

Carbide Miniature End Mill

EPDBE-PN/ATH ***EPDSE-PN/ATH***

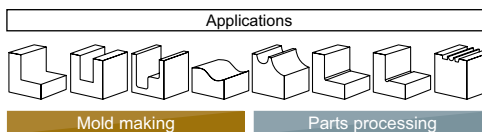
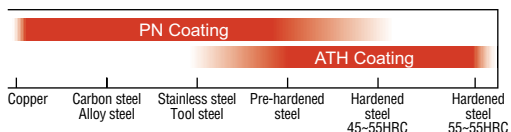
Epoch Deep Evolution series



MOLDINO Tool Engineering, Ltd.

New Product News | No.1110E-7 | 2021-7

Features 01 Features of Epoch Deep Evolution



EPDBE-ATH/PN
R0.05~R3 [164 Items×2]

EPDSE-ATH/PN
φ0.1~φ6 [145 Items×2]

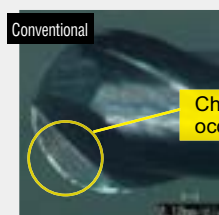
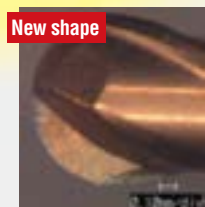
Flute shape increases resistance to breakage.

Epoch Deep Ball Evolution



High-strength flute shape with high chip removal characteristics. Stronger R flute helix angle improves cutting performance.

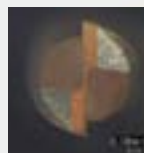
New shape



Tool : EPDBE2010-10-ATH
(R0.5 Under neck 10mm)
0.02mm
Finishing surface
Incline angle : 1°

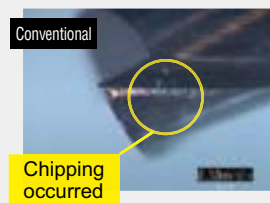
Work material : SUS420J2(H) 52HRC
Holder : HSK-F63
Coolant : Air Blow
 $n=16,000\text{min}^{-1}$ ($v_c=50.2\text{m/min}$)
 $v_f=1000\text{mm/min}$ ($f_z=0.03\text{mm/t}$)
 $a_p \times a_e=0.02\text{mm} \times 0.02\text{mm}$
OH=18mm

Epoch Deep Square Evolution



Flute shape with high flute tip strength and high cutting performance provides improved stability.

New shape



Tool : EPDSE2010-4-ATH
(φ1 Under neck 4mm)
1.5mm square island
(90° standing walls)

Work material : HPM-MAGIC 40HRC
Holder : HSK-F63
Coolant : Wet
 $n=15,000\text{min}^{-1}$ ($v_c=47\text{m/min}$)
 $v_f=1,000\text{mm/min}$ ($f_z=0.03\text{mm/t}$)
 $a_p \times a_e=0.1\text{mm} \times 0.1\text{mm}$

Improved compound neck shape

- Further improves the conventional compound shape of R and taper to both resist breakage and suppress deflection.
- ※Since the actual effective under-neck length is shorter than the conventional Deep Series, be sure to check the interference region before use.

New shape



Conventional Deep series

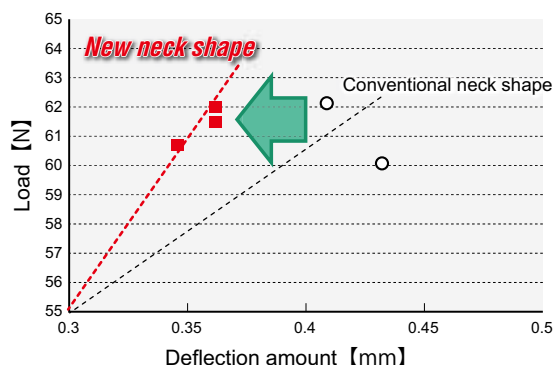


[Caution]

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

Static load test results

Testing tool size
φ1×Under neck 6



Deflection suppression effect is high even under the same load. Enables machining with even higher accuracy.

Abundant lineup

Ball End Mill

164

PN/ATH
Items×2

Total

618
items

EPDBE-PN
EPDBE-ATH

EPDB
EPDB-TH

Stocked by
specified distributor

Square End Mill

145

PN/ATH
Items×2

EPDSE-PN
EPDSE-ATH

EPDS
EPDS-TH

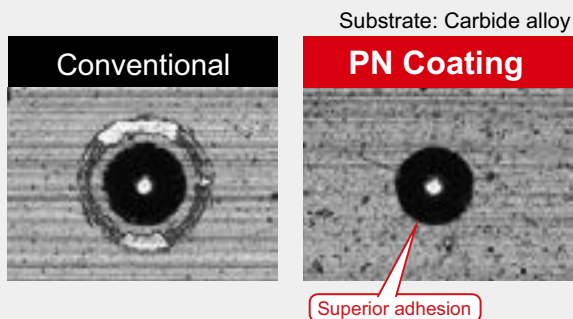
Stocked by
specified distributor

■ Features

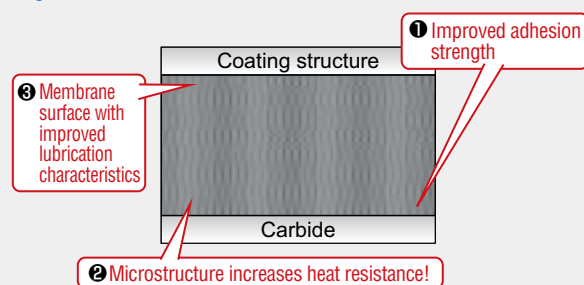
- A **heat-resistant coating material with excellent adhesion** to the tool substrate was achieved by optimizing the Al content.
- Exhibits with good wear resistance due to doping of the AlCr coating layer with Si.
- Exhibits excellent cutting life for cutting materials such as plastic molds, etc. where tool seizure often occurs.
(2x the cutting life compared to conventional products.)
Provides the long life in cutting processing of materials starting with HPM-MAGIC and including prehardened steel, carbon steel, alloy steel, SUS, SKD61, SKD11, etc.
- By improving heat resistance, long life are possible for both wet cutting and **dry cutting**.
Note) This product obtains less electric conductivity. Therefore, Please caution of using electric transmitted measuring systems.

■ Characteristics

Adhesion of PN Coating



Cross-section photograph of PN Coating layer structure



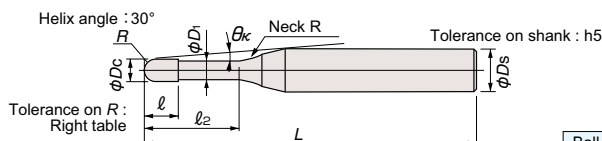
■ Features

- 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

Epoch Deep Ball Evolution EPDBE-PN

PNcoating

2 Flutes



(mm)	
Ball radius R	Tolerance on R
$R \leq 0.25$	± 0.003
$0.25 < R$	± 0.005

EPDBE2-0.0.0.0.0.0-PN

Item code	Stock	Size (mm)									The effective under-neck length for the various draft angles				
	PN	Ball radius R	Tool dia. D_c	Under neck length ℓ_2	Flute length ℓ	Neck dia. D_1	Overall length L	Shank dia. D_s	Neck R	Interference angle θ_K	0.5°	1°	1.5°	2°	3°
EPDBE2001-0.2-PN	●	0.05	0.1	0.2	0.08	0.08	45	4	1	11.76	0.35	0.37	0.39	0.41	0.44
EPDBE2001-0.3-PN	●			0.3						11.64	0.46	0.48	0.50	0.52	0.57
EPDBE2001-0.5-PN	●			0.5						11.40	0.67	0.70	0.73	0.76	0.81
EPDBE2002-0.5-PN	●	0.1	0.2	0.5	0.15	0.17	50	4	1	11.42	0.70	0.72	0.75	0.77	0.82
EPDBE2002-0.75-PN	●			0.75						11.13	0.96	0.99	1.02	1.05	1.11
EPDBE2002-1-PN	●			1						10.86	1.22	1.26	1.30	1.33	1.39
EPDBE2002-1.25-PN	●			1.25						10.60	1.48	1.52	1.57	1.61	1.72
EPDBE2002-1.5-PN	●			1.5						10.35	1.74	1.79	1.84	1.88	2.05
EPDBE2002-2-PN	●			2						9.88	2.25	2.32	2.37	2.45	2.71
EPDBE2002-2.5-PN	●			2.5						9.46	2.77	2.84	2.91	3.05	3.37
EPDBE2002-3-PN	●			3						9.07	3.28	3.37	3.48	3.65	4.04
EPDBE2003-0.5-PN	●	0.15	0.3	0.5	0.25	0.27	50	4	2	11.47	0.78	0.82	0.86	0.90	0.98
EPDBE2003-0.75-PN	●			0.75						11.17	1.05	1.10	1.15	1.20	1.29
EPDBE2003-1-PN	●			1						10.89	1.31	1.38	1.43	1.49	1.59
EPDBE2003-1.25-PN	●			1.25						10.62	1.58	1.65	1.72	1.78	1.89
EPDBE2003-1.5-PN	●			1.5						10.36	1.84	1.92	1.99	2.06	2.18
EPDBE2003-2-PN	●			2						9.88	2.36	2.46	2.55	2.62	2.76
EPDBE2003-2.5-PN	●			2.5						9.45	2.89	3.00	3.10	3.18	3.36
EPDBE2003-3-PN	●			3						9.05	3.41	3.53	3.64	3.73	4.02
EPDBE2004-0.75-PN	●	0.2	0.4	0.75	0.3	0.37	50	4	2	11.21	1.04	1.09	1.14	1.19	1.28
EPDBE2004-1-PN	●			1						10.91	1.31	1.37	1.43	1.48	1.58
EPDBE2004-1.5-PN	●			1.5						10.37	1.84	1.92	1.99	2.06	2.17
EPDBE2004-2-PN	●			2						9.88	2.36	2.46	2.54	2.62	2.75
EPDBE2004-2.5-PN	●			2.5						9.43	2.89	3.00	3.09	3.18	3.34
EPDBE2004-3-PN	●			3						9.03	3.41	3.53	3.63	3.73	4.01
EPDBE2004-3.5-PN	●			3.5						8.65	3.93	4.06	4.18	4.27	4.67
EPDBE2004-4-PN	●			4						8.30	4.45	4.59	4.71	4.83	5.33
EPDBE2004-4.5-PN	●		4.5							7.99	4.97	5.12	5.25	5.43	6.00
EPDBE2005-1-PN	●	0.25	0.5	1	0.35	0.47	50	4	2	10.94	1.31	1.37	1.42	1.47	1.57
EPDBE2005-1.5-PN	●			1.5						10.39	1.83	1.91	1.98	2.05	2.17
EPDBE2005-2-PN	●			2						9.88	2.36	2.45	2.54	2.61	2.75
EPDBE2005-2.5-PN	●			2.5						9.42	2.88	2.99	3.09	3.17	3.33
EPDBE2005-3-PN	●			3						9.00	3.41	3.53	3.63	3.72	3.99
EPDBE2005-4-PN	●			4						8.27	4.45	4.59	4.71	4.82	5.32
EPDBE2005-5-PN	●			5						7.64	5.48	5.65	5.78	6.01	6.65
EPDBE2005-5.5-PN	●			5.5						7.36	6.00	6.17	6.31	6.61	7.31
EPDBE2005-6-PN	●			6						7.10	6.52	6.70	6.88	7.21	7.97
EPDBE2005-8-PN	●			8						6.23	8.58	8.79	9.16	9.60	10.63
EPDBE2006-1-PN	●	0.3	0.6	1	0.4	0.57	50	4	4	10.98	1.44	1.54	1.63	1.71	1.88
EPDBE2006-2-PN	●			2						9.88	2.52	2.66	2.79	2.91	3.13
EPDBE2006-2.5-PN	●			2.5						9.41	3.05	3.22	3.36	3.49	3.73
EPDBE2006-3-PN	●			3						8.98	3.58	3.77	3.93	4.07	4.32
EPDBE2006-3.5-PN	●			3.5						8.58	4.12	4.32	4.49	4.64	4.91
EPDBE2006-4-PN	●			4						8.22	4.64	4.86	5.04	5.20	5.48
EPDBE2006-4.5-PN	●			4.5						7.89	5.17	5.40	5.59	5.76	6.06
EPDBE2006-5-PN	●			5						7.59	5.70	5.94	6.14	6.32	6.63
EPDBE2006-5.5-PN	●			5.5						7.31	6.22	6.48	6.69	6.87	7.29
EPDBE2006-6-PN	●			6						7.04	6.75	7.02	7.23	7.42	7.96
EPDBE2006-7-PN	●			7						6.57	7.79	8.08	8.32	8.52	9.28
EPDBE2006-8-PN	●			8						6.16	8.84	9.15	9.40	9.61	10.61
EPDBE2006-9-PN	●			9						5.79	9.88	10.21	10.47	10.79	11.94
EPDBE2006-10-PN	●			10						5.47	10.92	11.26	11.54	11.99	13.27
EPDBE2006-12-PN	●			12						4.92	12.99	13.37	13.72	14.38	15.92

● : Stocked items.

