

# ***EPDBPE-ATH***

Epoch Pencil Deep Ball Evolution



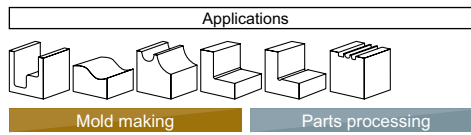
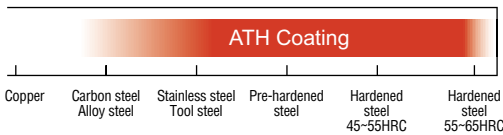
**MOLDINO Tool Engineering, Ltd.**

New Product News | No. H2004A-1 | 2020-10

## Features of EPDBPE-ATH

### Evolution version of Pencil Deep Ball

New variations of neck angle and under neck length have been added.



EPDBPE-ATH  
R0.1~R6 [ 261 Items ]

## Features Improved heat-resistant coating

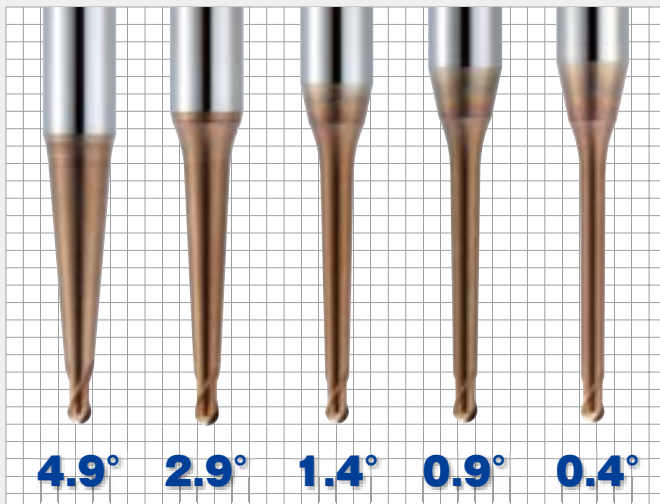


### Features and characteristics

- The TH coating has improved hardness and oxidation resistance. This enables longer tool life and higher efficiency 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 Wide lineup lets you select the tool according to your processing conditions.

Neck angle has been made a standard item, with a lineup including neck lengths of up to 120mm ( $\phi 4$ ,  $\phi 6$ ,  $\phi 8$ , and  $\phi 10$ )



Neck angle has been expanded from the previous EPDBP-TH tools.

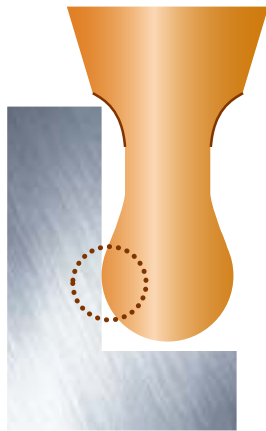
You can select the tool dimensions suitable for your mold shape!

By making the angle slightly smaller than the slope angle of the processing surface, interference due to tool deflection is reduced.

Longest depth is **90xD**

Reliable backdraft shape

Utilizes the reliable backdraft shape to reduce chattering when cutting on a vertical surface.



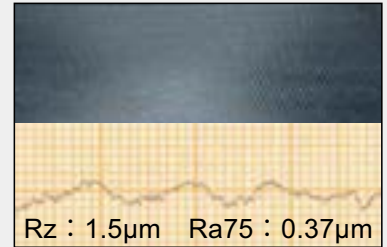
**Back draft effect**

Work material : Pre-hardened steels (Hardness : 40HRC)  
 $n=9, 100\text{min}^{-1}$   $v_f=600\text{mm/min}$   
 Z-Pick=0.01mm XY-Pick=0.03mm Dry (Air Blow)

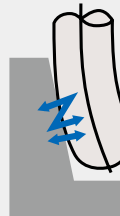
**EPDBPE-ATH**



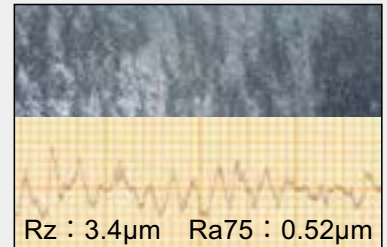
Surface roughness



**Conventional A**



Surface roughness



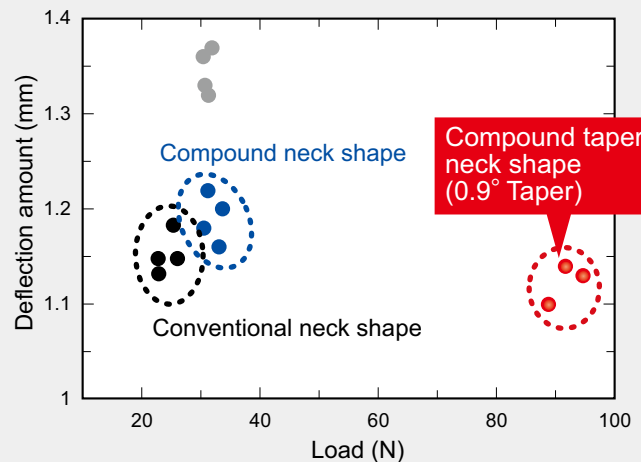
Adopt reliable compound neck shape

- Adopts the EPDBP-TH compound radius and taper to reduce deflection and breakage.

