	13.09	13.44	13.85	14.52	16.08
EPDRE2015-15-03-ATH	●			15						3.45	16.18	16.57	17.28	18.11	20.06
EPDRE2015-20-03-ATH	●			20			60			2.78	21.31	21.96	22.98	24.09	No interference
EPDRE2015-4-05-ATH	●		0.5	4			50			7.45	4.78	4.96	5.12	5.26	5.53
EPDRE2015-6-05-ATH	●			6						6.17	6.86	7.10	7.30	7.48	8.05
EPDRE2015-8-05-ATH	●			8						5.27	8.94	9.22	9.45	9.70	10.70
EPDRE2015-12-05-ATH	●			12			55			4.07	13.08	13.43	13.83	14.48	16.01
EPDRE2015-15-05-ATH	●			15						3.48	16.17	16.56	17.25	18.07	19.99
EPDRE2015-20-05-ATH	●			20			60			2.80	21.31	21.95	22.95	24.06	No interference
EPDRE20175-5-01-ATH	●	1.75	0.1	5	1.55	1.67	50	4	4	6.19	5.84	6.06	6.25	6.42	6.85
EPDRE20175-10-01-ATH	●			10						4.19	11.03	11.35	11.61	12.17	13.49
EPDRE20175-15-01-ATH	●			15			55			3.16	16.18	16.58	17.30	18.15	20.12
EPDRE20175-20-01-ATH	●			20			60			2.54	21.32	21.98	23.01	24.13	No interference
EPDRE20175-5-02-ATH	●		0.2	5			50			6.25	5.84	6.05	6.24	6.41	6.82
EPDRE20175-10-02-ATH	●			10						4.22	11.02	11.34	11.61	12.15	13.45
EPDRE20175-15-02-ATH	●			15			55			3.18	16.18	16.58	17.29	18.13	20.09
EPDRE20175-20-02-ATH	●			20			60			2.55	21.32	21.97	22.99	24.11	No interference
EPDRE20175-5-03-ATH	●		0.3	5			50			6.31	5.83	6.05	6.23	6.40	6.79
EPDRE20175-10-03-ATH	●			10						4.24	11.02	11.34	11.60	12.13	13.42
EPDRE20175-15-03-ATH	●			15			55			3.20	16.18	16.57	17.28	18.11	20.06
EPDRE20175-20-03-ATH	●			20			60			2.56	21.31	21.96	22.98	24.09	No interference
EPDRE2020-4-01-ATH	●	2	0.1	4	1.7	1.92	50	4	4	6.49	4.80	4.99	5.16	5.31	5.58
EPDRE2020-6-01-ATH	●			6						5.30	6.88	7.12	7.33	7.51	8.18
EPDRE2020-8-01-ATH	●			8						4.47	8.96	9.24	9.48	9.77	10.83
EPDRE2020-12-01-ATH	●			12			55			3.41	13.09	13.45	13.88	14.56	16.14
EPDRE2020-16-01-ATH	●			16						2.76	17.21	17.62	18.44	19.35	No interference
EPDRE2020-20-01-ATH	●			20			60			2.31	21.32	21.98	23.01	24.13	No interference
EPDRE2020-25-01-ATH	●			25			65			1.93	26.44	27.43	28.71	No interference	No interference
EPDRE2020-30-01-ATH	●			30			70			1.65	31.55	32.88	34.41	No interference	No interference
EPDRE2020-4-02-ATH	●		0.2	4			50			6.57	4.79	4.98	5.15	5.30	5.57
EPDRE2020-6-02-ATH	●			6						5.35	6.88	7.12	7.32	7.50	8.14
EPDRE2020-8-02-ATH	●			8						4.51	8.95	9.24	9.47	9.75	10.80
EPDRE2020-12-02-ATH	●			12			55			3.43	13.09	13.44	13.87	14.54	16.11
EPDRE2020-16-02-ATH	●			16						2.77	17.21	17.62	18.43	19.33	No interference
EPDRE2020-20-02-ATH	●			20			60			2.32	21.32	21.97	22.99	24.11	No interference
EPDRE2020-25-02-ATH	●			25			65			1.93	26.44	27.42	28.69	No interference	No interference
EPDRE2020-30-02-ATH	●			30			70			1.66	31.55	32.87	34.40	No interference	No interference

ATHCoating

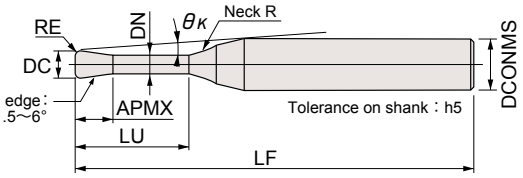
Radius

2 Flutes

Tolerance on corner radius RE：±0.005mm(centerline datum)

Helix angle：30°

Back taper on peripheral edge：1.5～6°



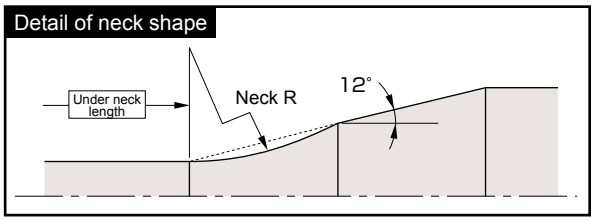
EPDRE2○○○○-○○.○-○○○-ATH

ϕ 4 or higher does not have backdraft shape.

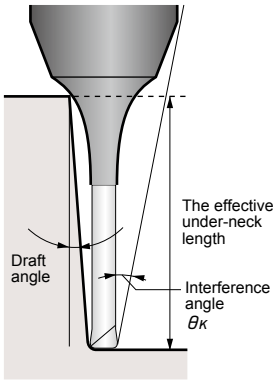
Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θκ	0.5°	1°	1.5°	2°	3°
EPDRE2020-4-03-ATH	●	2	0.3	4		0.94	50	4	4	6.64	4.79	4.97	5.14	5.29	5.55
EPDRE2020-6-03-ATH	●			6						5.40	6.87	7.11	7.31	7.49	8.11
EPDRE2020-8-03-ATH	●			8						4.55	8.95	9.23	9.47	9.73	10.77
EPDRE2020-12-03-ATH	●			12			55			3.45	13.09	13.44	13.85	14.52	16.08
EPDRE2020-16-03-ATH	●			16						2.79	17.21	17.61	18.42	19.31	No interference
EPDRE2020-20-03-ATH	●			20			60			2.33	21.31	21.96	22.98	24.09	No interference
EPDRE2020-25-03-ATH	●			25			65			1.94	26.43	27.41	28.68	No interference	No interference
EPDRE2020-30-03-ATH	●			30			70			1.66	31.55	32.86	34.38	No interference	No interference
EPDRE2020-6-05-ATH	●		0.5	6			50			5.50	6.86	7.10	7.30	7.48	8.05
EPDRE2020-8-05-ATH	●			8						4.62	8.94	9.22	9.45	9.70	10.70
EPDRE2020-12-05-ATH	●			12			55			3.50	13.08	13.43	13.83	14.48	16.01
EPDRE2020-16-05-ATH	●			16						2.81	17.20	17.61	18.39	19.27	No interference
EPDRE2020-20-05-ATH	●			20			60			2.35	21.31	21.95	22.95	24.06	No interference
EPDRE2020-25-05-ATH	●			25			65			1.95	26.43	27.39	28.65	No interference	No interference
EPDRE2020-30-05-ATH	●			30			70			1.67	31.54	32.84	34.36	No interference	No interference
EPDRE2020-6-08-ATH	●		0.8	6			50			5.66	6.85	7.08	7.27	7.45	7.95
EPDRE2020-8-08-ATH	●			8						4.73	8.93	9.20	9.43	9.64	10.61
EPDRE2020-12-08-ATH	●			12			55			3.56	13.07	13.41	13.78	14.42	15.92
EPDRE2020-16-08-ATH	●			16						2.85	17.19	17.59	18.35	19.21	No interference
EPDRE2020-20-08-ATH	●			20			60			2.38	21.30	21.92	22.91	24.00	No interference
EPDRE2020-25-08-ATH	●			25			65			1.97	26.42	27.37	28.61	No interference	No interference
EPDRE2020-30-08-ATH	●			30			70			1.69	31.53	32.81	34.31	No interference	No interference
EPDRE2025-10-01-ATH	●	2.5	0.1	10			50			3.14	11.08	11.39	11.68	12.25	13.58
EPDRE2025-20-01-ATH	●			20			60			1.82	21.36	22.06	23.09	No interference	No interference
EPDRE2025-30-01-ATH	●			30			70			1.28	31.59	32.95	No interference	No interference	No interference
EPDRE2025-10-02-ATH	●		0.2	10			50			3.16	11.08	11.39	11.67	12.23	13.55
EPDRE2025-20-02-ATH	●			20			60			1.83	21.36	22.05	23.07	No interference	No interference
EPDRE2025-30-02-ATH	●			30			70			1.28	31.58	32.94	No interference	No interference	No interference
EPDRE2025-10-03-ATH	●		0.3	10			50			3.19	11.08	11.38	11.65	12.21	13.52
EPDRE2025-20-03-ATH	●			20			60			1.83	21.36	22.04	23.06	No interference	No interference
EPDRE2025-30-03-ATH	●			30			70			1.29	31.58	32.93	No interference	No interference	No interference
EPDRE2025-10-05-ATH	●		0.5	10			50			3.24	11.07	11.37	11.63	12.17	13.45
EPDRE2025-20-05-ATH	●			20			60			1.85	21.35	22.02	23.03	No interference	No interference
EPDRE2025-30-05-ATH	●			30			70			1.30	31.58	32.92	No interference	No interference	No interference
EPDRE2030-6-01-ATH	●	3	0.1	6		1.18	50	4	4	6.45	7.01	7.23	7.42	7.59	8.36
EPDRE2030-8-01-ATH	●			8			55			5.61	9.07	9.34	9.56	9.94	11.02
EPDRE2030-12-01-ATH	●			12			60			4.45	13.20	13.53	14.04	14.73	16.33
EPDRE2030-16-01-ATH	●			16						3.69	17.30	17.78	18.60	19.52	21.64
EPDRE2030-18-01-ATH	●			18			65			3.40	19.35	19.96	20.89	21.91	24.29
EPDRE2030-20-01-ATH	●			20						3.15	21.40	22.13	23.17	24.30	26.95
EPDRE2030-30-01-ATH	●			30			75			2.31	31.62	33.03	34.57	36.27	No interference
EPDRE2030-35-01-ATH	●			35			80			2.04	36.83	38.48	40.27	42.25	No interference
EPDRE2030-6-02-ATH	●		0.2	6		1.42	50	4	4	6.49	7.00	7.22	7.41	7.58	8.33
EPDRE2030-8-02-ATH	●			8			55			5.65	9.07	9.33	9.55	9.92	10.99
EPDRE2030-12-02-ATH	●			12			60			4.48	13.19	13.52	14.03	14.71	16.30
EPDRE2030-16-02-ATH	●			16						3.71	17.30	17.77	18.59	19.50	21.60
EPDRE2030-18-02-ATH	●			18			65			3.41	19.35	19.95	20.87	21.89	24.26
EPDRE2030-20-02-ATH	●			20						3.16	21.40	22.13	23.15	24.28	26.91
EPDRE2030-30-02-ATH	●			30			75			2.31	31.62	33.02	34.56	36.25	No interference
EPDRE2030-35-02-ATH	●			35			80			2.04	36.83	38.47	40.26	42.23	No interference

● : Stocked items.