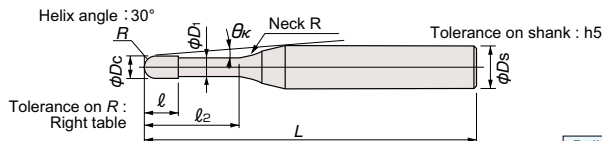
Line Up

Epoch Deep Ball Evolution

EPDBE-PN

PN coating

2 Flutes

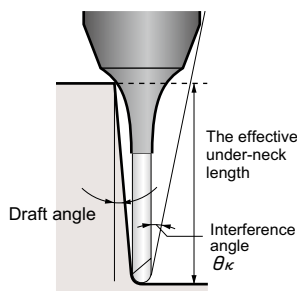
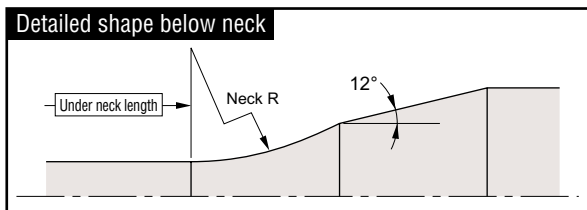


EPDBE2-000-00.00-PN

(mm)	
Ball radius R	Tolerance on R
$R \leq 0.25$	± 0.003
$0.25 < R$	± 0.005

Item code	Stock	Size (mm)									The effective under-neck length for the various draft angles				
	PN	Ball radius <i>R</i>	Tool dia. <i>D_c</i>	Under neck length <i>ℓ₂</i>	Flute length <i>ℓ</i>	Neck dia. <i>D₁</i>	Overall length <i>L</i>	Shank dia. <i>D_s</i>	Neck R	Interference angle <i>θ_K</i>	0.5°	1°	1.5°	2°	3°
EPDBE2020-3-PN	●	1	2	3	1.7	1.92	50	4	4	8.26	3.71	3.84	3.96	4.07	4.29
EPDBE2020-4-PN	●			4						7.23	4.75	4.92	5.07	5.21	5.45
EPDBE2020-6-PN	●			6						5.78	6.84	7.07	7.26	7.43	7.89
EPDBE2020-8-PN	●			8						4.81	8.92	9.19	9.42	9.61	10.54
EPDBE2020-10-PN	●			10						4.12	11.00	11.30	11.56	11.99	13.20
EPDBE2020-12-PN	●			12			55			3.61	13.06	13.41	13.76	14.39	15.85
EPDBE2020-13-PN	●			13						3.39	14.10	14.45	14.90	15.58	17.18
EPDBE2020-14-PN	●			14						3.20	15.13	15.50	16.04	16.78	18.51
EPDBE2020-16-PN	●			16			60			2.88	17.19	17.59	18.32	19.17	No interference
EPDBE2020-18-PN	●			18						2.62	19.24	19.72	20.60	21.57	No interference
EPDBE2020-20-PN	●			20						2.40	21.30	21.90	22.88	23.96	No interference
EPDBE2020-22-PN	●			22			65			2.22	23.35	24.08	25.16	26.35	No interference
EPDBE2020-25-PN	●			25						1.99	26.42	27.35	28.58	No interference	No interference
EPDBE2020-30-PN	●			30			70			1.70	31.53	32.80	34.29	No interference	No interference
EPDBE2020-35-PN	●			35			75			1.48	36.65	38.24	No interference	No interference	No interference
EPDBE2020-40-PN	●			40			80			1.31	41.86	43.69	No interference	No interference	No interference
EPDBE2025-6-PN	●	1.25	2.5	6	2	2.4	50	4	4	5.04	6.88	7.09	7.27	7.43	7.87
EPDBE2025-10-PN	●			10						3.43	11.03	11.32	11.56	12.00	13.18
EPDBE2025-15-PN	●			15			55			2.46	16.18	16.56	17.20	17.98	
EPDBE2025-20-PN	●			20			60			1.91	21.32	21.93	22.90	No interference	No interference
EPDBE2025-25-PN	●			25			65			1.57	26.44	27.38	28.60	No interference	No interference
EPDBE2025-30-PN	●			30			70			1.33	31.55	32.82	No interference	No interference	No interference
EPDBE2030-8-PN	●	1.5	3	8	2.5	2.88	55	6	4	6.19	8.99	9.23	9.44	9.62	10.51
EPDBE2030-10-PN	●			10						5.41	11.06	11.34	11.57	12.01	13.16
EPDBE2030-13-PN	●			13			60			4.56	14.15	14.48	14.94	15.60	17.15
EPDBE2030-16-PN	●			16						3.93	17.24	17.61	18.36	19.19	21.13
EPDBE2030-20-PN	●			20			65			3.33	21.34	21.96	22.92	23.97	26.44
EPDBE2030-25-PN	●			25			70			2.79	26.46	27.41	28.62	29.96	No interference
EPDBE2030-30-PN	●			30			75			2.40	31.57	32.85	34.32	35.94	No interference
EPDBE2030-35-PN	●	35	80	2.11	36.72	38.30	40.03	41.92	No interference						
EPDBE2035-15-PN	●	1.75	3.5	15	2.75	3.35	60	6	4	3.68	16.25	16.60	17.26	18.03	19.81
EPDBE2035-25-PN	●			25						70	2.43	26.49	27.46	28.67	29.99
EPDBE2035-35-PN	●			35			80			1.82	36.79	38.36	40.07	No interference	No interference
EPDBE2035-45-PN	●			45			90			1.45	47.22	49.25	No interference	No interference	No interference
EPDBE2040-10-PN	●	2	4	10	3	3.85	55	6	4	4.38	11.10	11.36	11.58	12.00	13.10
EPDBE2040-13-PN	●			13			60			3.57	14.19	14.50	14.95	15.59	17.08
EPDBE2040-16-PN	●			16						3.01	17.27	17.63	18.37	19.18	No interference
EPDBE2040-20-PN	●			20			65			2.49	21.37	21.99	22.93	23.96	No interference
EPDBE2040-25-PN	●			25			70			2.05	26.49	27.44	28.63	29.95	No interference
EPDBE2040-30-PN	●			30			75			1.74	31.59	32.89	34.34	No interference	No interference
EPDBE2040-35-PN	●			35			80			1.51	36.78	38.33	40.04	No interference	No interference
EPDBE2040-40-PN	●			40						1.34	41.99	43.78	No interference	No interference	No interference
EPDBE2040-45-PN	●			45			90			1.20	47.20	49.23	No interference	No interference	No interference
EPDBE2040-50-PN	●			50			100			1.08	52.42	54.68	No interference	No interference	No interference
EPDBE2050-20-PN	●	2.5	5	20	3.5	4.85	65	6	4	1.42	21.36	21.95	No interference	No interference	No interference
EPDBE2050-25-PN	●			25			70			1.14	26.48	27.39	No interference	No interference	No interference
EPDBE2050-30-PN	●			30			75			0.95	31.58	No interference	No interference	No interference	No interference
EPDBE2050-40-PN	●			40			80			0.72	41.97	No interference	No interference	No interference	No interference
EPDBE2060-12-PN	●	3	6	12	6	5.85	60	6	-	0	No interference	No interference	No interference	No interference	No interference
EPDBE2060-20-PN	●			20			65			0	No interference	No interference	No interference	No interference	No interference
EPDBE2060-30-PN	●			30			75			0	No interference	No interference	No interference	No interference	No interference
EPDBE2060-50-PN	●			50			100			0	No interference	No interference	No interference	No interference	No interference

● : Stocked items.



[Note]

The effective under-neck length is different from Epoch Deep Ball EPDB. Please recheck the interference region.

EPDBE2-ATH

Item code	Stock	Size (mm)									The effective under-neck length for the various draft angles						
	ATH	Ball radius <i>R</i>	Tool dia. <i>D_c</i>	Under neck length <i>ℓ</i> _≥	Flute length <i>ℓ</i>	Neck dia. <i>D</i> ₁	Overall length <i>L</i>	Shank dia. <i>D</i> _s	Neck R	Interference angle <i>θ_K</i>	0.5°	1°	1.5°	2°	3°		
EPDBE2018-8-ATH	●	0.9	1.8	8	1.6	1.73	50	4	4	5.06	8.91	9.18	9.41	9.61	10.54		
EPDBE2018-12-ATH	●			12			3.83			13.05	13.40	13.74	14.38	15.85			
EPDBE2018-16-ATH	●			16			3.09			17.17	17.58	18.31	19.16	21.16			
EPDBE2018-20-ATH	●			20			2.58			21.28	21.88	22.87	23.95	No interference			
EPDBE2020-3-ATH	●	1	2	3	1.7	1.92	50	4	4	8.26	3.71	3.84	3.96	4.07	4.29		
EPDBE2020-4-ATH	●			4						7.23	4.75	4.92	5.07	5.21	5.45		
EPDBE2020-6-ATH	●			6						5.78	6.84	7.07	7.26	7.43	7.89		
EPDBE2020-8-ATH	●			8						4.81	8.92	9.19	9.42	9.61	10.54		
EPDBE2020-10-ATH	●			10			4.12			11.00	11.30	11.56	11.99	13.20			
EPDBE2020-12-ATH	●			12			3.61			13.06	13.41	13.76	14.39	15.85			
EPDBE2020-13-ATH	●			13			3.39			14.10	14.45	14.90	15.58	17.18			
EPDBE2020-14-ATH	●			14			3.20			15.13	15.50	16.04	16.78	18.51			
EPDBE2020-16-ATH	●			16			2.88			17.19	17.59	18.32	19.17	No interference			
EPDBE2020-18-ATH	●			18			2.62			19.24	19.72	20.60	21.57	No interference			
EPDBE2020-20-ATH	●			20			2.40			21.30	21.90	22.88	23.96	No interference			
EPDBE2020-22-ATH	●			22			2.22			23.35	24.08	25.16	26.35	No interference			
EPDBE2020-25-ATH	●			25			1.99			26.42	27.35	28.58	No interference	No interference			
EPDBE2020-30-ATH	●			30			1.70			31.53	32.80	34.29	No interference	No interference			
EPDBE2020-35-ATH	●			35			1.48			36.65	38.24	No interference	No interference	No interference			
EPDBE2020-40-ATH	●			40			1.31			41.86	43.69	No interference	No interference	No interference			
EPDBE2025-6-ATH	●	1.25	2.5	6	2	2.4	50	4	4	5.04	6.88	7.09	7.27	7.43	7.87		
EPDBE2025-10-ATH	●			10						3.43	11.03	11.32	11.56	12.00	13.18		
EPDBE2025-15-ATH	●			15			55			2.46	16.18	16.56	17.20	17.98	No interference		
EPDBE2025-20-ATH	●			20			60			1.91	21.32	21.93	22.90	No interference	No interference		
EPDBE2025-25-ATH	●			25			65			1.57	26.44	27.38	28.60	No interference	No interference		
EPDBE2025-30-ATH	●			30			70			1.33	31.55	32.82	No interference	No interference			
EPDBE2030-8-ATH	●	1.5	3	8	2.5	2.88	55	6	4	6.19	8.99	9.23	9.44	9.62	10.51		
EPDBE2030-10-ATH	●			10						5.41	11.06	11.34	11.57	12.01	13.16		
EPDBE2030-13-ATH	●			13			60			4.56	14.15	14.48	14.94	15.60	17.15		
EPDBE2030-16-ATH	●			16						3.93	17.24	17.61	18.36	19.19	21.13		
EPDBE2030-20-ATH	●			20			65			3.33	21.34	21.96	22.92	23.97	26.44		
EPDBE2030-25-ATH	●			25			70			2.79	26.46	27.41	28.62	29.96	No interference		
EPDBE2030-30-ATH	●			30			75			2.40	31.57	32.85	34.32	35.94	No interference		
EPDBE2030-35-ATH	●			35			80			2.11	36.72	38.30	40.03	41.92	No interference		
EPDBE2035-15-ATH	●	1.75	3.5	15	2.75	3.35	60	6	4	3.68	16.25	16.60	17.26	18.03	19.81		
EPDBE2035-25-ATH	●			25			70			2.43	26.49	27.46	28.67	29.99	No interference		
EPDBE2035-35-ATH	●			35			80			1.82	36.79	38.36	40.07	No interference	No interference		
EPDBE2035-45-ATH	●			45			90			1.45	47.22	49.25	No interference	No interference	No interference		
EPDBE2040-10-ATH	●	2	4	10	3	3.85	55	6	4	4.38	11.10	11.36	11.58	12.00	13.10		
EPDBE2040-13-ATH	●			13			60			3.57	14.19	14.50	14.95	15.59	17.08		
EPDBE2040-16-ATH	●			16						3.01	17.27	17.63	18.37	19.18	No interference		
EPDBE2040-20-ATH	●			20			65			2.49	21.37	21.99	22.93	23.96	No interference		
EPDBE2040-25-ATH	●			25			70			2.05	26.49	27.44	28.63	29.95	No interference		
EPDBE2040-30-ATH	●			30			75			1.74	31.59	32.89	34.34	No interference	No interference		
EPDBE2040-35-ATH	●			35			80			1.51	36.78	38.33	40.04	No interference	No interference		
EPDBE2040-40-ATH	●			40						1.34	41.99	43.78	No interference	No interference	No interference		
EPDBE2040-45-ATH	●			45						1.20	47.20	49.23	No interference	No interference	No interference		
EPDBE2040-50-ATH	●			50			100			1.08	52.42	54.68	No interference	No interference	No interference		
EPDBE2050-20-ATH	●	2.5	5	20	3.5	4.85	65	6	4	1.42	21.36	21.95	No interference	No interference	No interference		
EPDBE2050-25-ATH	●			25			70			1.14	26.48	27.39	No interference	No interference	No interference		
EPDBE2050-30-ATH	●			30			75			0.95	31.58	No interference	No interference	No interference	No interference		
EPDBE2050-40-ATH	●			40			80			0.72	41.97	No interference	No interference	No interference	No interference		
EPDBE2060-12-ATH	●	3	6	12	6	5.85	60	6	-	0	No interference	No interference	No interference	No interference	No interference		
EPDBE2060-20-ATH	●			20			65			0	No interference	No interference	No interference	No interference	No interference		
EPDBE2060-30-ATH	●			30			75			0	No interference	No interference	No interference	No interference	No interference		
EPDBE2060-50-ATH	●			50			100			0	No interference	No interference	No interference	No interference	No interference		

● : Stocked items.