Deflection, which is a problem when cutting deep geometries, is reduced. This eliminates dimensional errors from caused by tool deflection.

Static load test results

Withstands 3 times the load compared to our company's conventional straight-neck product.

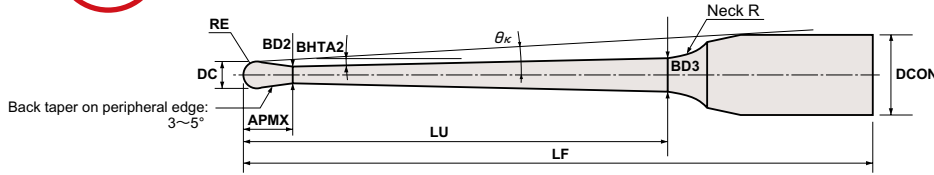
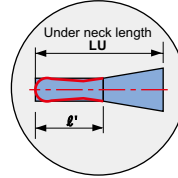


# Line Up

**ATHcoating**



[Note] ※ : R2 or higher does not have backdraft shape.



(mm)	
Ball radius RE	Tolerance on RE
RE ≤ 0.25	±0.003
0.25 < RE ≤ 3	±0.005
3 < RE	±0.01 Excluding some sizes.

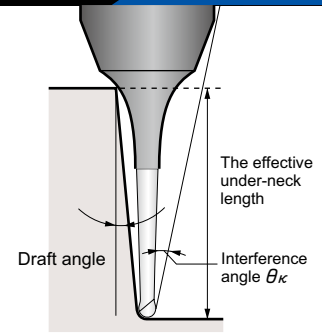
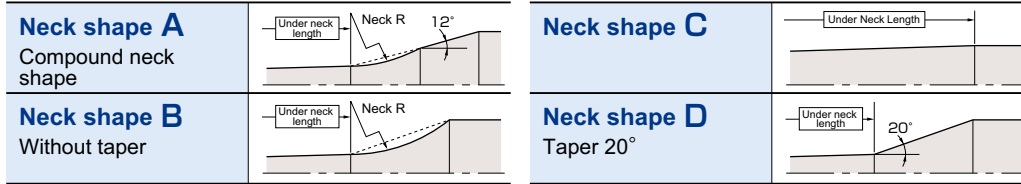
## EPDBPE2-ATH

※±0.015 for RE4 to RE5 types or types with under neck lengths of more than 80. ±0.015 for all RE6 types.