Detail of neck shape



【Note】
The effective under-neck length is different from Epoch Deep Radius EPDR. Please recheck the interference region.



EPDRE2○○○○-○○.○-○○○-ATH

Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θK	0.5°	1°	1.5°	2°	3°
EPDRE2030-6-03-ATH	●	3	0.3	6	2.5	2.86	50	6	4	6.54	7.00	7.22	7.40	7.57	8.30
EPDRE2030-8-03-ATH	●			8			55			5.68	9.07	9.33	9.54	9.90	10.95
EPDRE2030-12-03-ATH	●			12			60			4.50	13.19	13.52	14.02	14.69	16.26
EPDRE2030-16-03-ATH	●			16						3.72	17.30	17.76	18.58	19.48	21.57
EPDRE2030-18-03-ATH	●			18			65			3.43	19.35	19.94	20.86	21.87	24.23
EPDRE2030-20-03-ATH	●			20						3.17	21.40	22.12	23.14	24.26	26.88
EPDRE2030-30-03-ATH	●			30			75			2.32	31.62	33.01	34.54	36.23	No interference
EPDRE2030-35-03-ATH	●			35			80			2.05	36.82	38.46	40.25	42.21	No interference
EPDRE2030-8-05-ATH	●		0.5	8			55			5.76	9.06	9.31	9.53	9.87	10.89
EPDRE2030-12-05-ATH	●			12			60			4.55	13.18	13.51	13.99	14.65	16.20
EPDRE2030-16-05-ATH	●			16						3.75	17.29	17.74	18.55	19.44	21.51
EPDRE2030-18-05-ATH	●			18			65			3.45	19.34	19.92	20.83	21.83	24.16
EPDRE2030-20-05-ATH	●			20						3.20	21.39	22.10	23.11	24.22	26.82
EPDRE2030-30-05-ATH	●			30			75			2.33	31.61	32.99	34.52	36.19	No interference
EPDRE2030-35-05-ATH	●			35			80			2.06	36.82	38.44	40.22	42.17	No interference
EPDRE2030-8-1-ATH	●		1	8			55			5.96	9.05	9.29	9.50	9.77	10.73
EPDRE2030-12-1-ATH	●			12			60			4.67	13.17	13.49	13.92	14.55	16.04
EPDRE2030-16-1-ATH	●			16						3.84	17.28	17.70	18.48	19.34	21.35
EPDRE2030-18-1-ATH	●			18			65			3.52	19.33	19.88	20.76	21.73	24.00
EPDRE2030-20-1-ATH	●			20						3.26	21.38	22.05	23.04	24.13	26.66
EPDRE2030-30-1-ATH	●			30			75			2.37	31.60	32.95	34.45	36.09	No interference
EPDRE2030-35-1-ATH	●			35			80			2.08	36.79	38.40	40.15	42.08	No interference
EPDRE2040-8-01-ATH	●	4	0.1	8	3.5	3.8	55	6	4	4.38	9.18	9.42	9.64	10.11	11.21
EPDRE2040-12-01-ATH	●			12			60			3.36	13.29	13.60	14.20	14.90	16.51
EPDRE2040-16-01-ATH	●			16						2.72	17.39	17.93	18.77	19.68	No interference
EPDRE2040-20-01-ATH	●			20			65			2.29	21.48	22.29	23.33	24.47	No interference
EPDRE2040-30-01-ATH	●			30			75			1.64	31.77	33.18	34.73	No interference	No interference
EPDRE2040-35-01-ATH	●			35			80			1.43	36.98	38.63	No interference	No interference	No interference
EPDRE2040-45-01-ATH	●			45			90			1.15	47.41	49.52	No interference	No interference	No interference
EPDRE2040-8-02-ATH	●		0.2	8			55			4.41	9.18	9.42	9.63	10.09	11.17
EPDRE2040-12-02-ATH	●			12			60			3.38	13.29	13.59	14.19	14.88	16.48
EPDRE2040-16-02-ATH	●			16						2.73	17.39	17.92	18.75	19.66	No interference
EPDRE2040-20-02-ATH	●			20			65			2.30	21.48	22.28	23.31	24.45	No interference
EPDRE2040-30-02-ATH	●			30			75			1.64	31.76	33.17	34.72	No interference	No interference
EPDRE2040-35-02-ATH	●			35			80			1.44	36.98	38.62	No interference	No interference	No interference
EPDRE2040-45-02-ATH	●			45			90			1.15	47.40	49.52	No interference	No interference	No interference
EPDRE2040-8-03-ATH	●		0.3	8			55			4.45	9.17	9.41	9.62	10.07	11.14
EPDRE2040-12-03-ATH	●			12			60			3.40	13.28	13.59	14.18	14.86	16.45
EPDRE2040-16-03-ATH	●			16						2.75	17.38	17.91	18.74	19.65	No interference
EPDRE2040-20-03-ATH	●			20			65			2.31	21.48	22.27	23.30	24.43	No interference
EPDRE2040-30-03-ATH	●			30			75			1.65	31.76	33.16	34.71	No interference	No interference
EPDRE2040-35-03-ATH	●			35			80			1.44	36.97	38.61	No interference	No interference	No interference
EPDRE2040-45-03-ATH	●			45			90			1.15	47.40	49.51	No interference	No interference	No interference
EPDRE2040-12-05-ATH	●		0.5	12			60			3.44	13.28	13.58	14.15	14.82	16.39
EPDRE2040-16-05-ATH	●			16						2.77	17.38	17.89	18.71	19.61	No interference
EPDRE2040-20-05-ATH	●			20			65			2.33	21.47	22.25	23.27	24.39	No interference
EPDRE2040-30-05-ATH	●			30			75			1.66	31.75	33.15	34.68	No interference	No interference
EPDRE2040-35-05-ATH	●			35			80			1.45	36.96	38.59	No interference	No interference	No interference
EPDRE2040-45-05-ATH	●			45			90			1.16	47.39	49.49	No interference	No interference	No interference

ATHCoating

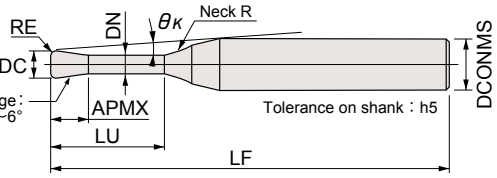
Radius

2 Flutes

Tolerance on corner radius RE：±0.005mm(centerline datum)

Helix angle：30°

Back taper on peripheral edge：1.5～6°



EPDRE2○○○○-○○.○-○○○-ATH

ϕ 4 or higher does not have backdraft shape.

Item code	Stock	Size(mm)								Interference angle (°)	Effective under neck length with respect to draft angle				
		Tool dia.	Corner radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R						
		DC	RE	LU	APMX	DN	LF	DCONMS		θK	0.5°	1°	1.5°	2°	3°
EPDRE2040-12-1-ATH	●	4	1	12	3.5	3.8	60	6	4	3.54	13.27	13.56	14.08	14.72	16.23
EPDRE2040-16-1-ATH	●			16						2.84	17.37	17.85	18.64	19.51	No interference
EPDRE2040-20-1-ATH	●			20			65			2.37	21.46	22.21	23.20	24.30	No interference
EPDRE2040-30-1-ATH	●			30			75			1.68	31.73	33.10	34.61	No interference	No interference
EPDRE2040-35-1-ATH	●			35			80			1.47	36.94	38.55	No interference	No interference	No interference
EPDRE2040-45-1-ATH	●			45			90			1.17	47.37	49.44	No interference	No interference	No interference
EPDRE2050-20-01-ATH	●	5	0.1	20	4	4.75	65	6	4	1.26	21.54	22.42	No interference	No interference	No interference
EPDRE2050-40-01-ATH	●			40			85			0.67	42.32	No interference	No interference	No interference	No interference
EPDRE2050-20-02-ATH	●		0.2	20			65			1.26	21.54	22.41	No interference	No interference	No interference
EPDRE2050-40-02-ATH	●			40			85			0.68	42.31	No interference	No interference	No interference	No interference
EPDRE2050-20-03-ATH	●		0.3	20			65			1.27	21.54	22.40	No interference	No interference	No interference
EPDRE2050-40-03-ATH	●			40			85			0.68	42.31	No interference	No interference	No interference	No interference
EPDRE2050-20-05-ATH	●		0.5	20			65			1.28	21.54	22.38	No interference	No interference	No interference
EPDRE2050-40-05-ATH	●			40			85			0.68	42.30	No interference	No interference	No interference	No interference
EPDRE2050-20-1-ATH	●		1	20			65			1.31	21.53	22.34	No interference	No interference	No interference
EPDRE2050-40-1-ATH	●			40			85			0.69	42.28	No interference	No interference	No interference	No interference
EPDRE2060-12-01-ATH	●	6	0.1	12	5	5.7	50	6	–	0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-18-01-ATH	●			18			60			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-24-01-ATH	●			24			70			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-35-01-ATH	●			35			80			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-55-01-ATH	●			55			100			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-12-02-ATH	●		0.2	12			50			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-18-02-ATH	●			18			60			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-24-02-ATH	●			24			70			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-35-02-ATH	●			35			80			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-55-02-ATH	●			55			100			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-12-03-ATH	●		0.3	12			50			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-18-03-ATH	●			18			60			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-24-03-ATH	●			24			70			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-35-03-ATH	●			35			80			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-55-03-ATH	●			55			100			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-18-05-ATH	●		0.5	18			60			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-24-05-ATH	●			24			70			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-35-05-ATH	●			35			80			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-55-05-ATH	●			55			100			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-18-1-ATH	●		1	18			60			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-24-1-ATH	●			24			70			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-35-1-ATH	●			35			80			0.01	No interference	No interference	No interference	No interference	No interference
EPDRE2060-55-1-ATH	●			55			100			0.01	No interference	No interference	No interference	No interference	No interference

● : Stocked items.

Regrinding compatibility range table

Item code	Product name	Shape	Re-grinding compatibility range(mm)	
			Outer dia.	End
EPDRE-ATH	Epoch Deep Radius Evolution		N/A	4～6

※The corner radius precision after regrinding uses the tool diameter as its datum.