Features

Dimensions
Ball PN Coating

Dimensions
Ball ATH Coating

Cutting condition
Ball High efficiency

Cutting condition
Ball High accuracy

Dimensions
Square PN Coating

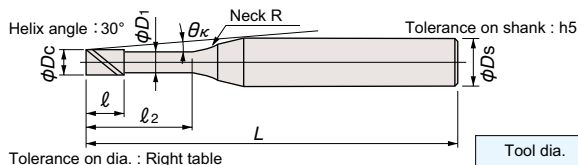
Dimensions
Square ATH Coating

Cutting condition
Square High efficiency

Cutting condition
Square High accuracy

Technical Data

2 Flutes

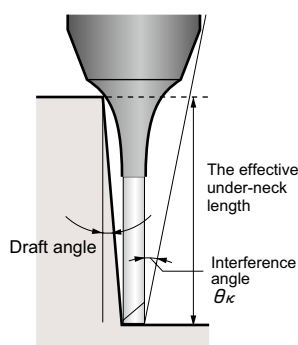
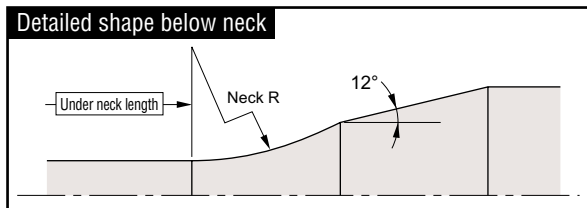


Tool dia.	Tolerance on dia.
φ 0.1~φ 0.5	$-\frac{0}{0.007}$
φ 0.6~φ 0.9	$-\frac{0}{0.01}$
φ 1~φ 6	$-\frac{0}{0.015}$

EPDSE2000-0.0.0-PN

Item code	Stock	Size(mm)								The effective under-neck length for the various draft angles				
	PN	Tool dia. Dc	Under neck length ℓ ₂	Flute length ℓ	Neck dia. D ₁	Overall length L	Shank dia. D _s	Neck R	Interference angle θ _K					
										0.5°	1°	1.5°	2°	3°
EPDSE2001-0.3-PN	●	0.1	0.3	0.15	0.08	45	4	1	11.58	0.46	0.49	0.51	0.53	0.58
EPDSE2001-0.5-PN	●		0.5						11.35	0.67	0.71	0.74	0.76	0.82
EPDSE2001-1-PN	●		1						10.81	1.20	1.25	1.29	1.33	1.39
EPDSE2002-0.5-PN	●	0.2	0.5	0.3	0.17	50	4	1	11.30	0.70	0.73	0.76	0.78	0.83
EPDSE2002-1-PN	●		1						10.75	1.22	1.27	1.31	1.34	1.42
EPDSE2002-1.5-PN	●		1.5						10.25	1.74	1.80	1.85	1.89	2.08
EPDSE2002-2-PN	●		2						9.80	2.26	2.32	2.38	2.47	2.74
EPDSE2002-3-PN	●		3						9.00	3.29	3.37	3.50	3.67	4.07
EPDSE2003-1-PN	●	0.3	1	0.45	0.27	50	4	2	10.72	1.32	1.39	1.45	1.51	1.62
EPDSE2003-1.5-PN	●		1.5						10.21	1.85	1.93	2.01	2.08	2.21
EPDSE2003-2-PN	●		2						9.75	2.37	2.47	2.56	2.64	2.78
EPDSE2003-2.5-PN	●		2.5						9.32	2.89	3.01	3.11	3.20	3.41
EPDSE2003-3-PN	●		3						8.93	3.42	3.54	3.65	3.75	4.07
EPDSE2004-1-PN	●	0.4	1	0.6	0.37	50	4	2	10.69	1.32	1.39	1.45	1.51	1.62
EPDSE2004-1.5-PN	●		1.5						10.17	1.85	1.93	2.01	2.08	2.21
EPDSE2004-2-PN	●		2						9.70	2.37	2.47	2.56	2.64	2.78
EPDSE2004-2.5-PN	●		2.5						9.27	2.89	3.01	3.11	3.20	3.41
EPDSE2004-3-PN	●		3						8.87	3.42	3.54	3.65	3.75	4.07
EPDSE2004-3.5-PN	●		3.5						8.51	3.94	4.08	4.19	4.29	4.73
EPDSE2004-4-PN	●		4						8.17	4.46	4.61	4.73	4.87	5.40
EPDSE2004-5-PN	●		5						7.58	5.49	5.66	5.79	6.06	6.72
EPDSE2004-6-PN	●		6						7.06	6.53	6.71	6.92	7.26	8.05
EPDSE2004-8-PN	●		8						6.22	8.59	8.80	9.20	9.65	10.71
EPDSE2004-10-PN	●	10	5.55	10.64	10.97	11.48	12.05	13.36						
EPDSE2005-1-PN	●	0.5	1	0.75	0.47	50	4	2	10.66	1.32	1.39	1.45	1.51	1.62
EPDSE2005-1.5-PN	●		1.5						10.13	1.85	1.93	2.01	2.08	2.21
EPDSE2005-2-PN	●		2						9.64	2.37	2.47	2.56	2.64	2.78
EPDSE2005-2.5-PN	●		2.5						9.21	2.89	3.01	3.11	3.20	3.41
EPDSE2005-3-PN	●		3						8.81	3.42	3.54	3.65	3.75	4.07
EPDSE2005-4-PN	●		4						8.10	4.46	4.61	4.73	4.87	5.40
EPDSE2005-5-PN	●		5						7.50	5.49	5.66	5.79	6.06	6.72
EPDSE2005-6-PN	●		6						6.98	6.53	6.71	6.92	7.26	8.05
EPDSE2005-8-PN	●		8						6.13	8.59	8.80	9.20	9.65	10.71
EPDSE2005-10-PN	●		10						5.47	10.64	10.97	11.48	12.05	13.36
EPDSE2006-2-PN	●	0.6	2	0.9	0.57	50	4	4	9.59	2.54	2.70	2.84	2.96	3.19
EPDSE2006-3-PN	●		3						8.74	3.60	3.80	3.96	4.11	4.37
EPDSE2006-4-PN	●		4						8.02	4.66	4.89	5.07	5.24	5.53
EPDSE2006-5-PN	●		5						7.42	5.71	5.96	6.17	6.35	6.72
EPDSE2006-6-PN	●		6						6.90	6.76	7.04	7.26	7.45	8.05
EPDSE2006-7-PN	●		7						6.44	7.81	8.10	8.34	8.55	9.38
EPDSE2006-8-PN	●		8						6.04	8.85	9.17	9.42	9.65	10.71
EPDSE2006-9-PN	●		9						5.69	9.89	10.22	10.49	10.85	12.03
EPDSE2006-10-PN	●		10						5.38	10.93	11.28	11.56	12.05	13.36
EPDSE2007-2-PN	●		0.7						2	1.05	0.67	50	4	4
EPDSE2007-4-PN	●	4		7.94	4.66	4.89	5.07	5.24	5.53					
EPDSE2007-6-PN	●	6		6.81	6.76	7.04	7.26	7.45	8.05					
EPDSE2007-8-PN	●	8		5.95	8.85	9.17	9.42	9.65	10.71					
EPDSE2007-10-PN	●	10		5.29	10.93	11.28	11.56	12.05	13.36					

● : Stocked items.



[Note]

The effective under-neck length is different from Epoch Deep Square EPDS. Please recheck the interference region.

EPDSE2000-00.0-PN

Item code	Stock	Size(mm)								The effective under-neck length for the various draft angles				
	PN	Tool dia. D_c	Under neck length ℓ_2	Flute length ℓ	Neck dia. D_1	Overall length L	Shank dia. D_s	Neck R	Interference angle θ_K	0.5°	1°	1.5°	2°	3°
EPDSE2008-2-PN	●	0.8	2	1.2	0.77	50	4	4	9.47	2.54	2.70	2.84	2.96	3.19
EPDSE2008-4-PN	●		4						7.86	4.66	4.89	5.07	5.24	5.53
EPDSE2008-6-PN	●		6						6.72	6.76	7.04	7.26	7.45	8.05
EPDSE2008-8-PN	●		8						5.86	8.85	9.17	9.42	9.65	10.71
EPDSE2008-10-PN	●		10						5.20	10.93	11.28	11.56	12.05	13.36
EPDSE2008-12-PN	●		12			55			4.67	13.00	13.38	13.76	14.44	16.02
EPDSE2009-2-PN	●	0.9	2	1.35	0.86	50	4	4	9.38	2.58	2.73	2.86	2.98	3.21
EPDSE2009-4-PN	●		4						7.76	4.69	4.91	5.09	5.26	5.54
EPDSE2009-6-PN	●		6						6.61	6.79	7.06	7.28	7.47	8.08
EPDSE2009-8-PN	●		8						5.76	8.87	9.18	9.43	9.68	10.74
EPDSE2009-10-PN	●		10						5.10	10.95	11.30	11.57	12.07	13.39
EPDSE2009-12-PN	●		12			55			4.58	13.02	13.40	13.79	14.47	16.05
EPDSE2010-2-PN	●	1	2	1.5	0.96	50	4	4	9.31	2.58	2.73	2.86	2.98	3.21
EPDSE2010-3-PN	●		3						8.41	3.64	3.82	3.99	4.13	4.39
EPDSE2010-4-PN	●		4						7.67	4.69	4.91	5.09	5.26	5.54
EPDSE2010-5-PN	●		5						7.04	5.74	5.99	6.19	6.37	6.76
EPDSE2010-6-PN	●		6						6.51	6.79	7.06	7.28	7.47	8.08
EPDSE2010-7-PN	●		7						6.06	7.83	8.12	8.36	8.56	9.41
EPDSE2010-8-PN	●		8						5.66	8.87	9.18	9.43	9.68	10.74
EPDSE2010-9-PN	●		9						5.31	9.91	10.24	10.50	10.88	12.07
EPDSE2010-10-PN	●		10			5.00			10.95	11.30	11.57	12.07	13.39	
EPDSE2010-12-PN	●		12			4.48			13.02	13.40	13.79	14.47	16.05	
EPDSE2010-14-PN	●		14			4.06			15.09	15.49	16.07	16.86	18.70	
EPDSE2010-16-PN	●		16			3.71			17.15	17.58	18.35	19.25	21.36	
EPDSE2010-20-PN	●		20			3.17			21.26	21.89	22.91	24.04	26.66	
EPDSE2010-25-PN	●		25			65			2.68	26.39	27.33	28.61	30.02	No interference
EPDSE2012-4-PN	●	1.2	4	1.8	1.15	50	4	4	7.46	4.72	4.93	5.11	5.27	5.55
EPDSE2012-6-PN	●		6						6.29	6.81	7.08	7.29	7.48	8.11
EPDSE2012-8-PN	●		8						5.44	8.90	9.20	9.45	9.71	10.77
EPDSE2012-10-PN	●		10						4.80	10.97	11.31	11.58	12.10	13.42
EPDSE2012-12-PN	●		12			4.29			13.04	13.41	13.82	14.49	16.08	
EPDSE2012-16-PN	●		16			3.53			17.16	17.59	18.38	19.28	21.39	
EPDSE2014-6-PN	●	1.4	6	2.1	1.34	50	4	4	6.06	6.84	7.09	7.31	7.50	8.15
EPDSE2014-12-PN	●		12			55			4.08	13.06	13.43	13.84	14.52	16.11
EPDSE2015-4-PN	●	1.5	4	2.25	1.44	50	4	4	7.11	4.75	4.95	5.13	5.29	5.57
EPDSE2015-6-PN	●		6						5.94	6.84	7.09	7.31	7.50	8.15
EPDSE2015-8-PN	●		8						5.10	8.92	9.22	9.46	9.74	10.80
EPDSE2015-10-PN	●		10						4.47	10.99	11.33	11.59	12.13	13.45
EPDSE2015-12-PN	●		12			3.97			13.06	13.43	13.84	14.52	16.11	
EPDSE2015-14-PN	●		14			3.58			15.12	15.52	16.12	16.92	18.76	
EPDSE2015-16-PN	●		16			3.25			17.18	17.60	18.40	19.31	21.42	
EPDSE2015-18-PN	●		18			2.98			19.24	19.76	20.69	21.70	No interference	
EPDSE2015-20-PN	●		20			2.76			21.29	21.94	22.97	24.10	No interference	
EPDSE2015-25-PN	●		25			65			2.31	26.42	27.39	28.67	30.08	No interference
EPDSE2015-30-PN	●		30			70			1.99	31.53	32.83	34.37	No interference	No interference
EPDSE2015-35-PN	●		35			75			1.75	36.64	38.28	40.07	No interference	No interference
EPDSE2015-40-PN	●		40			80			1.56	41.85	43.73	45.78	No interference	No interference
EPDSE2016-6-PN	●	1.6	6	2.4	1.54	50	4	4	5.82	6.84	7.09	7.31	7.50	8.15
EPDSE2016-8-PN	●		8						4.98	8.92	9.22	9.46	9.74	10.80
EPDSE2018-6-PN	●	1.8	6	2.7	1.73	50	4	4	5.55	6.86	7.11	7.32	7.51	8.18
EPDSE2018-8-PN	●		8						4.72	8.94	9.23	9.47	9.76	10.83

● : Stocked items.