Recommended Cutting Conditions

High efficiency cutting condition | High accuracy cutting condition

Please refer to P.16 about high accuracy cutting conditions

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
0.2	0.02	0.5	0.016	50,000	922	50,000	922	45,000	829	42,500	705	37,500	553	35,000	452
		1	0.011	50,000	922	50,000	922	45,000	829	42,500	705	37,500	553	35,000	452
		2	0.007	50,000	809	42,000	774	40,500	746	38,250	635	33,750	498	31,500	406
	0.05	0.5	0.02	50,000	922	50,000	922	45,000	829	42,500	705	37,500	553	35,000	452
		1	0.014	50,000	922	50,000	922	45,000	829	42,500	705	37,500	553	35,000	452
		1.5	0.008	50,000	809	47,000	866	42,750	788	40,375	670	35,625	525	33,250	429
		2	0.008	50,000	809	42,000	774	40,500	746	38,250	635	33,750	498	31,500	406
0.3	0.02	1	0.016	50,000	1,208	48,000	1,161	43,200	1,045	40,800	733	36,000	547	33,600	441
		2	0.011	45,000	998	38,880	860	34,992	774	33,048	594	29,160	443	27,216	357
		3	0.007	42,750	881	36,936	760	33,242	684	31,396	525	27,702	392	25,855	316
	0.05	1	0.021	50,000	1,208	48,000	1,161	43,200	1,045	40,800	733	36,000	547	33,600	441
		1.5	0.016	47,500	1,147	45,600	1,103	41,040	993	38,760	697	34,200	520	31,920	419
		2	0.012	45,000	998	38,880	860	34,992	774	33,048	594	29,160	443	27,216	357
		2.5	0.01	45,000	998	38,880	860	34,992	774	33,048	594	29,160	443	27,216	357
		3	0.008	42,750	881	36,936	760	33,242	684	31,396	525	27,702	392	25,855	316
0.4	0.02	1	0.016	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		2	0.013	46,080	1,115	38,300	929	34,560	836	32,256	714	28,800	557	26,726	457
		3	0.01	35,250	780	29,325	649	26,437	585	24,675	499	22,031	390	20,445	320
		4	0.007	29,029	642	24,150	535	21,772	481	20,320	411	18,143	321	16,837	263
	0.05	1	0.025	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		1.5	0.02	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		2	0.016	46,080	1,115	38,300	929	34,560	836	32,256	714	28,800	557	26,726	457
		2.5	0.015	43,200	1,062	36,000	885	32,400	796	30,600	677	27,000	531	25,200	434
		3	0.014	35,250	780	29,325	649	26,437	585	24,675	499	22,031	390	20,445	320
		3.5	0.012	33,048	731	27,540	609	24,786	548	23,409	467	20,655	365	19,278	299
		4	0.008	29,029	642	24,150	535	21,772	481	20,320	411	18,143	321	16,837	263
	0.1	1	0.033	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		2	0.028	46,080	1,115	38,300	929	34,560	836	32,256	714	28,800	557	26,726	457
		3	0.016	35,250	780	29,325	649	26,437	585	24,675	499	22,031	390	20,445	320
		4	0.01	29,029	642	24,150	535	21,772	481	20,320	411	18,143	321	16,837	263
0.5	0.02	1	0.016	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		2	0.013	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		3	0.01	37,325	1,000	31,104	839	27,994	750	26,438	634	23,328	473	21,773	381
		4	0.008	33,178	889	27,648	746	24,883	666	23,501	563	20,736	420	19,354	339
		6	0.006	25,805	666	21,504	555	19,354	499	18,278	320	16,128	282	15,053	222
	0.05	1	0.03	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		2	0.023	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		3	0.017	37,325	1,000	31,104	839	27,994	750	26,438	634	23,328	473	21,773	381
		4	0.017	33,178	889	27,648	746	24,883	666	23,501	563	20,736	420	19,354	339
		5	0.011	29,030	778	24,192	653	21,773	583	20,563	493	18,144	368	16,934	297
		6	0.008	25,805	666	21,504	555	19,354	499	18,278	320	16,128	282	15,053	222
	0.1	1	0.035	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		2	0.03	46,080	1,239	38,300	1,032	34,560	929	32,256	793	28,800	620	26,726	508
		3	0.02	37,325	1,000	31,104	839	27,994	750	26,438	634	23,328	473	21,773	381
		4	0.02	33,178	889	27,648	746	24,883	666	23,501	563	20,736	420	19,354	339
		5	0.013	29,030	778	24,192	653	21,773	583	20,563	493	18,144	368	16,934	297
		6	0.013	25,805	666	21,504	555	19,354	499	18,278	320	16,128	282	15,053	222
0.6	0.02	2	0.016	46,080	1,751	38,300	1,455	34,560	1,313	32,256	991	28,800	774	26,726	635
		4	0.013	37,325	1,376	31,104	1,147	27,994	1,032	26,438	792	23,328	591	21,773	477
		6	0.01	29,030	1,070	24,192	892	21,773	803	20,563	616	18,144	460	16,934	371
	0.05	2	0.028	46,080	1,751	38,300	1,455	34,560	1,313	32,256	991	28,800	774	26,726	635
		4	0.019	37,325	1,376	31,104	1,147	27,994	1,032	26,438	792	23,328	591	21,773	477
		6	0.012	29,030	1,070	24,192	892	21,773	803	20,563	616	18,144	460	16,934	371
		8	0.01	27,579	1,017	22,982	847	20,684	763	19,535	585	17,237	437	16,088	352
		10	0.007	24,676	814	20,563	678	18,507	610	17,479	489	15,422	355	14,394	287
	0.1	2	0.035	46,080	1,751	38,300	1,455	34,560	1,313	32,256	991	28,800	774	26,726	635
		4	0.024	37,325	1,376	31,104	1,147	27,994	1,032	26,438	792	23,328	591	21,773	477
		6	0.015	29,030	1,070	24,192	892	21,773	803	20,563	616	18,144	460	16,934	371
		8	0.013	27,579	1,017	22,982	847	20,684	763	19,535	585	17,237	437	16,088	352
		10	0.009	24,676	814	20,563	678	18,507	610	17,479	489	15,422	355	14,394	287
0.7	0.05	2	0.035	45,960	1,751	38,300	1,455	34,470	1,313	32,555	991	28,725	774	26,810	635
		4	0.024	37,325	1,376	31,104	1,147	27,994	1,032	26,438	792	23,328	591	21,773	477
		6	0.015	29,030	1,070	24,192	892	21,773	803	20,563	616	18,144	460	16,934	371
	0.1	2	0.042	45,960	1,751	38,300	1,455	34,470	1,313	32,555	991	28,725	774	26,810	635
		4	0.029	37,325	1,376	31,104	1,147	27,994	1,032	26,438	792	23,328	591	21,773	477
		6	0.018	29,030	1,070	24,192	892	21,773	803	20,563	616	18,144	460	16,934	371
0.8	0.02	2	0.016	48,000	2,211	40,000	1,843	36,000	1,658	34,000	1,410	30,000	1,106	28,000	903
		4	0.016	48,000	1,769	40,000	1,475	36,000	1,327	34,000	1,128	30,000	885	28,000	723
		6	0.013	36,720	1,218	30,600	1,015	27,540	914	26,010	863	22,950	677	21,420	553
	0.05	2	0.038	48,000	2,211	40,000	1,843	36,000	1,658	34,000	1,410	30,000	1,106	28,000	903
		4	0.026	48,000	1,769	40,000	1,475	36,000	1,327	34,000	1,128	30,000	885	28,000	723
		6	0.015	36,720	1,218	30,600	1,015	27,540	914	26,010	863	22,950	677	21,420	553
		8	0.012	29,376	906	24,480	755	22,032	680	20,808	642	18,360	504	17,136	411
		12	0.01	26,438	759	22,032	632	19,829	569	18,727	537	16,524	421	15,422	344

【Note】 Upon usage, please refer to comments and notes below table on page 15.

Recommended Cutting Conditions

High efficiency cutting condition | High accuracy cutting condition

Please refer to P.16 about high accuracy cutting conditions

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
0.8	0.1	2	0.047	48,000	2,211	40,000	1,843	36,000	1,658	34,000	1,410	30,000	1,106	28,000	903
		4	0.032	48,000	1,769	40,000	1,475	36,000	1,327	34,000	1,128	30,000	885	28,000	723
		6	0.019	36,720	1,218	30,600	1,015	27,540	914	26,010	863	22,950	677	21,420	553
		8	0.015	29,376	906	24,480	755	22,032	680	20,808	642	18,360	504	17,136	411
		12	0.012	26,438	759	22,032	632	19,829	569	18,727	537	16,524	421	15,422	344
	0.2	2	0.081	48,000	2,211	40,000	1,843	36,000	1,658	34,000	1,410	30,000	1,106	28,000	903
		4	0.056	48,000	1,769	40,000	1,475	36,000	1,327	34,000	1,128	30,000	885	28,000	723
		6	0.032	36,720	1,218	30,600	1,015	27,540	914	26,010	863	22,950	677	21,420	553
		8	0.018	29,376	906	24,480	755	22,032	680	20,808	642	18,360	504	17,136	411
		12	0.015	26,438	759	22,032	632	19,829	569	18,727	537	16,524	421	15,422	344
1	0.02	2	0.016	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		4	0.013	43,200	2,588	36,000	2,157	32,400	1,941	30,600	1,650	27,000	1,294	25,200	1,057
		6	0.01	34,992	1,887	29,160	1,572	29,299	1,757	24,786	1,336	21,870	1,048	20,412	856
		8	0.008	31,104	1,677	25,920	1,397	26,244	1,415	22,032	1,188	19,440	932	18,144	761
		10	0.006	27,216	1,467	22,680	1,223	23,328	1,258	19,278	1,039	17,010	815	15,876	666
		12	0.005	24,192	1,159	20,160	966	20,412	1,100	17,136	719	15,120	634	14,112	507
	0.05	2	0.046	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		3	0.035	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		4	0.027	43,200	2,588	36,000	2,157	32,400	1,941	30,600	1,650	27,000	1,294	25,200	1,057
		5	0.021	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		6	0.017	34,992	1,887	29,160	1,572	26,244	1,415	24,786	1,336	21,870	1,048	20,412	856
		8	0.016	31,104	1,677	25,920	1,397	23,328	1,258	22,032	1,188	19,440	932	18,144	761
		10	0.011	27,216	1,467	22,680	1,223	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		12	0.01	24,192	1,159	20,160	966	18,144	870	17,136	719	15,120	634	14,112	507
		16	0.006	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.004	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
	0.1	2	0.065	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		3	0.05	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		4	0.038	43,200	2,588	36,000	2,157	32,400	1,941	30,600	1,650	27,000	1,294	25,200	1,057
		5	0.03	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		6	0.024	34,992	1,887	29,160	1,572	26,244	1,415	24,786	1,336	21,870	1,048	20,412	856
		8	0.024	31,104	1,677	25,920	1,397	23,328	1,258	22,032	1,188	19,440	932	18,144	761
		10	0.015	27,216	1,467	22,680	1,223	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		12	0.015	24,192	1,159	20,160	966	18,144	870	17,136	719	15,120	634	14,112	507
		16	0.009	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.006	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
	0.2	2	0.11	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		3	0.09	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		4	0.07	43,200	2,588	36,000	2,157	32,400	1,941	30,600	1,650	27,000	1,294	25,200	1,057
		5	0.05	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		6	0.04	34,992	1,887	29,160	1,572	26,244	1,415	24,786	1,336	21,870	1,048	20,412	856
		8	0.04	31,104	1,677	25,920	1,397	23,328	1,258	22,032	1,188	19,440	932	18,144	761
		10	0.025	27,216	1,467	22,680	1,223	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		12	0.025	24,192	1,159	20,160	966	18,144	870	17,136	719	15,120	634	14,112	507
		16	0.015	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.01	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
	0.3	2	0.11	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		3	0.09	47,770	2,866	39,490	2,369	35,668	2,140	33,439	1,805	29,617	1,421	27,707	1,163
		4	0.07	43,200	2,588	36,000	2,157	32,400	1,941	30,600	1,650	27,000	1,294	25,200	1,057
		5	0.05	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		6	0.04	34,992	1,887	29,160	1,572	26,244	1,415	24,786	1,336	21,870	1,048	20,412	856
		8	0.04	31,104	1,677	25,920	1,397	23,328	1,258	22,032	1,188	19,440	932	18,144	761
		10	0.025	27,216	1,467	22,680	1,223	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		12	0.025	24,192	1,159	20,160	966	18,144	870	17,136	719	15,120	634	14,112	507
		16	0.015	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.01	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
1.25	0.1	5	0.03	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		10	0.015	27,216	1,467	25,920	1,397	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		15	0.01	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.006	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
	0.2	5	0.05	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		10	0.025	27,216	1,467	25,920	1,397	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		15	0.016	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.01	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
	0.3	5	0.05	39,808	2,388	31,847	1,910	29,299	1,757	27,707	1,496	24,522	1,177	22,929	963
		10	0.025	27,216	1,467	25,920	1,397	20,412	1,100	19,278	1,039	17,010	815	15,876	666
		15	0.016	24,192	1,014	20,160	845	18,144	761	17,136	667	15,120	543	14,112	423
		20	0.01	18,144	761	15,120	634	13,608	571	12,852	500	11,340	408	10,584	317
1.5	0.1	4	0.042	33,264	2,153	27,700	1,793	24,948	1,614	23,285	1,378	20,790	1,076	19,293	883
		6	0.04	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		8	0.036	30,240	1,956	25,200	1,630	22,680	1,467	21,420	1,268	18,900	979	17,640	807
		12	0.036	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.023	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.018	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
1.5	0.2	4	0.07	33,264	2,153	27,700	1,793	24,948	1,614	23,285	1,378	20,790	1,076	19,293	883
		6	0.065	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		8	0.06	30,240	1,956	25,200	1,630	22,680	1,467	21,420	1,268	18,900	979	17,640	807
		12	0.06	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.038	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.03	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428
	0.3	4	0.07	33,264	2,153	27,700	1,793	24,948	1,614	23,285	1,378	20,790	1,076	19,293	883
		6	0.065	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		8	0.06	30,240	1,956	25,200	1,630	22,680	1,467	21,420	1,268	18,900	979	17,640	807
		12	0.06	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.038	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.03	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428
	0.5	4	0.085	33,264	2,153	27,700	1,793	24,948	1,614	23,285	1,378	20,790	1,076	19,293	883
		6	0.08	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		8	0.07	30,240	1,956	25,200	1,630	22,680	1,467	21,420	1,268	18,900	979	17,640	807
		12	0.065	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.045	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.035	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428
1.75	0.1	5	0.04	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		10	0.036	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.023	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.018	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428
	0.2	5	0.065	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		10	0.06	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.038	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.03	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428
	0.3	5	0.065	31,847	2,057	26,539	1,714	23,779	1,536	22,505	1,332	19,957	1,033	18,471	845
		10	0.06	24,192	1,565	20,160	1,304	18,144	1,174	17,136	1,014	15,120	783	14,112	646
		15	0.038	18,816	1,082	15,680	902	14,112	812	13,328	671	11,760	592	10,976	473
		20	0.03	18,816	978	15,680	815	14,112	733	13,328	613	11,760	540	10,976	428
2	0.1	4	0.08	28,662	3,221	24,203	2,720	21,815	2,452	20,541	2,308	18,152	1,630	17,038	1,339
		6	0.07	27,720	3,114	23,100	2,595	20,790	2,335	19,635	2,205	17,325	1,557	16,170	1,271
		8	0.055	25,200	2,830	21,000	2,359	18,900	2,123	17,850	2,005	15,750	1,415	14,700	1,156
		12	0.03	20,412	2,063	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		16	0.03	18,144	1,834	15,120	1,528	13,608	1,376	12,852	1,299	11,340	1,019	10,584	832
		20	0.025	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		25	0.015	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.01	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.2	4	0.1	28,662	3,221	24,203	2,720	21,815	2,452	20,541	2,308	18,152	1,630	17,038	1,339
		6	0.08	27,720	3,114	23,100	2,595	20,790	2,335	19,635	2,205	17,325	1,557	16,170	1,271
		8	0.07	25,200	2,830	21,000	2,359	18,900	2,123	17,850	2,005	15,750	1,415	14,700	1,156
		12	0.04	20,412	2,063	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		16	0.04	18,144	1,834	15,120	1,528	13,608	1,376	12,852	1,299	11,340	1,019	10,584	832
		20	0.035	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		25	0.025	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.017	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.3	4	0.13	28,662	3,221	24,203	2,720	21,815	2,452	20,541	2,308	18,152	1,630	17,038	1,339
		6	0.11	27,720	3,114	23,100	2,595	20,790	2,335	19,635	2,205	17,325	1,557	16,170	1,271
		8	0.09	25,200	2,830	21,000	2,359	18,900	2,123	17,850	2,005	15,750	1,415	14,700	1,156
		12	0.06	20,412	2,063	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		16	0.06	18,144	1,834	15,120	1,528	13,608	1,376	12,852	1,299	11,340	1,019	10,584	832
		20	0.037	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		25	0.03	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.021	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.5	6	0.17	27,720	3,114	23,100	2,595	20,790	2,335	19,635	2,205	17,325	1,557	16,170	1,271
		8	0.14	25,200	2,830	21,000	2,359	18,900	2,123	17,850	2,005	15,750	1,415	14,700	1,156
		12	0.08	20,412	2,063	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		16	0.08	18,144	1,834	15,120	1,528	13,608	1,376	12,852	1,299	11,340	1,019	10,584	832
		20	0.05	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		25	0.05	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.03	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.8	6	0.22	27,720	3,114	23,100	2,595	20,790	2,335	19,635	2,205	17,325	1,557	16,170	1,271
		8	0.2	25,200	2,830	21,000	2,359	18,900	2,123	17,850	2,005	15,750	1,415	14,700	1,156
		12	0.13	20,412	2,063	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		16	0.1	18,144	1,834	15,120	1,528	13,608	1,376	12,852	1,299	11,340	1,019	10,584	832
		20	0.06	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		25	0.057	15,876	1,605	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.045	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621

【Note】 Upon usage, please refer to comments and notes below table on page 15.

Recommended Cutting Conditions

High efficiency cutting condition | High accuracy cutting condition

Please refer to P.16 about high accuracy cutting conditions

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
2.5	0.1	10	0.05	20,412	2,293	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		20	0.03	15,876	1,783	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.015	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.2	10	0.07	20,412	2,293	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		20	0.04	15,876	1,783	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.025	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.3	10	0.09	20,412	2,293	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		20	0.06	15,876	1,783	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.03	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
	0.5	10	0.12	20,412	2,293	17,010	1,720	15,309	1,548	14,459	1,462	12,758	1,146	11,907	936
		20	0.08	15,876	1,783	13,230	1,337	11,907	1,204	11,246	1,137	9,923	801	9,261	653
		30	0.05	15,082	1,525	12,569	1,271	11,312	1,143	10,683	1,080	9,426	761	8,798	621
3	0.1	6	0.08	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		8	0.07	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		12	0.05	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		16	0.035	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		18	0.035	16,985	2,384	14,331	2,012	12,738	1,788	12,208	1,714	10,615	1,193	10,084	992
		20	0.035	15,552	2,184	12,960	1,820	11,664	1,638	11,016	1,547	9,720	1,092	9,072	892
		30	0.027	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
		35	0.02	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
	0.2	6	0.1	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		8	0.09	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		12	0.07	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		16	0.05	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		18	0.05	16,985	2,384	14,331	2,012	12,738	1,788	12,208	1,714	10,615	1,193	10,084	992
		20	0.05	15,552	2,184	12,960	1,820	11,664	1,638	11,016	1,547	9,720	1,092	9,072	892
		30	0.04	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
		35	0.035	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
	0.3	6	0.145	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		8	0.13	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		12	0.1	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		16	0.075	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		18	0.075	16,985	2,384	14,331	2,012	12,738	1,788	12,208	1,714	10,615	1,193	10,084	992
		20	0.075	15,552	2,184	12,960	1,820	11,664	1,638	11,016	1,547	9,720	1,092	9,072	892
		30	0.06	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
		35	0.05	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
	0.5	8	0.18	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		12	0.13	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		16	0.1	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		18	0.1	16,985	2,384	14,331	2,012	12,738	1,788	13,600	1,909	10,615	1,193	10,084	992
		20	0.1	15,552	2,184	12,960	1,820	11,664	1,638	11,016	1,547	9,720	1,092	9,072	892
		30	0.08	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
		35	0.065	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
	1	8	0.2	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		12	0.15	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		16	0.12	19,200	2,696	16,000	2,246	14,400	2,022	13,600	1,909	12,000	1,348	11,200	1,101
		18	0.11	16,985	2,384	14,331	2,012	12,738	1,788	13,600	1,909	10,615	1,193	10,084	992
		20	0.11	15,552	2,184	12,960	1,820	11,664	1,638	11,016	1,547	9,720	1,092	9,072	892
		30	0.09	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
		35	0.075	12,096	1,524	10,080	1,270	9,072	1,143	8,568	1,079	7,560	771	7,056	621
4	0.1	8	0.08	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		12	0.065	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		16	0.06	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		20	0.055	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		30	0.045	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		35	0.04	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		45	0.03	8,789	1,100	7,324	917	6,592	825	6,226	780	5,494	554	5,127	446
	0.2	8	0.16	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		12	0.14	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		16	0.13	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		20	0.11	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		30	0.1	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		35	0.08	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		45	0.06	8,789	1,100	7,324	917	6,592	825	6,226	780	5,494	554	5,127	446
	0.3	8	0.24	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		12	0.22	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		16	0.2	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		20	0.18	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		30	0.16	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		35	0.14	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		45	0.12	8,789	1,100	7,324	917	6,592	825	6,226	780	5,494	554	5,127	446