Features

Dimensions
Ball PN Coating

Dimensions
Ball ATH Coating

Cutting condition
Ball High efficiency

Cutting condition
Ball High accuracy

Dimensions
Square PN Coating

Dimensions
Square ATH Coating

Cutting condition
Square High efficiency

Cutting condition
Square High accuracy

Technical Data

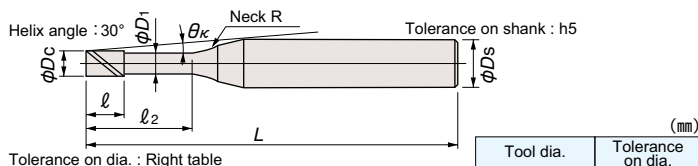
Line Up

Epoch Deep Square Evolution

EPDSE-PN

PN coating

2 Flutes



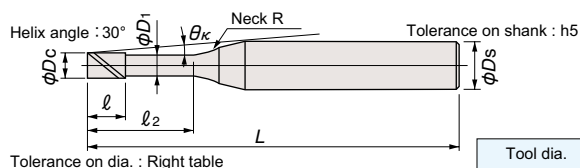
EPDSE2000-000-000-PN

Tool dia.	Tolerance on dia.
φ0.1~φ0.5	0 -0.007
φ0.6~φ0.9	0 -0.01
φ1~φ6	0 -0.015

Item code	Stock	Size(mm)								The effective under-neck length for the various draft angles					
	PN	Tool dia. Dc	Under neck length ℓ ₂	Flute length ℓ	Neck dia. D ₁	Overall length L	Shank dia. D _s	Neck R	Interference angle θ _K						
										0.5°	1°	1.5°	2°	3°	
EPDSE2020-4-PN	●	2	4	3	1.92	50	4	4	6.42	4.80	5.00	5.17	5.32	5.59	
EPDSE2020-6-PN	●		6						5.25	6.88	7.13	7.34	7.52	8.21	
EPDSE2020-8-PN	●		8						4.44	8.96	9.25	9.49	9.79	10.86	
EPDSE2020-10-PN	●		10						3.85	11.03	11.35	11.62	12.19	13.52	
EPDSE2020-12-PN	●		12						3.39	13.10	13.45	13.90	14.58	16.17	
EPDSE2020-14-PN	●		14			55			3.03	15.16	15.54	16.18	16.97	18.83	
EPDSE2020-16-PN	●		16						2.75	17.21	17.63	18.46	19.37	No interference	
EPDSE2020-18-PN	●		18						60	2.51	19.27	19.81	20.74	21.76	No interference
EPDSE2020-20-PN	●		20							2.31	21.32	21.99	23.02	24.15	No interference
EPDSE2020-25-PN	●		25							65	1.92	26.44	27.44	28.72	No interference
EPDSE2020-30-PN	●		30			70				1.65	31.55	32.88	34.42	No interference	No interference
EPDSE2020-35-PN	●		35			75				1.44	36.69	38.33	No interference	No interference	No interference
EPDSE2020-40-PN	●		40			80			1.28	41.90	43.78	No interference	No interference	No interference	
EPDSE2020-50-PN	●		50			90			1.05	52.33	54.67	No interference	No interference	No interference	
EPDSE2025-8-PN	●	2.5	8	3.75	2.4	4	4	3.65	9.00	9.28	9.51	9.85	10.93		
EPDSE2025-12-PN	●		12					55	2.73	13.13	13.48	13.95	14.64	No interference	
EPDSE2025-16-PN	●		16						2.18	17.25	17.68	18.51	19.42	No interference	
EPDSE2025-20-PN	●		20					60	1.81	21.35	22.04	23.07	No interference	No interference	
EPDSE2025-30-PN	●		30					70	1.28	31.58	32.94	No interference	No interference	No interference	
EPDSE2025-40-PN	●		40					80	0.99	41.95	No interference	No interference	No interference	No interference	
EPDSE2025-50-PN	●		50					90	0.80	52.38	No interference	No interference	No interference	No interference	
EPDSE2030-8-PN	●	3	8	4.5	2.88	55	6	4	5.59	9.04	9.31	9.54	9.91	10.99	
EPDSE2030-12-PN	●		12			60			4.44	13.16	13.50	14.00	14.69	16.30	
EPDSE2030-16-PN	●		16						3.68	17.28	17.73	18.57	19.48	21.61	
EPDSE2030-20-PN	●		20			65			3.15	21.38	22.09	23.13	24.26	26.91	
EPDSE2030-25-PN	●		25			70			2.66	26.49	27.54	28.83	30.25	No interference	
EPDSE2030-30-PN	●		30			75			2.31	31.60	32.99	34.53	36.23	No interference	
EPDSE2030-40-PN	●		40			90			1.82	42.00	43.88	45.94	No interference	No interference	
EPDSE2030-50-PN	●		50			100			1.50	52.43	54.78	No interference	No interference	No interference	
EPDSE2040-12-PN	●	4	12	6	3.85	60	6	4	3.36	13.21	13.54	14.08	14.78	16.39	
EPDSE2040-16-PN	●		16						2.72	17.32	17.81	18.65	19.56	No interference	
EPDSE2040-20-PN	●		20			70			2.29	21.42	22.17	23.21	24.35	No interference	
EPDSE2040-25-PN	●		25						1.91	26.53	27.62	28.91	No interference	No interference	
EPDSE2040-30-PN	●		30			80			1.64	31.65	33.06	34.61	No interference	No interference	
EPDSE2040-35-PN	●		35						1.44	36.86	38.51	No interference	No interference	No interference	
EPDSE2040-40-PN	●		40			90			1.28	42.08	43.96	No interference	No interference	No interference	
EPDSE2040-50-PN	●		50			100			1.05	52.50	54.85	No interference	No interference	No interference	
EPDSE2050-20-PN	●	5	20	7.5	4.85	70	6	4	1.27	21.42	22.17	No interference	No interference	No interference	
EPDSE2050-25-PN	●		25						1.04	26.53	27.62	No interference	No interference	No interference	
EPDSE2050-30-PN	●		30			80			0.88	31.65	No interference	No interference	No interference	No interference	
EPDSE2050-40-PN	●		40			90			0.68	42.08	No interference	No interference	No interference	No interference	
EPDSE2050-50-PN	●		50			100			0.55	52.50	No interference	No interference	No interference	No interference	
EPDSE2060-20-PN	●	6	20	9	5.85	70	6	-	0	No interference	No interference	No interference	No interference	No interference	
EPDSE2060-30-PN	●		30			80			0	No interference	No interference	No interference	No interference	No interference	
EPDSE2060-40-PN	●		40			90			0	No interference	No interference	No interference	No interference	No interference	
EPDSE2060-50-PN	●		50			100			0	No interference	No interference	No interference	No interference	No interference	

● : Stocked items.

2 Flutes



Tool dia.	Tolerance on dia.
φ0.1~φ0.5	0 -0.007
φ0.6~φ0.9	0 -0.01
φ1~φ6	0 -0.015

EPDSE2000-000-ATH

Item code	Stock	Size(mm)								The effective under-neck length for the various draft angles				
	ATH	Tool dia. Dc	Under neck length ℓ ₂	Flute length ℓ	Neck dia. D ₁	Overall length L	Shank dia. D _s	Neck R	Interference angle θ _κ	0.5°	1°	1.5°	2°	3°
EPDSE2001-0.3-ATH	●	0.1	0.3	0.15	0.08	45	4	1	11.58	0.46	0.49	0.51	0.53	0.58
EPDSE2001-0.5-ATH	●		0.5						11.35	0.67	0.71	0.74	0.76	0.82
EPDSE2001-1-ATH	●		1						10.81	1.20	1.25	1.29	1.33	1.39
EPDSE2002-0.5-ATH	●	0.2	0.5	0.3	0.17	50	4	1	11.30	0.70	0.73	0.76	0.78	0.83
EPDSE2002-1-ATH	●		1						10.75	1.22	1.27	1.31	1.34	1.42
EPDSE2002-1.5-ATH	●		1.5						10.25	1.74	1.80	1.85	1.89	2.08
EPDSE2002-2-ATH	●		2						9.80	2.26	2.32	2.38	2.47	2.74
EPDSE2002-3-ATH	●		3						9.00	3.29	3.37	3.50	3.67	4.07
EPDSE2003-1-ATH	●	0.3	1	0.45	0.27	50	4	2	10.72	1.32	1.39	1.45	1.51	1.62
EPDSE2003-1.5-ATH	●		1.5						10.21	1.85	1.93	2.01	2.08	2.21
EPDSE2003-2-ATH	●		2						9.75	2.37	2.47	2.56	2.64	2.78
EPDSE2003-2.5-ATH	●		2.5						9.32	2.89	3.01	3.11	3.20	3.41
EPDSE2003-3-ATH	●		3						8.93	3.42	3.54	3.65	3.75	4.07
EPDSE2004-1-ATH	●	0.4	1	0.6	0.37	50	4	2	10.69	1.32	1.39	1.45	1.51	1.62
EPDSE2004-1.5-ATH	●		1.5						10.17	1.85	1.93	2.01	2.08	2.21
EPDSE2004-2-ATH	●		2						9.70	2.37	2.47	2.56	2.64	2.78
EPDSE2004-2.5-ATH	●		2.5						9.27	2.89	3.01	3.11	3.20	3.41
EPDSE2004-3-ATH	●		3						8.87	3.42	3.54	3.65	3.75	4.07
EPDSE2004-3.5-ATH	●		3.5						8.51	3.94	4.08	4.19	4.29	4.73
EPDSE2004-4-ATH	●		4						8.17	4.46	4.61	4.73	4.87	5.40
EPDSE2004-5-ATH	●		5						7.58	5.49	5.66	5.79	6.06	6.72
EPDSE2004-6-ATH	●		6						7.06	6.53	6.71	6.92	7.26	8.05
EPDSE2004-8-ATH	●		8						6.22	8.59	8.80	9.20	9.65	10.71
EPDSE2004-10-ATH	●	10	5.55	10.64	10.97	11.48	12.05	13.36						
EPDSE2005-1-ATH	●	0.5	1	0.75	0.47	50	4	2	10.66	1.32	1.39	1.45	1.51	1.62
EPDSE2005-1.5-ATH	●		1.5						10.13	1.85	1.93	2.01	2.08	2.21
EPDSE2005-2-ATH	●		2						9.64	2.37	2.47	2.56	2.64	2.78
EPDSE2005-2.5-ATH	●		2.5						9.21	2.89	3.01	3.11	3.20	3.41
EPDSE2005-3-ATH	●		3						8.81	3.42	3.54	3.65	3.75	4.07
EPDSE2005-4-ATH	●		4						8.10	4.46	4.61	4.73	4.87	5.40
EPDSE2005-5-ATH	●		5						7.50	5.49	5.66	5.79	6.06	6.72
EPDSE2005-6-ATH	●		6						6.98	6.53	6.71	6.92	7.26	8.05
EPDSE2005-8-ATH	●		8						6.13	8.59	8.80	9.20	9.65	10.71
EPDSE2005-10-ATH	●		10						5.47	10.64	10.97	11.48	12.05	13.36
EPDSE2006-2-ATH	●	0.6	2	0.9	0.57	50	4	4	9.59	2.54	2.70	2.84	2.96	3.19
EPDSE2006-3-ATH	●		3						8.74	3.60	3.80	3.96	4.11	4.37
EPDSE2006-4-ATH	●		4						8.02	4.66	4.89	5.07	5.24	5.53
EPDSE2006-5-ATH	●		5						7.42	5.71	5.96	6.17	6.35	6.72
EPDSE2006-6-ATH	●		6						6.90	6.76	7.04	7.26	7.45	8.05
EPDSE2006-7-ATH	●		7						6.44	7.81	8.10	8.34	8.55	9.38
EPDSE2006-8-ATH	●		8						6.04	8.85	9.17	9.42	9.65	10.71
EPDSE2006-9-ATH	●		9						5.69	9.89	10.22	10.49	10.85	12.03
EPDSE2006-10-ATH	●		10						5.38	10.93	11.28	11.56	12.05	13.36
EPDSE2007-2-ATH	●		0.7						2	1.05	0.67	50	4	4
EPDSE2007-4-ATH	●	4		7.94	4.66	4.89	5.07	5.24	5.53					
EPDSE2007-6-ATH	●	6		6.81	6.76	7.04	7.26	7.45	8.05					
EPDSE2007-8-ATH	●	8		5.95	8.85	9.17	9.42	9.65	10.71					
EPDSE2007-10-ATH	●	10		5.29	10.93	11.28	11.56	12.05	13.36					

● : Stocked items.

Features

Dimensions
Ball PN CoatingDimensions
Ball ATH CoatingCutting condition
Ball High efficiencyCutting condition
Ball High accuracyDimensions
Square PN CoatingDimensions
Square ATH CoatingCutting condition
Square High efficiencyCutting condition
Square High accuracy

Technical Data

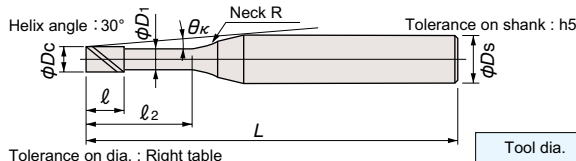
Line Up

Epoch Deep Square Evolution

EPDSE-ATH

ATHcoating

2 Flutes



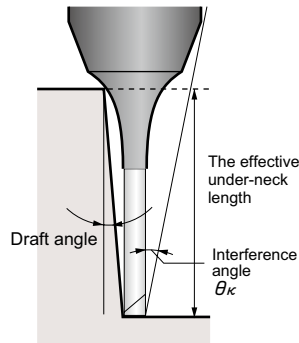
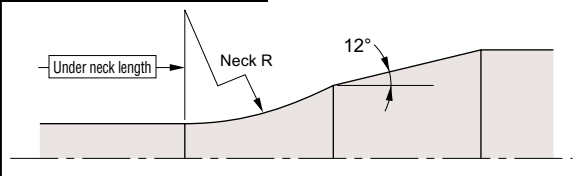
Tool dia.	Tolerance on dia.
$\phi 0.1 \sim \phi 0.5$	0 -0.007
$\phi 0.6 \sim \phi 0.9$	0 -0.01
$\phi 1 \sim \phi 6$	0 -0.015

EPDSE2000-000-ATH

Item code	Stock	Size(mm)								The effective under-neck length for the various draft angles						
	ATH	Tool dia. D_c	Under neck length ℓ_2	Flute length ℓ	Neck dia. D_1	Overall length L	Shank dia. D_s	Neck R	Interference angle θ_K	0.5°	1°	1.5°	2°	3°		
EPDSE2008-2-ATH	●	0.8	2	1.2	0.77	50	4	4	9.47	2.54	2.70	2.84	2.96	3.19		
EPDSE2008-4-ATH	●		4						7.86	4.66	4.89	5.07	5.24	5.53		
EPDSE2008-6-ATH	●		6						6.72	6.76	7.04	7.26	7.45	8.05		
EPDSE2008-8-ATH	●		8						5.86	8.85	9.17	9.42	9.65	10.71		
EPDSE2008-10-ATH	●		10						5.20	10.93	11.28	11.56	12.05	13.36		
EPDSE2008-12-ATH	●		12			55			4.67	13.00	13.38	13.76	14.44	16.02		
EPDSE2009-2-ATH	●	0.9	2	1.35	0.86	50	4	4	9.38	2.58	2.73	2.86	2.98	3.21		
EPDSE2009-4-ATH	●		4						7.76	4.69	4.91	5.09	5.26	5.54		
EPDSE2009-6-ATH	●		6						6.61	6.79	7.06	7.28	7.47	8.08		
EPDSE2009-8-ATH	●		8						5.76	8.87	9.18	9.43	9.68	10.74		
EPDSE2009-10-ATH	●		10						5.10	10.95	11.30	11.57	12.07	13.39		
EPDSE2009-12-ATH	●		12			55			4.58	13.02	13.40	13.79	14.47	16.05		
EPDSE2010-2-ATH	●	1	2	1.5	0.96	50	4	4	9.31	2.58	2.73	2.86	2.98	3.21		
EPDSE2010-3-ATH	●		3						8.41	3.64	3.82	3.99	4.13	4.39		
EPDSE2010-4-ATH	●		4						7.67	4.69	4.91	5.09	5.26	5.54		
EPDSE2010-5-ATH	●		5						7.04	5.74	5.99	6.19	6.37	6.76		
EPDSE2010-6-ATH	●		6						6.51	6.79	7.06	7.28	7.47	8.08		
EPDSE2010-7-ATH	●		7						6.06	7.83	8.12	8.36	8.56	9.41		
EPDSE2010-8-ATH	●		8			55			5.66	8.87	9.18	9.43	9.68	10.74		
EPDSE2010-9-ATH	●		9						5.31	9.91	10.24	10.50	10.88	12.07		
EPDSE2010-10-ATH	●		10						5.00	10.95	11.30	11.57	12.07	13.39		
EPDSE2010-12-ATH	●		12						4.48	13.02	13.40	13.79	14.47	16.05		
EPDSE2010-14-ATH	●		14			60			4.06	15.09	15.49	16.07	16.86	18.70		
EPDSE2010-16-ATH	●		16						3.71	17.15	17.58	18.35	19.25	21.36		
EPDSE2010-20-ATH	●		20			65			3.17	21.26	21.89	22.91	24.04	26.66		
EPDSE2010-25-ATH	●		25						2.68	26.39	27.33	28.61	30.02	No interference		
EPDSE2012-4-ATH	●	1.2	4	1.8	1.15	50	4	4	7.46	4.72	4.93	5.11	5.27	5.55		
EPDSE2012-6-ATH	●		6						6.29	6.81	7.08	7.29	7.48	8.11		
EPDSE2012-8-ATH	●		8						5.44	8.90	9.20	9.45	9.71	10.77		
EPDSE2012-10-ATH	●		10						4.80	10.97	11.31	11.58	12.10	13.42		
EPDSE2012-12-ATH	●		12			55			4.29	13.04	13.41	13.82	14.49	16.08		
EPDSE2012-16-ATH	●		16			55			3.53	17.16	17.59	18.38	19.28	21.39		
EPDSE2014-6-ATH	●	1.4	6	2.1	1.34	50	4	4	6.06	6.84	7.09	7.31	7.50	8.15		
EPDSE2014-12-ATH	●		12			55			4.08	13.06	13.43	13.84	14.52	16.11		
EPDSE2015-4-ATH	●	1.5	4	2.25	1.44	50	4	4	7.11	4.75	4.95	5.13	5.29	5.57		
EPDSE2015-6-ATH	●		6						5.94	6.84	7.09	7.31	7.50	8.15		
EPDSE2015-8-ATH	●		8						5.10	8.92	9.22	9.46	9.74	10.80		
EPDSE2015-10-ATH	●		10						4.47	10.99	11.33	11.59	12.13	13.45		
EPDSE2015-12-ATH	●		12			55			3.97	13.06	13.43	13.84	14.52	16.11		
EPDSE2015-14-ATH	●		14						3.58	15.12	15.52	16.12	16.92	18.76		
EPDSE2015-16-ATH	●		16			60			3.25	17.18	17.60	18.40	19.31	21.42		
EPDSE2015-18-ATH	●		18						2.98	19.24	19.76	20.69	21.70	No interference		
EPDSE2015-20-ATH	●		20			65			2.76	21.29	21.94	22.97	24.10	No interference		
EPDSE2015-25-ATH	●		25						2.31	26.42	27.39	28.67	30.08	No interference		
EPDSE2015-30-ATH	●		30			70			1.99	31.53	32.83	34.37	No interference	No interference		
EPDSE2015-35-ATH	●		35			75			1.75	36.64	38.28	40.07	No interference	No interference		
EPDSE2015-40-ATH	●		40			80			1.56	41.85	43.73	45.78	No interference	No interference		
EPDSE2016-6-ATH	●	1.6	6	2.4	1.54	50	4	4	5.82	6.84	7.09	7.31	7.50	8.15		
EPDSE2016-8-ATH	●		8						4.98	8.92	9.22	9.46	9.74	10.80		
EPDSE2018-6-ATH	●	1.8	6	2.7	1.73	50	4	4	5.55	6.86	7.11	7.32	7.51	8.18		
EPDSE2018-8-ATH	●		8						4.72	8.94	9.23	9.47	9.76	10.83		