Work material				1		2		3		4		5		6	
				Coppers		Carbon steels, Alloy steels (180~250HB)		Stainless steels, Tool steels (25~35HRC)		Pre-hardened steels (35~45HRC)		Hardened steels (45~55HRC)		Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
4	0.5	12	0.35	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		16	0.25	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		20	0.2	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		30	0.15	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		35	0.1	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		45	0.05	8,789	1,100	7,324	917	6,592	825	6,226	780	5,494	554	5,127	446
	1	12	0.4	16,560	2,880	13,800	2,400	12,420	2,160	11,730	2,040	10,350	1,440	9,660	1,176
		16	0.29	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		20	0.23	13,733	2,388	11,445	1,990	10,071	1,751	9,613	1,671	8,240	1,146	7,782	947
		30	0.17	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		35	0.12	10,985	1,719	9,154	1,433	8,239	1,290	7,781	1,218	6,866	860	6,408	702
		45	0.06	8,789	1,100	7,324	917	6,592	825	6,226	780	5,494	554	5,127	446
5	0.1	20	0.08	13,179	2,865	10,983	2,388	9,884	2,149	9,336	2,029	8,237	1,433	7,688	1,170
		40	0.06	11,868	2,312	9,890	1,926	8,901	1,734	8,407	1,637	7,418	1,156	6,923	944
	0.2	20	0.16	13,179	2,865	10,983	2,388	9,884	2,149	9,336	2,029	8,237	1,433	7,688	1,170
		40	0.13	11,868	2,312	9,890	1,926	8,901	1,734	8,407	1,637	7,418	1,156	6,923	944
	0.3	20	0.24	13,179	2,865	10,983	2,388	9,884	2,149	9,336	2,029	8,237	1,433	7,688	1,170
		40	0.2	11,868	2,312	9,890	1,926	8,901	1,734	8,407	1,637	7,418	1,156	6,923	944
	0.5	20	0.35	13,179	2,865	10,983	2,388	9,884	2,149	9,336	2,029	8,237	1,433	7,688	1,170
		40	0.135	11,868	2,312	9,890	1,926	8,901	1,734	8,407	1,637	7,418	1,156	6,923	944
	1	20	0.4	13,179	2,865	10,983	2,388	9,884	2,149	9,336	2,029	8,237	1,433	7,688	1,170
		40	0.15	11,868	2,312	9,890	1,926	8,901	1,734	8,407	1,637	7,418	1,156	6,923	944
6	0.1	12	0.08	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		18	0.065	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		24	0.06	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		35	0.05	9,881	2,320	8,234	1,933	7,411	1,740	6,999	1,643	6,176	1,160	5,764	947
		55	0.04	7,687	1,805	6,406	1,504	5,765	1,354	5,445	1,278	4,805	902	4,484	737
	0.2	12	0.16	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		18	0.14	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		24	0.13	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		35	0.11	9,881	2,320	8,234	1,933	7,411	1,740	6,999	1,643	6,176	1,160	5,764	947
		55	0.08	7,687	1,805	6,406	1,504	5,765	1,354	5,445	1,278	4,805	902	4,484	737
	0.3	12	0.24	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		18	0.22	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		24	0.2	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		35	0.18	9,881	2,320	8,234	1,933	7,411	1,740	6,999	1,643	6,176	1,160	5,764	947
		55	0.14	7,687	1,805	6,406	1,504	5,765	1,354	5,445	1,278	4,805	902	4,484	737
	0.5	18	0.35	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		24	0.29	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		35	0.24	9,881	2,320	8,234	1,933	7,411	1,740	6,999	1,643	6,176	1,160	5,764	947
		55	0.165	7,687	1,805	6,406	1,504	5,765	1,354	5,445	1,278	4,805	902	4,484	737
	1	18	0.4	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		24	0.35	10,985	2,866	9,154	2,388	8,239	2,149	7,781	2,030	6,866	1,433	6,408	1,170
		35	0.28	9,881	2,320	8,234	1,933	7,411	1,740	6,999	1,643	6,176	1,160	5,764	947
		55	0.2	7,687	1,805	6,406	1,504	5,765	1,354	5,445	1,278	4,805	902	4,484	737

※(1) a_p is shown as the criteria for carbon steel, alloy steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.
※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., the cutting depth setting should be set by multiplying a_p by a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.
※(3) Adjust by setting a_e to (5 or less)×(a_p)×(cutting depth ratio). When performing finishing cutting, calculate the theoretical cusp height and set accordingly.
※(4) Helical or sloped cutting is recommended for the approach method when engraving.
※(5) When L/D is 5 or greater:
①The recommended slope entrance angle when engraving is 1° or less. In addition, feed rate should be adjusted to 70% or less of the values in the cutting condition table.
②When slotting such engraving letters, adjust feed rate to 50% or less and ap to 30% or less of the values shown. In addition, cutting by reciprocal cutting is recommended.

【Cutting depth setting example】

When cutting rib groove contours in pre-hardened steel (40HRC) using an EPDRE2030-6-02-ATH tool:
Cutting depth = 0.1 (a_p) × 0.8 (cutting depth factor for pre-hardened steel) × 0.8 (for closed-area cutting) = 0.064mm

【Note】

① Use the appropriate coolant for the work material and machining shape.
② These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
③ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

Recommended Cutting Conditions

High efficiency cutting condition

High accuracy cutting condition

Please refer to P.11 about high efficiency cutting conditions

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
0.2	0.02	0.5	0.016	50,000	307	50,000	258	50,000	230	50,000	205	50,000	180	50,000	160
		1	0.011	50,000	307	50,000	258	50,000	230	50,000	205	50,000	180	50,000	160
		2	0.007	50,000	246	42,000	202	37,800	181	36,700	176	36,700	162	36,700	147
	0.05	0.5	0.02	50,000	307	50,000	258	50,000	230	50,000	205	50,000	180	50,000	160
		1	0.014	50,000	307	50,000	258	50,000	230	50,000	205	50,000	180	50,000	160
		1.5	0.008	50,000	276	50,000	240	48,600	223	45,900	202	45,900	170	45,900	153
		2	0.008	50,000	246	42,000	202	37,800	181	36,700	176	36,700	162	36,700	147
0.3	0.02	1	0.016	50,000	696	50,000	585	50,000	516	50,000	456	50,000	336	50,000	320
		2	0.011	45,000	620	45,000	530	45,000	460	45,000	420	45,000	300	45,000	290
		3	0.007	40,000	504	35,000	412	35,000	358	35,000	326	30,000	200	30,000	194
	0.05	1	0.021	50,000	696	50,000	585	50,000	516	50,000	456	50,000	336	50,000	320
		1.5	0.016	50,000	696	50,000	585	45,000	516	45,000	456	45,000	336	45,000	320
		2	0.012	45,000	620	45,000	530	45,000	460	45,000	420	45,000	300	45,000	290
		2.5	0.01	40,000	551	40,000	471	40,000	409	40,000	373	40,000	267	40,000	258
		3	0.008	40,000	504	35,000	412	35,000	358	35,000	326	30,000	200	30,000	194
0.4	0.02	1	0.016	50,000	691	50,000	580	50,000	518	50,000	461	40,000	320	36,000	270
		2	0.013	45,000	620	45,000	520	45,000	470	45,000	410	36,000	290	34,000	240
		3	0.01	40,000	480	40,000	410	40,000	370	40,000	330	32,800	240	25,600	200
		4	0.007	30,000	370	30,000	320	30,000	280	30,000	250	21,600	160	19,200	150
	0.05	1	0.025	50,000	691	50,000	580	50,000	518	50,000	461	40,000	320	36,000	270
		1.5	0.02	50,000	691	50,000	580	50,000	518	50,000	461	40,000	320	36,000	270
		2	0.016	45,000	620	45,000	520	45,000	470	45,000	410	36,000	290	34,000	240
		2.5	0.015	40,500	560	40,500	480	40,500	400	40,500	370	33,400	270	30,600	220
		3	0.014	40,000	480	40,000	410	40,000	370	40,000	330	32,800	240	25,600	200
		3.5	0.012	36,000	420	36,000	380	36,000	320	36,000	300	29,400	200	22,920	180
		4	0.008	30,000	370	30,000	320	30,000	280	30,000	250	21,600	160	19,200	150
	0.1	1	0.033	50,000	691	50,000	580	50,000	518	50,000	461	40,000	320	36,000	270
		2	0.028	45,000	620	45,000	520	45,000	470	45,000	410	36,000	290	34,000	240
		3	0.016	40,000	480	40,000	410	40,000	370	40,000	330	32,800	240	25,600	200
		4	0.01	30,000	370	30,000	320	30,000	280	30,000	250	21,600	160	19,200	150
0.5	0.02	1	0.016	50,000	1,070	50,000	898	50,000	756	40,000	464	30,000	378	28,000	315
		2	0.013	50,000	1,070	50,000	898	50,000	756	40,000	464	30,000	378	28,000	315
		3	0.01	45,000	960	45,000	810	45,000	684	36,000	414	27,000	315	24,500	261
		4	0.008	40,000	850	40,000	720	40,000	603	32,000	378	24,000	279	20,000	234
		6	0.006	30,000	570	28,800	480	24,000	380	19,400	260	18,000	250	15,000	200
	0.05	1	0.03	50,000	1,070	50,000	898	50,000	756	40,000	464	30,000	378	28,000	315
		2	0.023	50,000	1,070	50,000	898	50,000	756	40,000	464	30,000	378	28,000	315
		3	0.017	45,000	960	45,000	810	45,000	684	36,000	414	27,000	315	24,500	261
		4	0.017	40,000	850	40,000	720	40,000	603	32,000	378	24,000	279	20,000	234
		5	0.011	30,000	640	28,800	540	24,000	380	19,400	280	18,000	250	15,000	200
		6	0.008	30,000	570	28,800	480	24,000	380	19,400	260	18,000	250	15,000	200
	0.1	1	0.035	50,000	1,070	50,000	898	50,000	756	40,000	464	30,000	378	28,000	315
		2	0.03	50,000	1,070	50,000	898	50,000	756	40,000	464	30,000	378	28,000	315
		3	0.02	45,000	960	45,000	810	45,000	684	36,000	414	27,000	315	24,500	261
		4	0.02	40,000	850	40,000	720	40,000	603	32,000	378	24,000	279	20,000	234
		5	0.013	30,000	640	28,800	540	24,000	380	19,400	280	18,000	250	15,000	200
		6	0.013	30,000	570	28,800	480	24,000	380	19,400	260	18,000	250	15,000	200
0.6	0.02	2	0.016	50,000	1,380	50,000	1,159	46,800	920	37,830	600	28,200	390	23,000	320
		4	0.013	40,000	980	40,000	830	34,500	620	27,800	440	23,600	280	21,000	230
		6	0.01	30,000	580	24,000	490	20,000	360	18,000	300	17,800	240	15,000	210
	0.05	2	0.028	50,000	1,380	50,000	1,159	46,800	920	37,830	600	28,200	390	23,000	320
		4	0.019	40,000	980	40,000	830	34,500	620	27,800	440	23,600	280	21,000	230
		6	0.012	30,000	580	24,000	490	20,000	360	18,000	300	17,800	240	15,000	210
		8	0.01	30,000	551	24,000	466	20,000	342	18,000	285	17,800	228	15,000	200
		10	0.007	30,000	534	24,000	451	20,000	331	18,000	276	17,800	221	15,000	193
	0.1	2	0.035	50,000	1,380	50,000	1,159	46,800	920	37,830	600	28,200	390	23,000	320
		4	0.024	40,000	980	40,000	830	34,500	620	27,800	440	23,600	280	21,000	230
		6	0.015	30,000	580	24,000	490	20,000	360	18,000	300	17,800	240	15,000	210
		8	0.013	30,000	551	24,000	466	20,000	342	18,000	285	17,800	228	15,000	200
		10	0.009	30,000	534	24,000	451	20,000	331	18,000	276	17,800	221	15,000	193
0.7	0.05	2	0.035	49,200	1,244	49,200	1,054	42,430	787	34,190	558	29,030	355	25,830	292
		4	0.024	40,000	980	40,000	830	34,500	620	27,800	440	23,600	280	21,000	230
		6	0.015	30,000	580	24,000	490	20,000	360	18,000	300	17,800	240	15,000	210
	0.1	2	0.042	49,200	1,244	49,200	1,054	42,430	787	34,190	558	29,030	355	25,830	292
		4	0.029	40,000	980	40,000	830	34,500	620	27,800	440	23,600	280	21,000	230
		6	0.018	30,000	580	24,000	490	20,000	360	18,000	300	17,800	240	15,000	210
0.8	0.02	2	0.016	50,000	1,640	48,000	1,378	36,000	937	28,000	647	20,000	400	20,000	360
		4	0.016	50,000	1,312	48,000	1,102	36,000	750	28,000	518	20,000	320	20,000	288
		6	0.013	40,000	950	38,700	800	26,000	530	25,000	461	18,000	288	18,000	256
	0.05	2	0.038	50,000	1,640	48,000	1,378	36,000	937	28,000	647	20,000	400	20,000	360
		4	0.026	50,000	1,312	48,000	1,102	36,000	750	28,000	518	20,000	320	20,000	288
		6	0.015	40,000	950	38,700	800	26,000	530	25,000	461	18,000	288	18,000	256
		8	0.012	30,000	713	29,025	600	20,800	424	20,000	369	16,200	259	16,200	230
		12	0.01	30,000	677	29,025	570	20,800	403	20,000	350	16,200	246	16,200	219

Work material				1		2		3		4		5		6	
				Coppers		Carbon steels, Alloy steels (180~250HB)		Stainless steels, Tool steels (25~35HRC)		Pre-hardened steels (35~45HRC)		Hardened steels (45~55HRC)		Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
0.8	0.1	2	0.047	50,000	1,640	48,000	1,378	36,000	937	28,000	647	20,000	400	20,000	360
		4	0.032	50,000	1,312	48,000	1,102	36,000	750	28,000	518	20,000	320	20,000	288
		6	0.019	40,000	950	38,700	800	26,000	530	25,000	461	18,000	288	18,000	256
		8	0.015	30,000	713	29,025	600	20,800	424	20,000	369	16,200	259	16,200	230
		12	0.012	30,000	677	29,025	570	20,800	403	20,000	350	16,200	246	16,200	219
	0.2	2	0.081	50,000	1,640	48,000	1,378	36,000	937	28,000	647	20,000	400	20,000	360
		4	0.056	50,000	1,312	48,000	1,102	36,000	750	28,000	518	20,000	320	20,000	288
		6	0.032	40,000	950	38,700	800	26,000	530	25,000	461	18,000	288	18,000	256
		8	0.018	30,000	713	29,025	600	20,800	424	20,000	369	16,200	259	16,200	230
		12	0.015	30,000	677	29,025	570	20,800	403	20,000	350	16,200	246	16,200	219
1	0.02	2	0.016	42,675	1,877	35,668	1,569	32,076	1,411	30,294	1,212	26,730	962	24,948	798
		4	0.013	38,880	1,630	32,400	1,359	29,160	1,223	27,540	1,039	24,300	815	22,680	666
		6	0.01	31,493	1,189	26,244	990	23,620	891	22,307	842	19,683	660	18,371	539
		8	0.008	27,994	1,056	23,328	880	20,995	792	19,829	748	17,496	587	16,330	479
		10	0.006	21,773	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		12	0.005	21,773	730	18,144	609	16,330	548	15,422	453	13,608	399	12,701	320
	0.05	2	0.046	42,675	1,877	35,668	1,569	32,076	1,411	30,254	1,210	26,730	962	24,948	798
		3	0.035	40,796	1,754	34,020	1,462	30,618	1,317	30,294	1,212	25,515	867	23,814	714
		4	0.027	38,880	1,630	32,400	1,359	29,160	1,223	28,917	1,128	24,300	815	22,680	666
		5	0.021	34,713	1,388	28,868	1,154	25,982	1,039	27,540	1,039	21,651	727	20,208	594
		6	0.017	31,493	1,189	26,244	990	23,620	891	24,538	928	19,683	660	18,371	539
		8	0.016	27,994	1,056	23,328	880	20,995	792	19,829	748	17,496	587	16,330	479
		10	0.011	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		12	0.01	21,773	730	18,144	609	16,330	548	15,422	453	13,608	399	12,701	320
		16	0.006	21,773	639	18,144	533	16,330	479	15,422	420	13,608	342	12,701	266
		20	0.004	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
	0.1	2	0.065	42,675	1,877	35,668	1,569	32,076	1,411	30,294	1,212	26,730	962	24,948	798
		3	0.05	40,796	1,754	34,020	1,462	30,618	1,317	28,917	1,128	25,515	867	23,814	714
		4	0.038	38,880	1,630	32,400	1,359	29,160	1,223	27,540	1,039	24,300	815	22,680	666
		5	0.03	34,713	1,388	28,868	1,154	25,982	1,039	24,538	928	21,651	727	20,208	594
		6	0.024	31,493	1,189	26,244	990	23,620	891	22,307	842	19,683	660	18,371	539
		8	0.024	27,994	1,056	23,328	880	20,995	792	19,829	748	17,496	587	16,330	479
		10	0.015	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		12	0.015	21,773	730	18,144	609	16,330	548	15,422	453	13,608	399	12,701	320
		16	0.009	21,773	639	18,144	533	16,330	479	15,422	420	13,608	342	12,701	266
		20	0.006	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
	0.2	2	0.11	42,675	1,877	35,668	1,569	32,076	1,411	30,294	1,212	26,730	962	24,948	798
		3	0.09	40,796	1,754	34,020	1,462	30,618	1,317	28,917	1,128	25,515	867	23,814	714
		4	0.07	38,880	1,630	32,400	1,359	29,160	1,223	27,540	1,039	24,300	815	22,680	666
		5	0.05	34,713	1,388	28,868	1,154	25,982	1,039	24,538	928	21,651	727	20,208	594
		6	0.04	31,493	1,189	26,244	990	23,620	891	22,307	842	19,683	660	18,371	539
		8	0.04	27,994	1,056	23,328	880	20,995	792	19,829	748	17,496	587	16,330	479
		10	0.025	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		12	0.025	21,773	730	18,144	609	16,330	548	15,422	453	13,608	399	12,701	320
		16	0.015	21,773	639	18,144	533	16,330	479	15,422	420	13,608	342	12,701	266
		20	0.01	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
	0.3	2	0.11	42,675	1,877	35,668	1,569	32,076	1,411	30,294	1,212	26,730	962	24,948	798
		3	0.09	40,796	1,754	34,020	1,462	30,618	1,317	28,917	1,128	25,515	867	23,814	714
		4	0.07	38,880	1,630	32,400	1,359	29,160	1,223	27,540	1,039	24,300	815	22,680	666
		5	0.05	34,713	1,388	28,868	1,154	25,982	1,039	24,538	928	21,651	727	20,208	594
		6	0.04	31,493	1,189	26,244	990	23,620	891	22,307	842	19,683	660	18,371	539
		8	0.04	27,994	1,056	23,328	880	20,995	792	19,829	748	17,496	587	16,330	479
		10	0.025	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		12	0.025	21,773	730	18,144	609	16,330	548	15,422	453	13,608	399	12,701	320
		16	0.015	21,773	639	18,144	533	16,330	479	15,422	420	13,608	342	12,701	266
		20	0.01	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
1.25	0.1	5	0.03	34,713	1,388	28,868	1,154	25,982	1,039	24,538	928	21,651	727	20,208	594
		10	0.015	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		15	0.01	21,773	639	18,144	533	16,330	548	15,422	453	13,608	342	12,701	266
		20	0.006	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
	0.2	5	0.05	34,713	1,388	28,868	1,154	25,982	1,039	24,538	928	21,651	727	20,208	594
		10	0.025	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		15	0.016	21,773	639	18,144	533	16,330	548	15,422	453	13,608	342	12,701	266
		20	0.01	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
	0.3	5	0.05	34,713	1,388	28,868	1,154	25,982	1,039	24,538	928	21,651	727	20,208	594
		10	0.025	24,494	924	20,412	770	18,371	693	17,350	655	15,309	514	14,288	419
		15	0.016	21,773	639	18,144	533	16,330	548	15,422	453	13,608	342	12,701	266
		20	0.01	16,330	479	13,608	399	12,247	359	11,567	315	10,206	257	9,526	200
1.5	0.1	4	0.042	29,938	1,356	24,930	1,130	22,453	1,017	20,956	947	18,711	752	17,364	611
		6	0.04	28,450	1,285	23,779	1,074	21,443	969	20,382	921	17,834	716	16,560	582
		8	0.036	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		12	0.036	21,773	986	18,144	822	16,330	740	15,422	698	13,608	548	12,701	447
		15	0.023	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.018	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298

【Note】 Upon usage, please refer to comments and notes below table on page 20.

Recommended Cutting Conditions

High efficiency cutting condition | **High accuracy cutting condition**

Please refer to P.11 about high efficiency cutting conditions

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
1.5	0.2	4	0.07	29,938	1,356	24,930	1,130	22,453	1,017	20,956	868	18,711	678	17,364	556
		6	0.065	28,450	1,285	23,779	1,074	21,443	969	20,382	921	17,834	716	16,560	582
		8	0.06	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		12	0.06	21,773	986	18,144	822	16,330	740	15,422	698	13,608	548	12,701	447
		15	0.038	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.03	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
	0.3	4	0.07	29,938	1,356	24,930	1,130	22,453	1,017	20,956	868	18,711	678	17,364	556
		6	0.065	28,450	1,285	23,779	1,074	21,443	969	20,382	921	17,834	716	16,560	582
		8	0.06	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		12	0.06	21,773	986	18,144	822	16,330	740	15,422	698	13,608	548	12,701	447
		15	0.038	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.03	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
	0.5	4	0.085	29,938	1,356	24,930	1,130	22,453	1,017	20,956	868	18,711	678	17,364	556
		6	0.08	28,450	1,285	23,779	1,074	21,443	969	20,382	921	17,834	716	16,560	582
		8	0.07	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		12	0.065	21,773	986	18,144	822	16,330	740	15,422	698	13,608	548	12,701	447
		15	0.045	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.035	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
1.75	0.1	5	0.04	29,938	1,356	24,930	1,130	22,453	1,017	20,956	868	18,711	678	17,364	556
		10	0.036	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		15	0.023	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.018	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
	0.2	5	0.065	29,938	1,356	24,930	1,130	22,453	1,017	20,956	868	18,711	678	17,364	556
		10	0.06	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		15	0.038	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.03	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
	0.3	5	0.065	29,938	1,356	24,930	1,130	22,453	1,017	20,956	868	18,711	678	17,364	556
		10	0.06	27,216	1,233	22,680	1,027	20,412	924	19,278	873	17,010	685	15,876	559
		15	0.038	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
		20	0.03	16,934	682	14,112	568	12,701	511	11,995	423	10,584	373	9,878	298
2	0.1	4	0.08	26,114	2,052	21,974	1,727	19,745	1,551	18,471	1,451	16,401	1,033	15,286	840
		6	0.07	24,948	1,962	20,790	1,635	18,711	1,471	17,672	1,389	15,593	981	14,553	801
		8	0.055	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		12	0.03	18,371	1,300	15,309	1,083	13,778	975	13,013	921	11,482	722	10,716	590
		16	0.03	16,330	1,156	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		20	0.025	14,288	1,011	11,907	843	10,716	758	10,121	716	8,930	562	8,335	459
		25	0.015	14,288	908	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
		30	0.01	13,574	863	11,312	719	10,180	647	9,615	611	8,484	480	7,918	391
	0.2	4	0.1	26,114	2,052	21,974	1,727	19,745	1,551	18,471	1,451	16,401	1,033	15,286	840
		6	0.08	24,948	1,962	20,790	1,635	18,711	1,471	17,672	1,389	15,593	981	14,553	801
		8	0.07	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		12	0.04	18,371	1,300	15,309	1,083	13,778	975	13,013	921	11,482	722	10,716	590
		16	0.04	16,330	1,156	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		20	0.035	14,288	1,011	11,907	843	10,716	758	10,121	716	8,930	562	8,335	459
		25	0.025	14,288	908	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
		30	0.017	13,574	863	11,312	719	10,180	647	9,615	611	8,484	480	7,918	391
	0.3	4	0.13	26,114	2,052	21,974	1,727	19,745	1,551	18,471	1,451	16,401	1,033	15,286	840
		6	0.11	24,948	1,962	20,790	1,635	18,711	1,471	17,672	1,389	15,593	981	14,553	801
		8	0.09	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		12	0.06	18,371	1,444	15,309	1,083	13,778	975	13,013	921	11,482	722	10,716	590
		16	0.06	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		20	0.037	14,288	1,123	11,907	843	10,716	758	10,121	716	8,930	562	8,335	459
		25	0.03	14,288	908	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
		30	0.021	13,574	863	11,312	719	10,180	647	9,615	611	8,484	480	7,918	391
	0.5	6	0.17	24,948	1,962	20,790	1,635	18,711	1,471	17,672	1,389	15,593	981	14,553	801
		8	0.14	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		12	0.08	18,371	1,444	15,309	1,083	13,778	975	13,013	1,023	11,482	722	10,716	590
		16	0.08	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		20	0.05	14,288	1,123	11,907	843	10,716	758	10,121	716	8,930	562	8,335	459
		25	0.05	14,288	908	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
		30	0.03	13,574	863	11,312	719	10,180	647	9,615	611	8,484	480	7,918	391
	0.8	6	0.22	24,948	1,962	20,790	1,635	18,711	1,471	17,672	1,389	15,593	981	14,553	801
		8	0.2	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		12	0.13	18,371	1,444	15,309	1,083	13,778	975	13,013	921	11,482	722	10,716	590
		16	0.1	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		20	0.06	14,288	1,123	11,907	843	10,716	758	10,121	716	8,930	562	8,335	459
		25	0.057	14,288	908	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
		30	0.045	13,574	863	11,312	719	10,180	647	9,615	611	8,484	480	7,918	391