● : Stocked items.

Detailed shape below neck

**[Note]**

The effective under-neck length is different from Epoch Deep Square EPDS. Please recheck the interference region.

EPDSE2000-00.0-ATH

Item code	Stock	Size(mm)								The effective under-neck length for the various draft angles					
	ATH	Tool dia. Dc	Under neck length ℓ ₂	Flute length ℓ	Neck dia. D ₁	Overall length L	Shank dia. Ds	Neck R	Interference angle θκ	0.5°	1°	1.5°	2°	3°	
EPDSE2020-4-ATH	●	2	4	3	1.92	50	4	4	6.42	4.80	5.00	5.17	5.32	5.59	
EPDSE2020-6-ATH	●		6						5.25	6.88	7.13	7.34	7.52	8.21	
EPDSE2020-8-ATH	●		8						4.44	8.96	9.25	9.49	9.79	10.86	
EPDSE2020-10-ATH	●		10						3.85	11.03	11.35	11.62	12.19	13.52	
EPDSE2020-12-ATH	●		12			55			3.39	13.10	13.45	13.90	14.58	16.17	
EPDSE2020-14-ATH	●		14						3.03	15.16	15.54	16.18	16.97	18.83	
EPDSE2020-16-ATH	●		16						2.75	17.21	17.63	18.46	19.37	No interference	
EPDSE2020-18-ATH	●		18						2.51	19.27	19.81	20.74	21.76	No interference	
EPDSE2020-20-ATH	●		20			60			2.31	21.32	21.99	23.02	24.15	No interference	
EPDSE2020-25-ATH	●		25						1.92	26.44	27.44	28.72	No interference	No interference	
EPDSE2020-30-ATH	●		30						1.65	31.55	32.88	34.42	No interference	No interference	
EPDSE2020-35-ATH	●		35						1.44	36.69	38.33	No interference	No interference	No interference	
EPDSE2020-40-ATH	●	40	70	1.28	41.90	43.78	No interference	No interference	No interference						
EPDSE2020-50-ATH	●	50		1.05	52.33	54.67	No interference	No interference	No interference						
EPDSE2025-8-ATH	●	2.5		8	3.75	2.4	50	4	4	3.65	9.00	9.28	9.51	9.85	10.93
EPDSE2025-12-ATH	●			12						2.73	13.13	13.48	13.95	14.64	No interference
EPDSE2025-16-ATH	●		16	2.18						17.25	17.68	18.51	19.42	No interference	
EPDSE2025-20-ATH	●		20	1.81						21.35	22.04	23.07	No interference	No interference	
EPDSE2025-30-ATH	●		30	1.28						31.58	32.94	No interference	No interference	No interference	
EPDSE2025-40-ATH	●		40	0.99						41.95	No interference	No interference	No interference	No interference	
EPDSE2025-50-ATH	●		50	0.80						52.38	No interference	No interference	No interference	No interference	
EPDSE2030-8-ATH	●	3	8	4.5	2.88	55	6	4	5.59	9.04	9.31	9.54	9.91	10.99	
EPDSE2030-12-ATH	●		12						4.44	13.16	13.50	14.00	14.69	16.30	
EPDSE2030-16-ATH	●		16						3.68	17.28	17.73	18.57	19.48	21.61	
EPDSE2030-20-ATH	●		20						3.15	21.38	22.09	23.13	24.26	26.91	
EPDSE2030-25-ATH	●		25						2.66	26.49	27.54	28.83	30.25	No interference	
EPDSE2030-30-ATH	●		30						2.31	31.60	32.99	34.53	36.23	No interference	
EPDSE2030-40-ATH	●		40						1.82	42.00	43.88	45.94	No interference	No interference	
EPDSE2030-50-ATH	●	50	1.50	52.43	54.78	No interference	No interference	No interference							
EPDSE2040-12-ATH	●	4	12	6	3.85	60	6	4	3.36	13.21	13.54	14.08	14.78	16.39	
EPDSE2040-16-ATH	●		16						2.72	17.32	17.81	18.65	19.56	No interference	
EPDSE2040-20-ATH	●		20						70	2.29	21.42	22.17	23.21	24.35	No interference
EPDSE2040-25-ATH	●		25							1.91	26.53	27.62	28.91	No interference	No interference
EPDSE2040-30-ATH	●		30			80			1.64	31.65	33.06	34.61	No interference	No interference	
EPDSE2040-35-ATH	●		35						1.44	36.86	38.51	No interference	No interference	No interference	
EPDSE2040-40-ATH	●		40			90			1.28	42.08	43.96	No interference	No interference	No interference	
EPDSE2040-50-ATH	●	50	100	1.05	52.50	54.85	No interference	No interference	No interference						
EPDSE2050-20-ATH	●	5	20	7.5	4.85	70	6	4	1.27	21.42	22.17	No interference	No interference	No interference	
EPDSE2050-25-ATH	●		25						1.04	26.53	27.62	No interference	No interference	No interference	
EPDSE2050-30-ATH	●		30						0.88	31.65	No interference	No interference	No interference	No interference	
EPDSE2050-40-ATH	●		40						0.68	42.08	No interference	No interference	No interference	No interference	
EPDSE2050-50-ATH	●		50			100			0.55	52.50	No interference	No interference	No interference		
EPDSE2060-20-ATH	●	6	20	9	5.85	70	6	-	0	No interference	No interference	No interference	No interference	No interference	
EPDSE2060-30-ATH	●		30			80			0	No interference	No interference	No interference	No interference	No interference	
EPDSE2060-40-ATH	●		40			90			0	No interference	No interference	No interference	No interference	No interference	
EPDSE2060-50-ATH	●		50			100			0	No interference	No interference	No interference	No interference	No interference	

● : Stocked items.

Recommended Cutting Conditions

**High efficiency
cutting condition**

High accuracy
cutting condition

Please refer to P.25
about high accuracy cutting conditions

Epoch Deep Square Evolution

EPDSE-PN

EPDSE-ATH

Recommended range		PN series												ATH series	
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%		70%		50%		45%		
Tool dia. (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	
0.1	0.3	0.006	50,000	500	50,000	500	50,000	475	48,600	348	42,750	255	40,050	208	
	0.5	0.004	50,000	500	50,000	500	50,000	475	48,600	348	42,750	255	40,050	208	
	1	0.003	50,000	455	50,000	455	48,600	430	43,700	315	38,500	232	36,050	187	
0.2	0.5	0.02	50,000	708	45,000	638	40,500	574	38,250	403	33,750	301	31,500	242	
	1	0.014	50,000	708	45,000	638	40,500	574	38,250	403	33,750	301	31,500	242	
	1.5	0.008	48,600	630	40,500	525	36,450	472	34,425	362	30,375	271	28,350	218	
	2	0.005	43,200	504	36,000	420	32,400	378	30,600	286	27,000	214	25,200	172	
	3	0.003	43,200	454	36,000	378	32,400	340	30,600	257	27,000	193	25,200	155	
0.3	1	0.021	48,000	680	40,000	567	36,000	510	34,000	358	30,000	267	28,000	216	
	1.5	0.021	48,000	680	40,000	567	36,000	510	34,000	358	30,000	267	28,000	216	
	2	0.012	43,200	560	36,000	467	32,400	420	30,600	322	27,000	241	25,200	194	
	2.5	0.01	43,200	560	36,000	467	32,400	420	30,600	322	27,000	241	25,200	194	
	3	0.008	43,200	560	36,000	467	32,400	420	30,600	322	27,000	241	25,200	194	
0.4	1	0.04	38,400	847	32,000	706	28,800	635	27,200	446	24,000	333	22,400	268	
	1.5	0.028	38,400	847	32,000	706	28,800	635	27,200	446	24,000	333	22,400	268	
	2	0.028	38,400	847	32,000	706	28,800	635	27,200	446	24,000	333	22,400	268	
	2.5	0.022	34,560	697	28,800	581	25,920	523	24,480	401	21,600	299	20,160	241	
	3	0.016	34,560	697	28,800	581	25,920	523	24,480	401	21,600	299	20,160	241	
	3.5	0.012	34,560	697	28,800	581	25,920	523	24,480	401	21,600	299	20,160	241	
	4	0.01	34,560	697	28,800	581	25,920	523	24,480	401	21,600	299	20,160	241	
	5	0.01	30,720	542	25,600	452	23,040	406	21,760	260	19,200	230	17,920	181	
	6	0.006	30,720	542	25,600	452	23,040	406	21,760	260	19,200	230	17,920	181	
	8	0.003	26,880	413	22,400	344	20,160	310	19,040	200	16,800	172	15,680	131	
	10	0.002	23,040	304	19,200	253	17,280	228	16,320	147	14,400	127	13,440	96	
0.5	1	0.05	38,400	847	32,000	706	28,800	635	27,200	535	24,000	333	22,400	268	
	1.5	0.05	38,400	847	32,000	706	28,800	635	27,200	535	24,000	333	22,400	268	
	2	0.035	38,400	847	32,000	706	28,800	635	27,200	535	24,000	333	22,400	268	
	2.5	0.03	34,560	697	28,800	581	25,920	523	24,480	441	21,600	299	20,160	241	
	3	0.02	34,560	697	28,800	581	25,920	523	24,480	441	21,600	299	20,160	241	
	4	0.02	34,560	697	28,800	581	25,920	523	24,480	401	21,600	299	20,160	241	
	5	0.013	34,560	697	28,800	581	25,920	523	24,480	401	21,600	299	20,160	241	
	6	0.013	30,720	542	25,600	452	23,040	406	21,760	260	19,200	230	17,920	181	
	8	0.008	30,720	464	25,600	387	23,040	348	21,760	247	19,200	194	17,920	147	
	10	0.004	26,880	360	22,400	300	20,160	270	19,040	174	16,800	150	15,680	114	
0.6	2	0.042	38,400	1,210	32,000	1,008	28,800	907	27,200	636	24,000	475	22,400	383	
	3	0.035	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345	
	4	0.024	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345	
	5	0.02	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345	
	6	0.015	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345	
	7	0.015	30,720	859	25,600	716	23,040	644	21,760	494	19,200	369	17,920	298	
	8	0.015	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258	
	9	0.012	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258	
	10	0.009	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258	
	10	0.018	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258	
0.7	2	0.07	38,400	1,210	32,000	1,008	28,800	907	27,200	636	24,000	475	22,400	384	
	4	0.049	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345	
	6	0.018	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345	
	8	0.018	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258	
	10	0.018	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258	