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
2.5	0.1	10	0.055	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		20	0.03	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		30	0.015	14,288	1,008	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
	0.2	10	0.07	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		20	0.04	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		30	0.025	14,288	1,008	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
	0.3	10	0.09	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		20	0.06	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		30	0.03	14,288	1,008	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
	0.5	10	0.14	22,680	1,783	18,900	1,486	17,010	1,337	16,065	1,263	14,175	892	13,230	728
		20	0.08	16,330	1,284	13,608	963	12,247	867	11,567	818	10,206	642	9,526	524
		30	0.05	14,288	1,008	11,907	757	10,716	681	10,121	643	8,930	505	8,335	411
3	0.1	6	0.08	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		8	0.07	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		12	0.05	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		16	0.035	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		18	0.035	15,498	1,521	12,951	1,271	11,677	1,149	10,934	1,073	9,766	767	9,023	620
		20	0.035	13,997	1,376	11,664	1,146	10,498	1,032	9,914	974	8,748	687	8,165	561
		30	0.027	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
		35	0.02	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
	0.2	6	0.1	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		8	0.09	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		12	0.07	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		16	0.05	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		18	0.05	15,498	1,521	12,951	1,271	11,677	1,149	10,934	1,073	9,766	767	9,023	620
		20	0.05	13,997	1,376	11,664	1,146	10,498	1,032	9,914	974	8,748	687	8,165	561
		30	0.04	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
		35	0.035	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
	0.3	6	0.145	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		8	0.13	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		12	0.1	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		16	0.075	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		18	0.075	15,498	1,521	12,951	1,271	11,677	1,149	10,934	1,073	9,766	767	9,023	620
		20	0.075	13,997	1,376	11,664	1,146	10,498	1,032	9,914	974	8,748	687	8,165	561
		30	0.06	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
		35	0.05	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
	0.5	8	0.18	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		12	0.13	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		16	0.1	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		18	0.1	15,498	1,521	12,951	1,271	11,677	1,149	10,934	1,073	9,766	767	9,023	620
		20	0.1	13,997	1,376	11,664	1,146	10,498	1,032	9,914	974	8,748	687	8,165	561
		30	0.08	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
		35	0.065	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
	1	8	0.2	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		12	0.15	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		16	0.12	17,280	1,698	14,400	1,415	12,960	1,274	12,240	1,203	10,800	849	10,080	693
		18	0.11	15,498	1,521	12,951	1,271	11,677	1,149	10,934	1,073	9,766	767	9,023	620
		20	0.11	13,997	1,376	11,664	1,146	10,498	1,032	9,914	974	8,748	687	8,165	561
		30	0.09	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
		35	0.075	10,886	962	9,072	801	8,165	721	7,711	681	6,804	480	6,350	393
4	0.1	8	0.08	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		12	0.065	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		16	0.06	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		20	0.055	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		30	0.045	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		35	0.04	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		45	0.03	9,888	1,289	8,240	1,075	7,324	955	5,584	728	4,944	516	4,119	358
	0.2	8	0.16	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		12	0.14	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		16	0.13	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		20	0.11	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		30	0.1	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		35	0.08	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		45	0.06	9,888	1,289	8,240	1,075	7,324	955	5,584	728	4,944	516	4,119	358
	0.3	8	0.24	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		12	0.22	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		16	0.2	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		20	0.18	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		30	0.16	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		35	0.14	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		45	0.12	9,888	1,289	8,240	1,075	7,324	955	5,584	728	4,944	516	4,119	358

【Note】 Upon usage, please refer to comments and notes below table on page 20.

Recommended Cutting Conditions

High efficiency cutting condition | **High accuracy cutting condition**

Please refer to P.11 about high efficiency cutting conditions

Work material				1 Coppers		2 Carbon steels, Alloy steels (180~250HB)		3 Stainless steels, Tool steels (25~35HRC)		4 Pre-hardened steels (35~45HRC)		5 Hardened steels (45~55HRC)		6 Hardened steels (55~65HRC)	
Ratio to standard depth of cut				120%		100%		90%		80%		65%		60%	
Tool dia. DC (mm)	Corner radius RE (mm)	Under neck length (mm)	a_p (mm)	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min	Revolution n min^{-1}	Feed rate v_f mm/min
4	0.5	12	0.35	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		16	0.25	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		20	0.2	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		30	0.15	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		35	0.1	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		45	0.05	9,888	1,289	8,240	1,075	7,324	955	5,584	728	4,944	516	4,119	358
	1	12	0.4	13,455	2,340	11,213	1,950	10,091	1,755	9,531	1,658	8,410	1,170	7,849	956
		16	0.29	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		20	0.23	12,360	2,149	10,255	1,783	9,155	1,592	8,697	1,512	7,599	1,057	6,684	814
		30	0.17	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		35	0.12	12,360	2,149	10,255	1,783	9,155	1,592	6,867	1,075	5,491	688	5,124	561
		45	0.06	9,888	1,289	8,240	1,075	7,324	955	5,584	728	4,944	516	4,119	358
5	0.1	20	0.08	10,985	2,388	9,154	1,990	8,239	1,791	7,781	1,692	6,866	1,194	6,408	975
		40	0.06	7,907	1,540	6,590	1,284	5,931	1,155	5,602	1,091	4,943	770	4,613	629
	0.2	20	0.16	10,985	2,388	9,154	1,990	8,239	1,791	7,781	1,692	6,866	1,194	6,408	975
		40	0.13	7,907	1,540	6,590	1,284	5,931	1,155	5,602	1,091	4,943	770	4,613	629
	0.3	20	0.24	10,985	2,388	9,154	1,990	8,239	1,791	7,781	1,692	6,866	1,194	6,408	975
		40	0.2	7,907	1,540	6,590	1,284	5,931	1,155	5,602	1,091	4,943	770	4,613	629
	0.5	20	0.35	10,985	2,388	9,154	1,990	8,239	1,791	7,781	1,692	6,866	1,194	6,408	975
		40	0.135	7,907	1,540	6,590	1,284	5,931	1,155	5,602	1,091	4,943	770	4,613	629
	1	20	0.4	10,985	2,388	9,154	1,990	8,239	1,791	7,781	1,692	6,866	1,194	6,408	975
		40	0.15	7,907	1,540	6,590	1,284	5,931	1,155	5,602	1,091	4,943	770	4,613	629
6	0.1	12	0.08	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		18	0.065	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		24	0.06	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		35	0.05	7,783	1,827	6,486	1,523	5,837	1,371	5,513	1,294	4,865	914	4,540	746
		55	0.04	6,590	1,260	5,491	1,050	4,943	945	4,668	892	4,118	623	3,844	508
	0.2	12	0.16	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		18	0.14	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		24	0.13	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		35	0.11	7,783	1,827	6,486	1,523	5,837	1,371	5,513	1,294	4,865	914	4,540	746
		55	0.08	6,590	1,260	5,491	1,050	4,943	945	4,668	892	4,118	623	3,844	508
	0.3	12	0.24	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		18	0.22	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		24	0.2	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		35	0.18	7,783	1,827	6,486	1,523	5,837	1,371	5,513	1,294	4,865	914	4,540	746
		55	0.14	6,590	1,260	5,491	1,050	4,943	945	4,668	892	4,118	623	3,844	508
	0.5	18	0.35	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		24	0.29	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		35	0.24	7,783	1,827	6,486	1,523	5,837	1,371	5,513	1,294	4,865	914	4,540	746
		55	0.165	6,590	1,260	5,491	1,050	4,943	945	4,668	892	4,118	623	3,844	508
	1	18	0.4	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		24	0.35	9,156	2,389	7,630	1,991	6,868	1,791	6,486	1,692	5,722	1,194	5,342	975
		35	0.28	7,783	1,827	6,486	1,523	5,837	1,371	5,513	1,294	4,865	914	4,540	746
		55	0.2	6,590	1,260	5,491	1,050	4,943	945	4,668	892	4,118	623	3,844	508

※(1) a_p is shown as the criteria for carbon steel, alloy steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.
※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., the cutting depth setting should be set by multiplying a_p by a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.
※(3) Adjust by setting a_e to (5 or less)×(a_p)×(cutting depth ratio). When performing finishing cutting, calculate the theoretical cusp height and set accordingly.
※(4) Helical or sloped cutting is recommended for the approach method when engraving.
※(5) When L/D is 5 or greater:
①The recommended slope entrance angle when engraving is 1° or less. In addition, feed rate should be adjusted to 70% or less of the values in the cutting condition table.
②When slotting such engraving letters, adjust feed rate to 50% or less and ap to 30% or less of the values shown. In addition, cutting by reciprocal cutting is recommended.