[Note] Please refer to P.24

Recommended range			PN series											
			ATH series											
Work material			1		2		3		4		5		6	
			Coppers		Carbon steels, Alloy steels		Stainless steels, Tool steels		Pre-hardened steels		Hardened steels		Hardened steels	
					(180~250HB)		(25~35HRC)		(35~45HRC)		(45~55HRC)		(55~65HRC)	
Ratio to standard depth of cut			120%		100%		90%		70%		50%		45%	
Tool dia. (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	2	0.08	38,400	1,210	32,000	1,008	28,800	907	27,200	780	24,000	688	22,400	422
	4	0.056	38,400	1,210	32,000	1,008	28,800	907	27,200	780	24,000	688	22,400	422
	6	0.032	34,560	995	28,800	829	25,920	746	24,480	678	24,000	665	20,160	379
	8	0.02	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345
	10	0.02	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258
	12	0.012	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258
0.9	2	0.09	38,400	1,326	32,000	1,205	28,800	1,085	27,200	833	24,000	674	22,400	502
	4	0.063	38,400	1,326	32,000	1,205	28,800	1,085	27,200	833	24,000	674	22,400	502
	6	0.036	34,560	1,094	28,800	994	25,920	895	24,480	687	21,600	556	20,160	414
	8	0.023	34,560	1,094	28,800	911	25,920	820	24,480	630	21,600	513	20,160	379
	10	0.023	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258
	12	0.023	30,720	774	25,600	645	23,040	581	21,760	372	19,200	328	17,920	258
1	2	0.1	34,560	1,628	28,800	1,356	25,920	1,220	24,480	1,150	22,930	1,008	20,160	846
	3	0.085	34,560	1,628	28,800	1,356	25,920	1,220	24,480	1,150	22,930	1,008	20,160	846
	4	0.07	34,560	1,628	28,800	1,356	25,920	1,220	24,480	1,077	22,930	963	20,160	766
	5	0.055	34,560	1,628	28,800	1,356	25,920	1,220	24,480	1,028	22,930	871	20,160	685
	6	0.04	31,104	1,344	25,920	1,120	23,328	1,008	22,032	903	20,700	745	18,144	465
	7	0.04	31,104	1,344	25,920	1,120	23,328	1,008	22,032	837	20,700	703	18,144	465
	8	0.04	31,104	1,344	25,920	1,120	23,328	1,008	22,032	837	20,700	622	18,144	465
	9	0.033	31,104	1,344	25,920	1,120	23,328	1,008	22,032	773	19,440	577	18,144	465
	10	0.025	31,104	1,344	25,920	1,120	23,328	1,008	22,032	773	19,440	577	18,144	465
	12	0.025	27,648	1,045	23,040	871	20,736	784	19,584	502	17,280	443	16,128	348
	14	0.025	27,648	1,045	23,040	871	20,736	784	19,584	502	17,280	443	16,128	348
	16	0.015	27,648	896	23,040	746	20,736	672	19,584	476	17,280	373	16,128	283
	20	0.01	24,828	732	20,690	610	22,345	549	17,587	348	15,518	305	14,483	226
	25	0.005	21,000	569	17,500	474	18,900	427	14,875	270	13,125	237	12,250	175
1.2	4	0.09	30,720	1,452	25,600	1,210	23,040	1,089	21,760	870	19,200	570	17,920	460
	6	0.084	30,720	1,452	25,600	1,210	23,040	1,089	21,760	870	19,200	570	17,920	460
	8	0.048	27,648	1,194	23,040	995	20,736	896	19,584	783	17,280	513	16,128	414
	10	0.03	27,648	1,194	23,040	995	20,736	896	19,584	744	17,280	513	16,128	414
	12	0.03	27,648	1,194	23,040	995	20,736	896	19,584	687	17,280	513	16,128	414
	16	0.02	24,576	1,061	20,480	884	18,432	796	17,408	611	15,360	456	14,336	368
1.4	6	0.1	26,880	1,270	22,400	1,058	20,160	953	19,040	668	16,800	499	15,680	403
	12	0.035	24,192	1,045	20,160	871	18,144	784	17,136	601	15,120	449	14,112	362
1.5	4	0.11	26,880	1,397	22,400	1,163	20,160	1,048	19,040	801	16,800	648	15,680	482
	6	0.11	26,880	1,397	22,400	1,163	20,160	1,048	19,040	801	16,800	623	15,680	482
	8	0.08	24,192	1,149	20,160	958	18,144	940	17,136	721	15,120	538	14,112	416
	10	0.06	24,192	1,149	20,160	871	18,144	862	17,136	721	15,120	538	14,112	416
	12	0.06	24,192	1,045	20,160	871	18,144	784	17,136	721	15,120	449	14,112	362
	14	0.038	24,192	1,045	20,160	871	18,144	784	17,136	721	15,120	449	14,112	362
	16	0.038	21,504	813	17,920	677	16,128	610	15,232	391	13,440	345	12,544	271
	18	0.038	21,504	813	17,920	677	16,128	610	15,232	391	13,440	345	12,544	271
	20	0.038	21,504	813	17,920	677	16,128	610	15,232	391	13,440	345	12,544	271
	25	0.023	16,128	523	13,440	435	12,096	392	11,424	278	10,080	218	9,408	165
	30	0.015	13,440	355	11,200	296	12,096	266	9,520	178	8,400	139	7,840	112
	35	0.01	13,440	355	11,200	296	12,096	266	9,520	178	8,400	139	7,840	112
1.6	6	0.11	24,960	1,310	20,800	1,201	18,720	1,130	17,680	759	15,600	566	14,560	456
	8	0.11	24,960	1,310	20,800	1,201	18,720	983	17,680	690	15,600	566	14,560	456
1.8	6	0.13	24,960	1,310	20,800	1,201	18,720	1,179	17,680	759	15,600	618	14,560	498
	8	0.13	24,960	1,310	20,800	1,201	18,720	1,081	17,680	690	15,600	618	14,560	498

[Note] Please refer to P.24

Features

Dimensions
Ball PN Coating

Dimensions
Ball ATH Coating

Cutting condition
Ball High efficiency

Cutting condition
Ball High accuracy

Dimensions
Square PN Coating

Dimensions
Square ATH Coating

Cutting condition
Square High efficiency

Cutting condition
Square High accuracy

Technical Data

Recommended Cutting Conditions

**High efficiency
cutting condition**

High accuracy
cutting condition

Please refer to P.25
about high accuracy cutting conditions

Epoch Deep Square Evolution **EPDSE-PN** **EPDSE-ATH**

Recommended range			PN series											
			ATH series											
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%		70%		50%		45%	
Tool dia. (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	4	0.2	20,160	1,397	16,800	1,174	15,120	1,048	14,280	734	12,600	548	11,760	443
	6	0.2	20,160	1,397	16,800	1,174	15,120	1,048	14,280	734	12,600	548	11,760	443
	8	0.14	20,160	1,397	16,800	1,174	15,120	1,048	14,280	734	12,600	548	11,760	443
	10	0.14	20,160	1,397	16,800	1,174	15,120	1,048	14,280	734	12,600	548	11,760	443
	12	0.1	18,144	1,149	15,120	958	13,608	862	12,852	661	11,340	493	10,584	398
	14	0.08	18,144	1,149	15,120	958	13,608	862	12,852	661	11,340	493	10,584	362
	16	0.08	18,144	1,045	15,120	914	13,608	862	12,852	601	11,340	449	10,584	362
	18	0.05	18,144	1,045	15,120	914	13,608	862	12,852	601	11,340	449	10,584	362
	20	0.05	18,144	1,045	15,120	871	13,608	784	12,852	601	11,340	449	10,584	362
	25	0.05	16,128	813	13,440	677	12,096	610	11,424	391	10,080	345	9,408	271
	30	0.03	16,128	813	13,440	677	12,096	610	11,424	391	10,080	345	9,408	271
	35	0.02	14,112	583	11,760	486	10,584	437	9,996	282	8,820	228	8,232	185
	40	0.01	14,112	583	11,760	486	10,584	437	9,996	282	8,820	228	8,232	185
	50	0.005	12,096	355	10,080	296	9,072	266	8,568	172	7,560	139	7,056	112
2.5	8	0.18	17,280	1,497	14,400	1,247	12,960	1,123	12,240	787	10,800	642	10,080	474
	12	0.18	17,280	1,260	14,400	1,247	12,960	1,123	12,240	716	10,800	588	10,080	431
	16	0.1	15,552	1,120	12,960	1,073	11,664	966	11,016	644	9,720	529	9,072	388
	20	0.1	15,552	1,120	12,960	933	11,664	840	11,016	644	9,720	529	9,072	388
	30	0.06	13,824	870	11,520	725	10,368	653	9,792	435	8,640	341	8,064	276
	40	0.03	12,096	625	10,080	521	9,072	469	8,568	313	7,560	245	7,056	198
3	50	0.01	12,096	625	10,080	521	9,072	469	8,568	313	7,560	245	7,056	198
	8	0.3	15,360	1,331	12,800	1,108	11,520	997	10,880	699	10,600	570	8,960	422
	12	0.21	15,360	1,331	12,800	1,108	11,520	997	10,880	699	10,600	570	8,960	422
	16	0.15	13,824	1,144	11,520	994	10,368	820	9,792	630	9,450	513	8,064	379
	20	0.12	13,824	995	11,520	911	10,368	820	9,792	630	9,450	513	8,064	379
	25	0.08	13,824	995	11,520	911	10,368	820	9,792	630	9,450	513	8,064	379
	30	0.08	13,824	995	11,520	829	10,368	746	9,792	630	9,450	513	8,064	347
4	40	0.05	12,288	884	10,240	737	9,216	663	8,704	509	7,680	380	7,168	307
	50	0.02	10,752	556	8,960	463	8,064	417	7,616	278	6,720	218	6,272	176
	12	0.4	11,500	2,300	9,400	1,880	8,460	1,524	7,990	1,358	7,050	902	6,580	728
	16	0.28	11,500	2,300	9,400	1,880	8,460	1,524	7,990	1,358	7,050	902	6,580	728
	20	0.28	10,350	2,070	8,460	1,692	7,614	1,371	7,191	1,222	6,345	812	5,922	655
	25	0.16	10,350	1,863	8,460	1,524	7,614	1,233	7,191	1,100	6,345	812	5,922	655
	30	0.16	10,350	1,863	8,460	1,524	7,614	1,233	7,191	1,100	6,345	812	5,922	655
	35	0.1	9,137	1,645	7,614	1,371	6,853	1,110	6,472	990	5,711	731	5,330	589
5	40	0.1	9,137	1,645	7,614	1,371	6,853	1,110	6,472	990	5,711	731	5,330	589
	50	0.06	7,896	1,128	6,580	940	5,922	846	5,593	658	4,935	442	4,606	357
	20	0.3	9,014	1,802	7,512	1,652	6,761	1,487	6,385	1,051	5,634	706	5,258	571
	25	0.3	8,112	1,621	6,760	1,351	6,084	1,216	5,746	946	5,070	635	4,732	513
	30	0.2	8,112	1,461	6,760	1,217	6,084	1,094	5,746	851	5,070	573	4,732	462
6	40	0.15	7,301	1,315	6,084	1,096	5,476	986	5,171	767	4,563	515	4,259	416
	50	0.1	7,301	1,315	6,084	1,096	5,476	986	5,171	767	4,563	515	4,259	416
	20	0.5	7,418	1,629	6,182	1,481	5,564	1,333	5,255	1,036	4,637	766	4,327	562
	30	0.4	6,744	1,480	5,620	1,346	5,058	1,212	4,777	942	4,215	696	3,934	511
	40	0.3	6,744	1,332	5,620	1,109	5,058	998	4,777	847	4,215	625	3,934	459
6	50	0.2	6,000	1,090	5,000	986	4,500	887	4,250	690	3,750	515	3,500	379

* a_p is shown as the criteria for Group 2 workpieces. For other groups, adjust the cutting depth according to the cutting depth factors in the above table.

- [Note]**
- ① PN coating is less electro conductive. Therefore, electric transmitted measuring systems may not work.
 - ② Use the appropriate coolant for the work material and machining shape.
 - ③ 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.
 - ④ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

High efficiency
cutting condition

High accuracy
cutting condition

Please refer to P.22
about high efficiency cutting conditions

Epoch Deep Square Evolution EPDSE-PN EPDSE-ATH

Recommended range			PN series											
			ATH series											
			1	2	3	4	5	6						
Work material			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%	70%	50%	45%						
Tool dia. (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
0.1	0.3	0.006	50,000	350	50,000	350	50,000	332	48,600	242	42,750	178	40,050	144
	0.5	0.004	50,000	350	50,000	350	50,000	332	48,600	242	42,750	178	40,050	144
	1	0.003	50,000	318	50,000	318	48,600	301	43,700	220	38,500	162	36,050	129
0.2	0.5	0.015	50,000	495	45,000	446	40,500	401	38,250	282	33,750	210	31,500	169
	1	0.011	50,000	495	45,000	446	40,500	401	38,250	282	33,750	210	31,500	169
	1.5	0.006	48,600	441	40,500	367	36,450	330	34,425	253	30,375	189	28,350	152
	2	0.004	43,200	352	36,000	294	32,400	264	30,600	200	27,000	165	25,200	147
0.3	3	0.002	43,200	317	36,000	264	32,400	238	30,600	179	27,000	165	25,200	133
	1	0.021	48,000	544	40,000	453	36,000	408	34,000	286	30,000	240	28,000	193
	1.5	0.021	48,000	544	40,000	453	36,000	408	34,000	286	30,000	240	28,000	193
	2	0.012	43,200	448	36,000	373	32,400	336	30,600	257	27,000	192	25,200	155
	2.5	0.01	43,200	448	36,000	373	32,400	336	30,600	257	27,000	192	25,200	155
0.4	3	0.008	43,200	448	36,000	373	32,400	336	30,600	257	27,000	180	25,200	145
	1	0.04	38,400	762	32,000	635	28,800	571	27,200	401	24,000	297	22,400	241
	1.5	0.028	38,400	762	32,000	635	28,800	571	27,200	401	24,000	297	22,400	241
	2	0.028	38,400	762	32,000	635	28,800	571	27,200	401	24,000	297	22,400	241
	2.5	0.022	34,560	557	28,800	464	25,920	418	24,480	320	21,600	239	20,160	192
	3	0.016	34,560	557	28,800	464	25,920	418	24,480	320	21,600	239	20,160	192
	3.5	0.012	34,560	557	28,800	464	25,920	418	24,480	320	21,600	239	20,160	192
	4	0.01	34,560	557	28,800	464	25,920	418	24,480	320	21,600	239	20,160	192
	5	0.01	30,720	406	25,600	316	23,040	284	21,760	208	19,200	184	17,920	144
	6	0.006	30,720	406	25,600	316	23,040	284	21,760	208	19,200	184	17,920	144
0.5	8	0.003	26,880	289	22,400	240	20,160	217	19,040	160	16,800	141	15,680	128
	10	0.002	23,040	212	19,200	177	17,280	159	16,320	117	14,400	103	13,440	94
	1	0.05	38,400	762	32,000	635	28,800	571	27,200	446	24,000	299	22,400	241
	1.5	0.05	38,400	762	32,000	635	28,800	571	27,200	446	24,000	299	22,400	241
	2	0.035	38,400	762	32,000	635	28,800	571	27,200	446	24,000	299	22,400	241
	2.5	0.03	34,560	557	28,800	464	25,920	418	24,480	354	21,600	239	20,160	192
	3	0.02	34,560	557	28,800	464	25,920	418	24,480	354	21,600	239	20,160	192
	4	0.02	34,560	557	28,800	464	25,920	418	24,480	320	21,600	239	20,160	192
	5	0.013	34,560	557	28,800	464	25,920	418	24,480	320	21,600	239	20,160	192
	6	0.013	30,720	433	25,600	361	23,040	324	21,760	208	19,200	184	17,920	144
0.6	8	0.008	30,720	371	25,600	309	23,040	278	21,760	172	19,200	155	17,920	117
	10	0.004	26,880	288	22,400	240	20,160	216	19,040	121	16,800	105	15,680	79
	2	0.042	38,400	1,089	32,000	907	28,800	816	27,200	572	24,000	427	22,400	344
	3	0.035	34,560	895	28,800	746	25,920	671	24,480	515	21,600	385	20,160	310
	4	0.024	34,560	895	28,800	746	25,920	671	24,480	515	21,600	385	20,160	310
	5	0.02	34,560	796	28,800	663	25,920	596	24,480	458	21,600	342	20,160	276
	6	0.015	34,560	796	28,800	663	25,920	596	24,480	458	21,600	342	20,160	276
	7	0.015	30,720	687	25,600	572	23,040	515	21,760	395	19,200	295	17,920	238
	8	0.015	30,720	595	25,600	516	23,040	464	21,760	297	19,200	262	17,920	206
	9	0.012	30,720	595	25,600	516	23,040	464	21,760	297	19,200	262	17,920	206
0.7	10	0.009	30,720	595	25,600	516	23,040	464	21,760	297	19,200	262	17,920	206
	2	0.07	38,400	1,089	32,000	907	28,800	816	27,200	572	24,000	427	22,400	344
	4	0.049	34,560	796	28,800	663	25,920	596	24,480	458	21,600	342	20,160	276
	6	0.018	34,560	796	28,800	663	25,920	596	24,480	458	21,600	342	20,160	276
	8	0.018	30,720	541	25,600	451	23,040	406	21,760	260	19,200	229	17,920	180
	10	0.018	30,720	541	25,600	451	23,040	406	21,760	260	19,200	229	17,920	180

[Note] Please refer to P.27

Features

Dimensions
Ball PN Coating

Dimensions
Ball ATH Coating

Cutting condition
Ball High efficiency

Cutting condition
Ball High accuracy

Dimensions
Square PN Coating

Dimensions
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Technical Data

Recommended Cutting Conditions

High efficiency
cutting condition

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cutting condition

Please refer to P.22
about high efficiency cutting conditions

Epoch Deep Square Evolution EPDSE-PN EPDSE-ATH

Recommended range			PN series											
			ATH series											
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%		70%		50%		45%	
Tool dia. (mm)	Under neck length (mm)	ap (mm)	Revolution n min ⁻¹	Feed rate vf mm/min	Revolution n min ⁻¹	Feed rate vf mm/min	Revolution n min ⁻¹	Feed rate vf mm/min	Revolution n min ⁻¹	Feed rate vf mm/min	Revolution n min ⁻¹	Feed rate vf mm/min	Revolution n min ⁻¹	Feed rate vf mm/min
0.8	2	0.08	38,400	1,089	32,000	907	28,800	816	27,200	636	24,000	475	22,400	383
	4	0.056	38,400	1,089	32,000	907	28,800	816	27,200	636	24,000	475	22,400	383
	6	0.032	34,560	796	28,800	663	25,920	596	24,480	573	21,600	428	20,160	345
	8	0.02	34,560	796	28,800	663	25,920	596	24,480	458	21,600	342	20,160	276
	10	0.02	30,720	541	25,600	451	23,040	406	21,760	260	19,200	229	17,920	180
	12	0.012	30,720	541	25,600	451	23,040	406	21,760	260	19,200	229	17,920	180
0.9	2	0.09	38,400	1,206	32,000	1,005	28,800	904	27,200	695	24,000	519	22,400	418
	4	0.063	38,400	1,206	32,000	1,005	28,800	904	27,200	695	24,000	519	22,400	418
	6	0.036	34,560	995	28,800	829	25,920	746	24,480	573	21,600	428	20,160	345
	8	0.023	34,560	995	28,800	746	25,920	746	24,480	573	21,600	428	20,160	345
	10	0.023	30,720	619	25,600	516	23,040	464	21,760	297	19,200	262	17,920	206
	12	0.023	30,720	541	25,600	451	23,040	414	21,760	297	19,200	262	17,920	206
1	2	0.09	34,560	1,465	28,800	1,220	25,920	1,098	24,480	936	21,600	699	20,160	563
	3	0.07	34,560	1,465	28,800	1,220	25,920	1,098	24,480	936	21,600	699	20,160	563
	4	0.065	34,560	1,465	28,800	1,220	25,920	1,098	24,480	936	21,600	699	20,160	563
	5	0.05	34,560	1,465	28,800	1,220	25,920	1,098	24,480	936	21,600	699	20,160	563
	6	0.035	31,104	1,276	25,920	1,008	23,328	907	22,032	773	19,440	577	18,144	418
	7	0.035	31,104	1,276	25,920	1,008	23,328	907	22,032	773	19,440	577	18,144	418
	8	0.035	31,104	1,209	25,920	1,008	23,328	907	22,032	773	19,440	577	18,144	418
	9	0.03	31,104	1,209	25,920	1,008	23,328	907	22,032	695	19,440	461	18,144	372
	10	0.022	31,104	1,209	25,920	896	23,328	816	22,032	695	19,440	461	18,144	372
	12	0.022	27,648	836	23,040	696	20,736	627	19,584	401	17,280	354	16,128	278
	14	0.022	27,648	836	23,040	696	20,736	627	19,584	401	17,280	354	16,128	278
	16	0.012	27,648	716	23,040	596	20,736	537	19,584	380	17,280	298	16,128	226
	20	0.008	24,828	586	20,690	488	18,621	439	17,587	278	15,518	213	14,483	158
	25	0.005	21,000	455	17,500	379	15,750	341	14,875	216	13,125	165	12,250	122
1.2	4	0.09	30,720	1,306	25,600	1,089	23,040	980	21,760	760	19,200	513	17,920	414
	6	0.084	30,720	1,306	25,600	1,089	23,040	980	21,760	760	19,200	513	17,920	414
	8	0.048	27,648	1,074	23,040	895	20,736	806	19,584	684	17,280	461	16,128	372
	10	0.03	27,648	1,074	23,040	895	20,736	806	19,584	684	17,280	461	16,128	372
	12	0.03	27,648	955	23,040	716	20,736	642	19,584	549	17,280	410	16,128	331
	16	0.02	24,576	848	20,480	707	18,432	557	17,408	488	15,360	364	14,336	294
1.4	6	0.1	26,880	1,143	22,400	952	20,160	857	19,040	601	16,800	449	15,680	361
	12	0.035	24,192	940	20,160	783	18,144	705	17,136	540	15,120	404	14,112	325
1.5	4	0.11	26,880	1,270	22,400	1,058	20,160	953	19,040	668	16,800	499	15,680	402
	6	0.11	26,880	1,143	22,400	952	20,160	866	19,040	668	16,800	499	15,680	402
	8	0.06	24,192	1,045	20,160	871	18,144	784	17,136	601	15,120	449	14,112	362
	10	0.06	24,192	1,045	20,160	783	18,144	705	17,136	601	15,120	449	14,112	362
	12	0.06	24,192	940	20,160	783	18,144	705	17,136	601	15,120	404	14,112	325
	14	0.038	24,192	940	20,160	783	18,144	705	17,136	601	15,120	404	14,112	325
	16	0.038	21,504	731	17,920	609	16,128	549	15,232	351	13,440	310	12,544	243
	18	0.038	21,504	731	17,920	609	16,128	549	15,232	351	13,440	310	12,544	243
	20	0.038	21,504	731	17,920	609	16,128	488	15,232	312	13,440	276	12,544	216
	25	0.023	16,128	470	13,440	391	12,096	313	11,424	222	10,080	174	9,408	132
	30	0.015	13,440	319	11,200	266	12,096	212	9,520	149	8,400	111	7,840	89
	35	0.01	13,440	284	11,200	236	12,096	186	9,520	149	8,400	111	7,840	89
1.6	40	0.005	10,752	152	8,960	126	8,064	113	7,616	76	6,720	59	6,272	48
	6	0.11	24,960	1,179	20,800	977	18,720	884	17,680	690	15,600	515	14,560	415
1.8	8	0.11	24,960	1,179	20,800	977	18,720	884	17,680	621	15,600	515	14,560	415
	6	0.13	24,960	1,179	20,800	997	18,720	884	17,680	690	15,600	515	14,560	415
	8	0.13	24,960	1,179	20,800	997	18,720	884	17,680	621	15,600	515	14,560	415

[Note] Please refer to P.27

Recommended range			PN series											
			ATH series											
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%	70%	50%	45%						
Tool dia. (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	4	0.2	20,160	1,270	16,800	952	15,120	861	14,280	655	12,600	499	11,760	402
	6	0.2	20,160	1,270	16,800	952	15,120	861	14,280	655	12,600	499	11,760	402
	8	0.14	20,160	1,270	16,800	952	15,120	861	14,280	655	12,600	499	11,760	402
	10	0.14	20,160	1,270	16,800	952	15,120	861	14,280	655	12,600	499	11,760	402
	12	0.08	18,144	1,045	15,120	871	13,608	784	12,852	590	11,340	449	10,584	362
	14	0.08	18,144	1,045	15,120	871	13,608	784	12,852	590	11,340	449	10,584	325
	16	0.08	18,144	940	15,120	783	13,608	707	12,852	540	11,340	426	10,584	325
	18	0.05	18,144	940	15,120	783	13,608	707	12,852	540	11,340	404	10,584	289
	20	0.05	18,144	888	15,120	696	13,608	627	12,852	480	11,340	359	10,584	289
	25	0.05	16,128	731	13,440	609	12,096	549	11,424	312	10,080	310	9,408	232
	30	0.03	16,128	650	13,440	541	12,096	488	11,424	273	10,080	276	9,408	216
	35	0.02	14,112	466	11,760	388	10,584	349	9,996	225	8,820	182	8,232	148
	40	0.01	14,112	408	11,760	340	10,586	306	9,996	197	8,820	159	8,232	129
	50	0.005	12,096	284	10,080	236	9,072	186	8,568	120	7,560	97	7,056	78
2.5	8	0.18	17,280	1,361	14,400	1,134	12,960	1,021	12,240	716	10,800	535	10,080	431
	12	0.18	17,280	1,134	14,400	1,020	12,960	933	12,240	644	10,800	520	10,080	387
	16	0.1	15,552	1,008	12,960	839	11,664	758	11,016	579	9,720	450	9,072	349
	20	0.1	15,552	840	12,960	794	11,664	711	11,016	515	9,720	450	9,072	310
	30	0.06	13,824	696	11,520	580	10,368	457	9,792	348	8,640	272	8,064	220
	40	0.03	12,096	437	10,080	364	9,072	328	8,568	250	7,560	196	7,056	158
3	50	0.01	12,096	375	10,080	338	9,072	304	8,568	203	7,560	171	7,056	138
	8	0.3	15,360	1,210	12,800	1,008	11,520	907	10,880	636	9,600	475	8,960	383
	12	0.21	15,360	1,210	12,800	1,008	11,520	907	10,880	636	9,600	475	8,960	383
	16	0.12	13,824	995	11,520	829	10,368	746	9,792	573	8,640	428	8,064	344
	20	0.12	13,824	895	11,520	787	10,368	705	9,792	573	8,640	428	8,064	344
	25	0.08	13,824	895	11,520	787	10,368	705	9,792	573	8,640	428	8,064	344
	30	0.08	13,824	796	11,520	663	10,368	601	9,792	573	8,640	428	8,064	310
4	40	0.05	12,288	618	10,240	515	9,216	464	8,704	356	7,680	304	7,168	245
	50	0.02	10,752	389	8,960	347	8,064	291	7,616	194	6,720	152	6,272	123
	12	0.4	11,500	2,070	9,400	1,692	8,460	1,370	7,990	1,222	7,050	811	6,580	654
	16	0.28	11,500	2,070	9,400	1,692	8,460	1,370	7,990	1,222	7,050	811	6,580	654
	20	0.28	10,350	1,863	8,460	1,522	7,614	1,233	7,191	1,099	6,345	730	5,922	588
	25	0.16	10,350	1,676	8,460	1,370	7,614	1,109	7,191	990	6,345	730	5,922	588
	30	0.16	10,350	1,676	8,460	1,370	7,614	1,109	7,191	880	6,345	649	5,922	588
5	35	0.1	9,137	1,316	7,614	1,096	6,853	888	6,472	792	5,711	584	5,330	471
	40	0.1	9,137	1,151	7,614	959	6,853	777	6,472	693	5,711	511	5,330	412
	50	0.06	7,896	789	6,580	658	7,106	592	5,593	460	4,935	309	4,606	249
	20	0.3	9,014	1,621	7,512	1,351	6,761	1,216	6,385	945	5,634	635	5,258	513
	25	0.3	8,112	1,458	6,760	1,215	6,084	1,094	5,746	850	5,070	571	4,732	461
6	30	0.2	8,112	1,313	6,760	1,094	6,084	984	5,746	765	5,070	514	4,732	415
	40	0.15	7,301	1,052	6,084	876	5,476	788	5,171	613	4,563	412	4,259	332
	50	0.1	7,301	986	6,084	876	5,476	690	5,171	575	4,563	360	4,259	291
	20	0.5	7,418	1,481	6,182	1,234	5,564	1,111	5,255	864	4,637	580	4,327	469
	30	0.4	6,744	1,346	5,620	1,122	5,058	1,010	4,777	785	4,215	527	3,934	426
	40	0.3	6,744	1,211	5,620	1,009	5,058	908	4,777	706	4,215	474	3,934	383
	50	0.2	6,000	981	5,000	817	4,500	735	4,250	636	3,750	427	3,500	345

※ a_p is shown as the criteria for Group 2 workpieces. For other groups, adjust the cutting depth according to the cutting depth factors in the above table.

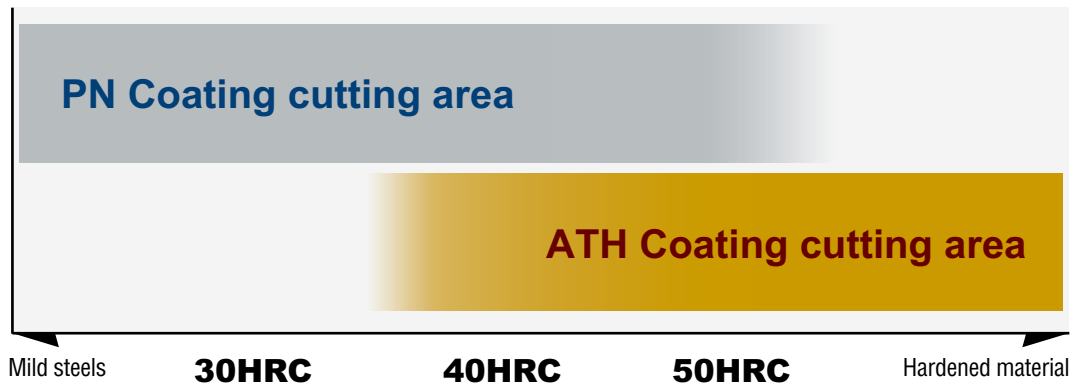
- [Note]**
- ① PN coating is less electro conductive. Therefore, electric transmitted measuring systems may not work.
 - ② Use the appropriate coolant for the work material and machining shape.
 - ③ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
 - ④ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

New PVD Technology



2 types of coatings to handle a variety of work materials.