【Cutting depth setting example】

When cutting rib groove contours in pre-hardened steel (40HRC) using an EPDRE2030-6-02-ATH tool:
Cutting depth = 0.1 (a_p) × 0.8 (cutting depth factor for pre-hardened steel) × 0.8 (for closed-area cutting) = 0.064mm

【Note】

① Use the appropriate coolant for the work material and machining shape.
② These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
③ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

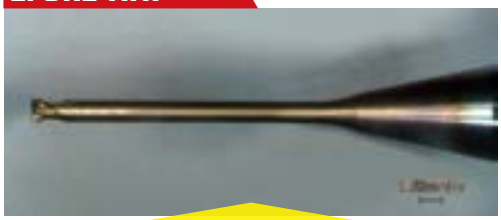
Stable processing even when rib slotting in enclosed areas.

Rib slot evaluation SUS420J2Ⓗ 52HRC

Tool : EPDRE2010-10-02-ATH (ϕ1×RE0.2×Under neck10mm)

This is amazing! Point 1 Good breakage resistance! Stabilized cutting performance!

EPDRE-ATH

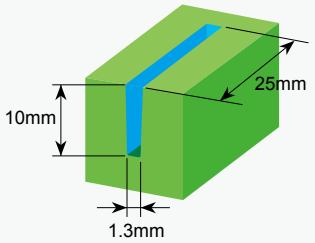


Stable processing is possible to depths of 10mm.

Conventional radius end mill

Breakage at 6mm depth

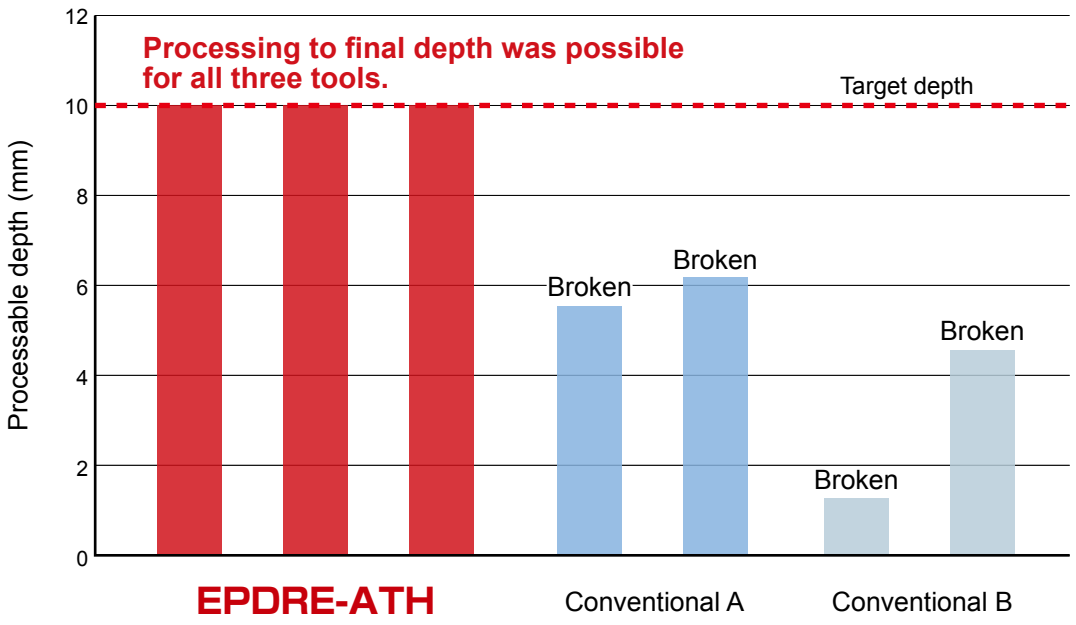
Rib slot evaluation



Incline angle : 0.5°

Coolant : Wet
n=12,800min^{-1}(v_c=40m/min)
v_f=640mm/min
(f_z=0.025mm/t)
$a_p \times a_e$=0.03mm×0.5mm

This is amazing! Point 2 Deeper rib slotting achieved!



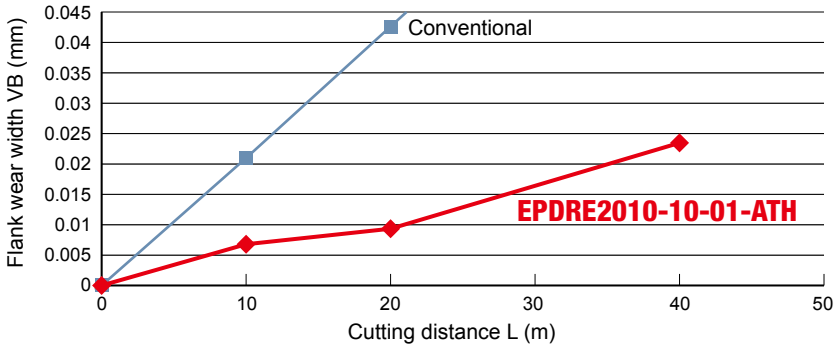
Stable wear when rib slotting enables processing of long lengths.

01 Rib slot evaluation Pre-hardened steel 40HRC

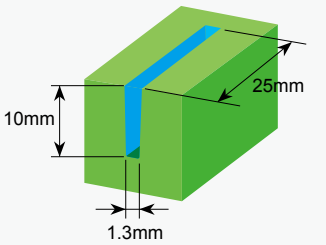
Tool : EPDRE2010-10-01-ATH (ϕ1×RE0.1×Under neck10mm)

This is amazing! Point 1 Wear condition is stable, enabling long-life cutting.

Wear condition after cutting 40m



Rib slot evaluation



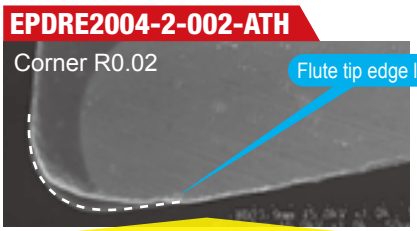
Incline angle : 0.5°

Coolant : Wet
n=17,350min^{-1}(v_c=54m/min)
v_f=655mm/min
(f_z=0.018mm/t)
a_p×a_e=0.012mm×Change

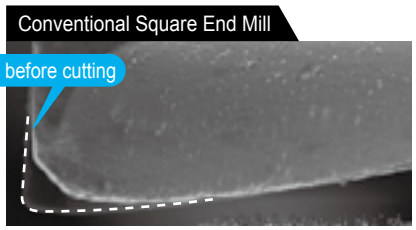
02 Example of cutting SUS420J2Ⓗ 52HRC at minimum corner radius.

Tool : EPDRE2004-2-002-ATH (ϕ0.4×RE0.02×Under neck 2mm)

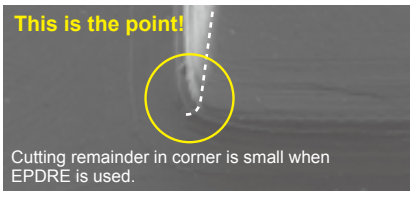
This is amazing! Point 2 Ideal for finishing tiny corners

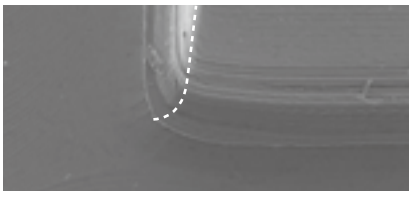


Wear is low enabling stable processing.

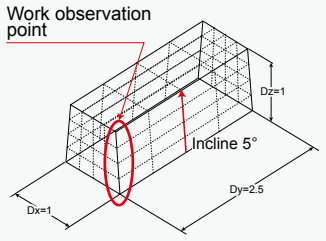


Dimensional differences occur due to corner chipping.





Evaluation of corner finishing



Coolant : Wet
n=40,000min^{-1}(v_c=50.3m/min)
v_f=520mm/min
(f_z=0.0065mm/t)
a_p×a_e=0.005mm×0.5mm
Cutting distance : 40m
Processing location:
Corner between bottom and slope

When a square is used to finish the corner, chipping of the corner and cutting differences are likely to occur, but when fine corner R is used, cutting differences are reduced because wear is stable.

Enables stable processing without contact of outer flute!

Cutting for Pre-hardened steel 40HRC

Tool : EPDRE2010-10-01-ATH (ϕ1×RE0.1×Under neck10mm)

EPDRE2010-10-01-ATH

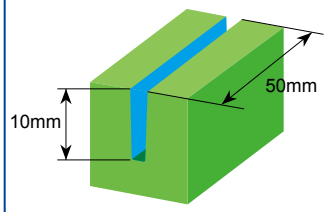
Good conditions without chattering due to backdraft shape effect.

Conventional A

Entire outer flank face contacts with work-piece to fracture

Inclination of chattering vibrations due to tool deflection.

Cutting condition

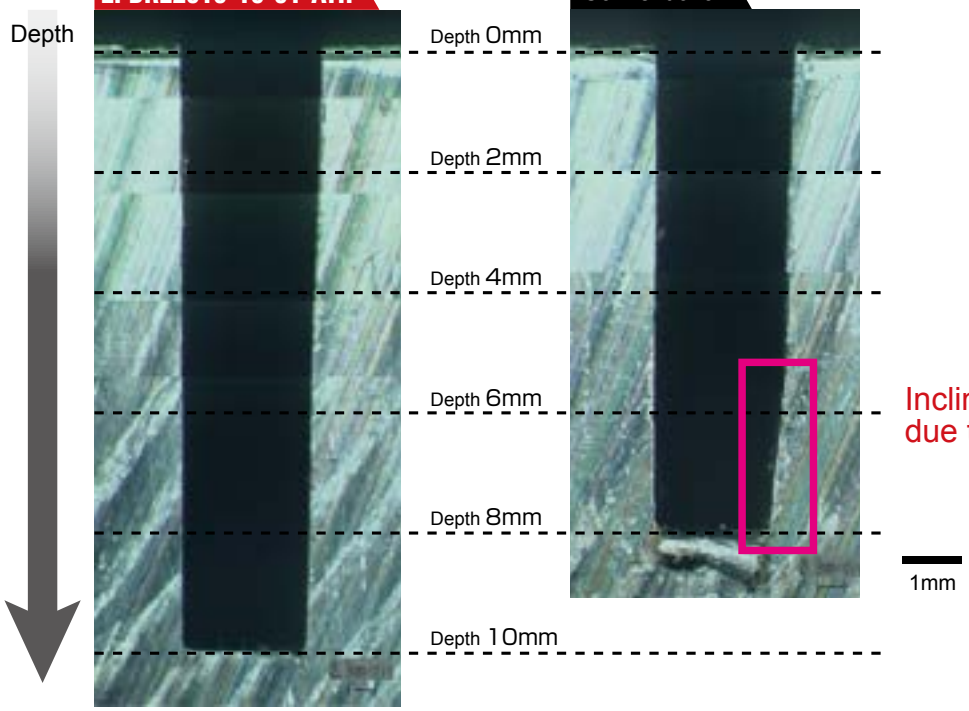


Coolant : Wet
n=17,350min^{-1}(v_c=54m/min)
v_f=655mm/min
(f_z=0.018mm/t)
a_p×a_e=0.012mm× Change
Wet
Processing by contouring

Inclination condition at exit side of rib slot

EPDRE2010-10-01-ATH

Conventional



Inclination of slot occurred due to tool deflection.

MOLDINO

The Edge To Innovation

The diagrams and table data are examples of test results, and are not guaranteed values.

⚠ 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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