Recommended machining areas for each coating



Cutting Data 1

Work material : **SCM440[®] 30HRC**
 Holder : HSK-F63
 Tool dia. : R0.5×Under neck 6mm
 Coolant : Air-blow
 $n=28,000\text{min}^{-1}$ ($v_c=88\text{m/min}$)
 $v_f=1,200\text{mm/min}$ ($f_z=0.02\text{mm/t}$)
 $a_p=0.036\text{mm}$ $a_e=0.108\text{mm}$ OH=18mm
 Cutting length 10m

PN Coating



ATH Coating



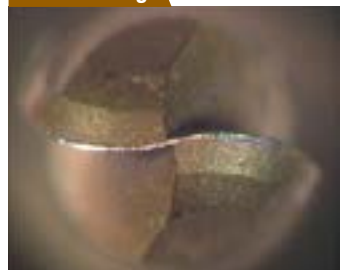
Cutting Data 2

Work material : **HPM-MAGIC 40HRC**
 Holder : HSK-F63
 Tool dia. : R0.5×Under neck 10mm
 Coolant : Air-blow
 $n=24,300\text{min}^{-1}$ ($v_c=76\text{m/min}$)
 $v_f=900\text{mm/min}$ ($f_z=0.018\text{mm/t}$)
 $a_p=0.04\text{mm}$ Cutting reciprocating slot.
 OH=18mm

PN Coating



ATH Coating



Cutting Data 3

Work material : **DAC[®] 45HRC**
 Holder : HSK-F63
 Tool dia. : R0.5×Under neck 6mm
 Coolant : Air-blow
 $n=27,540\text{min}^{-1}$ ($v_c=86\text{m/min}$)
 $v_f=1,115\text{mm/min}$ ($f_z=0.02\text{mm/t}$)
 $a_p=0.032\text{mm}$ $a_e=0.096\text{mm}$ OH=18mm
 Cutting length 10m

PN Coating



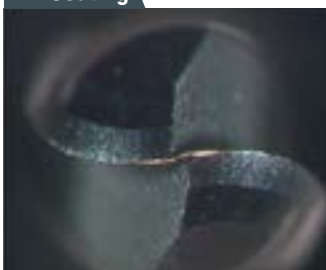
ATH Coating



Cutting Data 4

Work material : **HPM38 52HRC**
 Holder : HSK-F63
 Tool dia. : R0.5×Under neck 10mm
 Coolant : Air-blow
 $n=24,300\text{min}^{-1}$ ($v_c=76\text{m/min}$)
 $v_f=919\text{mm/min}$ ($f_z=0.018\text{mm/t}$)
 $a_p=0.016\text{mm}$ OH=18mm
 Cutting length 20m

PN Coating



ATH Coating



Features

Dimensions
Ball PN Coating

Dimensions
Ball ATH Coating

Cutting condition
Ball High efficiency

Cutting condition
Ball High accuracy

Dimensions
Square PN Coating

Dimensions
Square ATH Coating

Cutting condition
Square High efficiency

Cutting condition
Square High accuracy

Technical Data

Technical data Ball nose



Enables high-accuracy stable machining with excellent surface quality.

EPDBE-PN

PN coating

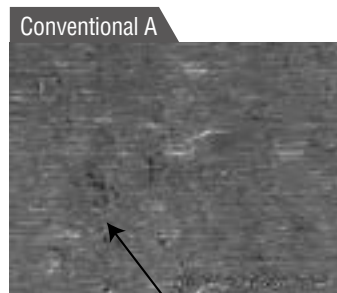
Technical Data **SCM440^H 33HRC rib slot evaluation**

Tool : EPDBE2010-10-PN (R0.5 Under neck10mm)

★This is amazing! Point 1 **Uniformity of machined surface**

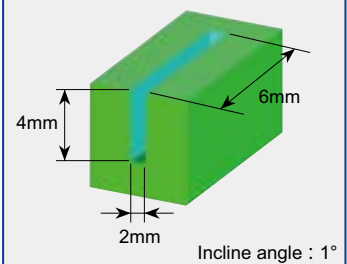


**Forms uniform cutter marks.
No vibrations occurred.**



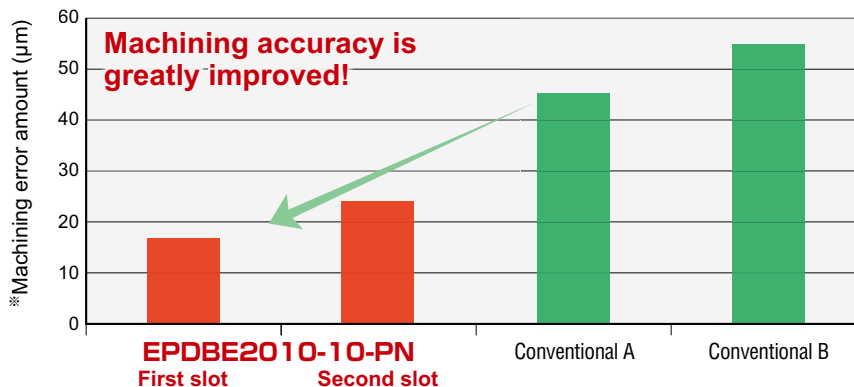
Cutter marks are not uniform.
In addition, friction has collapsed marks

Rib slot evaluation

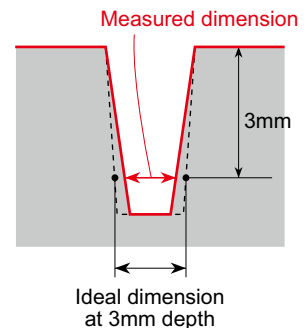


Work material : SCM440^H 33HRC
Holder : HSK-F63
Coolant : Wet
 $n=16,000\text{min}^{-1}$ ($v_c=50\text{m/min}$)
 $v_r=1,000\text{mm/min}$ ($f_z=0.03\text{mm/t}$)
 $a_p \times a_e=0.02\text{mm} \times 0.04\text{mm}$

★This is amazing! Point 2 **Low deflection provides improved machining accuracy!**



Machining accuracy is greatly improved!

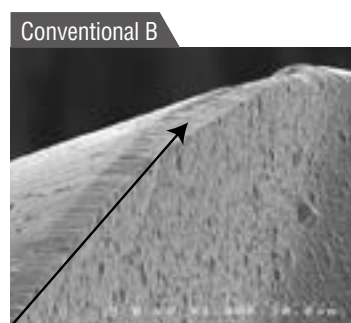
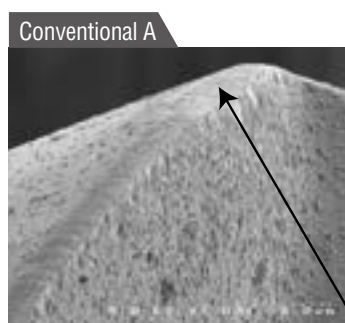


※Machining error amount::
(Ideal dimension)-(Measured dimension after cutting)

★This is amazing! Point 3 **Long life: Wear resistance plus good chipping resistance**



**Enables stable machining
with no vibrations.
Good wear condition.**



Wearing down of tip is fast.
Wear resistance is poor.

Features

Dimensions
Ball PN Coating

Dimensions
Ball ATH Coating

Cutting condition
Ball High efficiency

Cutting condition
Ball High accuracy

Dimensions
Square PN Coating

Dimensions
Square ATH Coating

Cutting condition
Square High efficiency

Cutting condition
Square High accuracy

Technical Data

Technical data Ball nose



Rely on ATH Coating for stable machining of even high-hardness materials!

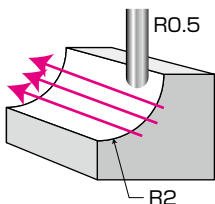
EPDBE-ATH

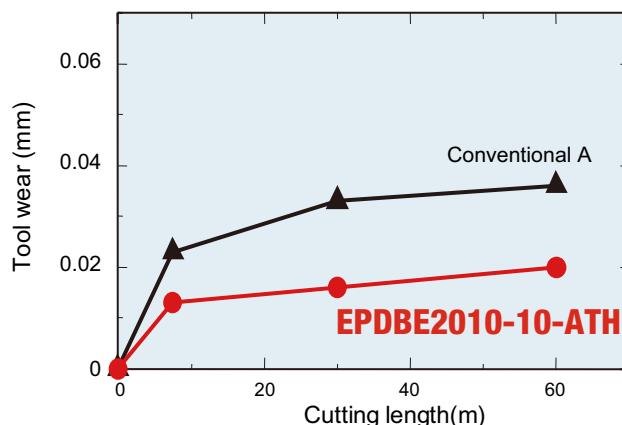
ATHcoating

Technical Data

Tool : EPDBE2010-10-ATH (R0.5 Under neck10mm)

★This is amazing! Point 1 Wear condition is stable. No chipping even on high-hardness materials.

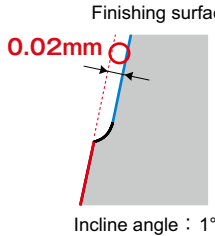
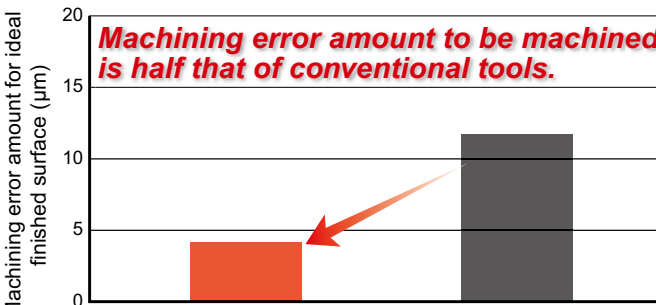
Machining shape	Cutting condition	EPDBE2010-10-ATH	Conventional
	Work material : SLD[®] 60HRC Holder : HSK-F63 Coolant : Air Blow $n=10,000\text{min}^{-1}$ $(v_c=31.4\text{m/min})$ $v_f=800\text{mm/min}$ $(f_z=0.04\text{mm/t})$ $a_p \times a_e=0.02\text{mm} \times 0.02\text{mm}$	 Stable wear condition from chisel to outer perimeter	 Chipping occurred



Technical Data

Tool : EPDBE2010-10-ATH (R0.5 Under neck10mm)

★This is amazing! Point 2 High accuracy achieved due to low deflection.

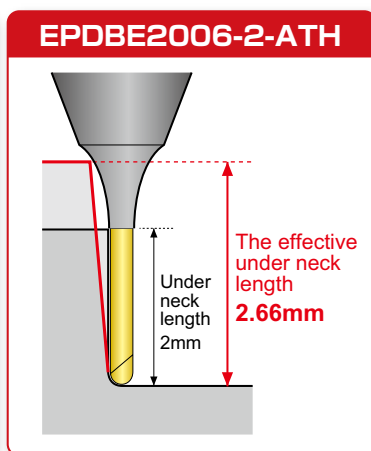
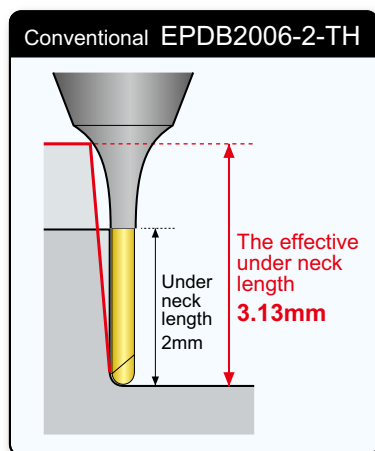
Machining shape	Cutting condition	
 Finishing surface 0.02mm Incline angle : 1°	Work material : SUS420J2[®] 52HRC Holder: HSK-F63 Coolant : Air Blow $n=16,000\text{min}^{-1}$ $(v_c=50\text{m/min})$ $v_f=1,000\text{mm/min}$ $(f_z=0.03\text{mm/t})$ $a_p \times a_e=0.02\text{mm} \times 0.02\text{mm}$	 Machining error amount for ideal finished surface (μm) EPDBE2010-10-ATH: ~4.5 μm Conventional: ~11.5 μm Machining error amount to be machined is half that of conventional tools. Periphery helix angle is strong, improving cutting performance.

Tool interference check, Re-grinding

Example of difference in neck interference area

Difference in interference area for $R=0.3 \times$ Under neck length=2mm

(Figures show a slope angle of 1° .)



When a conventional product and new product with $R=0.3 \times$ Under neck length=2mm are compared for a surface with a 1° slope angle, the conventional EPDB2006-2-TH has an effective under neck length of 3.13mm, but for the new EPDBE2006-2-ATH, the effective under neck length is 2.66mm.

The improved neck shape used in these new products results in a different interference area than the EPDB and EPDS conventional models.

For checking interference:

CAD/CAM Support Data Pack

The CAD/CAM Support Data Pack has been updated to include the Epoch Deep Evolution Series. You can search for the latest end mill. Please visit our company's home page for details.



Re-grinding compatibility range table

Item code	Product name	Tool dia. (mm)	Shape	Re-grinding compatibility range (mm)	
				Outer dia.	End
EPDBE-PN	Epoch Deep Ball Evolution (PN Coating)	0.1~6		×	1~6
EPDBE-ATH	Epoch Deep Ball Evolution (ATH Coating)	0.1~6		×	1~6
EPDSE-PN	Epoch Deep Square Evolution (PN Coating)	0.1~6		6	2~6
EPDSE-ATH	Epoch Deep Square Evolution (ATH Coating)	0.1~6		6	2~6

[Note] Contact our sales office regarding whether or not regrinding is possible for tools where Under neck length/Tool diameter is 10 or greater.

特長

寸法ボール・PN

寸法ボール・ATH

切削条件ボール・高精度

切削条件ボール・高精度

寸法スクエア・PN

寸法スクエア・ATH

切削条件スクエア・高精度

切削条件スクエア・高精度

技術データ



The diagrams and table data are examples of test results, and are not guaranteed values.
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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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Database for selection Cutting Tool Products **[TOOL SEARCH]**

TOOLSEARCH

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