Order No.	Stock	Size(mm)											Interference Angle $\theta_k$ (°)	The effective under-neck length for the various draft angles.									
		Ball radius RE	Tool dia. DC	Neck angle BHTA2	Under neck length LU	Flute length APMX	Neck dia. BD2	Under neck dia. BD3	Overall length LF	Shank dia. DCON	Neck R	Neck shape		Approx neck length l'	0.5°	1°	1.5°	2°	3°				
		EPDBPE2002-1-04-ATH	●	0.1	0.2	0.4	1	0.15	0.17	50	4	10		A	1.35	10.89	1.55	1.72	1.88	2.03	2.31		
EPDBPE2002-1.5-04-ATH	★	1.5	2.06				2.28						2.47				2.64	2.97					
EPDBPE2002-2-04-ATH	★	2	2.70				3.03						3.30				3.56	4.02					
EPDBPE2002-3-04-ATH	★	3	3.73			4.14	4.47						4.77				5.29						
EPDBPE2002-2-09-ATH	●	0.9	2			2.81	3.14						3.42				3.92						
EPDBPE2002-2.5-09-ATH	●		2.5			3.32	3.70						4.01				4.54						
EPDBPE2002-3-09-ATH	★		3			3.84	4.25						4.58				5.15						
EPDBPE2002-1-14-ATH	★	1.4	1			1.51	1.71						1.88				2.20						
EPDBPE2002-2-14-ATH	★		2			2.47	2.93						3.26				3.80						
EPDBPE2002-3-14-ATH	★		3			2.42	3.96						4.37				5.00						
EPDBPE2002-1-29-ATH	★	2.9	1	0.62	0.81	1.57	1.99																
EPDBPE2002-2-29-ATH	★		2	0.62	0.81	1.21	3.35																
EPDBPE2002-3-29-ATH	★		3	0.62	0.81	1.21	4.37																
EPDBPE2003-2-04-ATH	●	0.15	0.3	0.4	0.25	0.27	50	4	10	A	2.19	9.94	2.57	2.83	3.04	3.24	3.59						
EPDBPE2003-3-04-ATH	★												3	4.14	4.47	4.76	5.28						
EPDBPE2003-3-09-ATH	●												3	3.85	4.25	4.58	5.15						
EPDBPE2003-4-09-ATH	★			4									4.87	5.35	5.73	6.35							
EPDBPE2004-2-04-ATH	●	0.2	0.4	0.4	0.3	0.37	50	4	10	A	2.20	9.93	2.57	2.82	3.03	3.23	3.57						
EPDBPE2004-3-04-ATH	●												3	3.92	4.18	4.40	4.80						
EPDBPE2004-4-04-ATH	★												4	5.23	5.61	5.93	6.51						
EPDBPE2004-5-04-ATH	★			5									6.33	6.74	7.10	7.71							
EPDBPE2004-6-04-ATH	★			6									7.41	7.86	8.25	8.90							
EPDBPE2004-8-04-ATH	★			8									9.57	10.08	10.51	11.24							
EPDBPE2004-2-09-ATH	●			0.9									0.9	2.30	2.66	2.90	3.12	3.49					
EPDBPE2004-4-09-ATH	●																		4	4.87	5.35	5.72	6.34
EPDBPE2004-5-09-ATH	●																		5	5.90	6.44	6.85	7.53
EPDBPE2004-6-09-ATH	★			6									6.92	7.52	7.97	8.69							
EPDBPE2004-2-14-ATH	★	1.4	2	1.31	2.41	2.75	2.99	3.40															
EPDBPE2004-4-14-ATH	★								4	2.70	5.00	5.47	6.16										
EPDBPE2004-6-14-ATH	★								6	2.70	7.04	7.64	8.46										
EPDBPE2004-2-29-ATH	★	2.9	2	0.67	0.80	1.02	1.48	3.04															
EPDBPE2004-4-29-ATH	★								4	0.80	1.02	1.48	5.42										
EPDBPE2004-6-29-ATH	★								6	0.80	1.02	1.48	7.45										
EPDBPE2005-4-04-ATH	●	0.25	0.5	0.4	0.35	0.47	50	4	10	A	2.49	8.35	4.62	5.00	5.30	5.55	5.99						
EPDBPE2005-6-04-ATH	●												6	7.41	7.86	8.24	8.89						
EPDBPE2005-6-09-ATH	●												6	6.92	7.52	7.97	8.69						
EPDBPE2005-8-09-ATH	●			8									8.96	9.67	10.18	10.99							
EPDBPE2005-12-09-ATH	●	12	13.05	13.94	14.55	15.49																	
EPDBPE20054-2-04-ATH	★	0.27	0.54	0.4	0.37	0.52	50	4	10	A	1.80	9.95	2.36	2.55	2.70	2.83	3.06						
EPDBPE20054-4-04-ATH	★												4	4.96	5.26	5.52	5.97						
EPDBPE20054-5-04-ATH	★												5	6.04	6.38	6.66	7.15						
EPDBPE20054-6-04-ATH	★												6	7.37	7.82	8.21	8.87						
EPDBPE20054-6.5-04-ATH	★												6.5	7.91	8.38	8.78	9.46						
EPDBPE20054-7-04-ATH	★												7	8.45	8.94	9.35	10.05						
EPDBPE2006-2-04-ATH	●	0.3	0.6	0.4	0.4	0.57	50	4	10	A	2.17	9.93	2.42	2.59	2.73	2.85	3.08						
EPDBPE2006-4-04-ATH	●												4	5.00	5.29	5.54	5.98						
EPDBPE2006-6-04-ATH	●												6	7.41	7.85	8.23	8.88						
EPDBPE2006-8-04-ATH	●												8	9.56	10.07	10.50	11.22						
EPDBPE2006-10-04-ATH	●												10	11.70	12.27	12.73	13.52						
EPDBPE2006-12-04-ATH	★												12	13.83	14.44	14.95	15.79						
EPDBPE2006-15-04-ATH	★	15	17.01	17.68	18.24	19.27																	

● : Inventory maintained in US ★ : Inventory maintained in Japan

■ Detail of neck shape



# EPDBPE2-ATH

Order No.	Stock	Size(mm)											Interference Angle $\theta_{\kappa}$ (°)	The effective under-neck length for the various draft angles.								
		Ball radius	Tool dia.	Neck angle	Under neck length	Flute length	Neck dia.	Under neck dia.	Overall length	Shank dia.	Neck R	Neck shape		Approx neck length $l'$	0.5°	1°	1.5°	2°	3°			
		RE	DC	BHTA2	LU	APMX	BD2	BD3	LF	DCON												
EPDBPE2006-4-09-ATH	●				4			0.683	50				7	A	1.35	8.41	2.67	4.70	5.07	5.37	5.85	
EPDBPE2006-6-09-ATH	●				6			0.746	50				10	A	1.35	7.26	2.67	6.92	7.51	7.96	8.68	
EPDBPE2006-8-09-ATH	●				8			0.809	50				10	A	1.35	6.38	2.67	8.96	9.67	10.18	10.98	
EPDBPE2006-10-09-ATH	●				10			0.872	50				10	A	1.35	5.70	2.67	11.01	11.81	12.37	13.25	
EPDBPE2006-12-09-ATH	●				12			0.934	55				10	A	1.35	5.14	2.67	13.05	13.94	14.54	15.49	
EPDBPE2006-15-09-ATH	●				15			1.029	55				10	A	1.35	4.49	2.67	16.10	17.11	17.78	18.81	
EPDBPE2006-4-14-ATH	●				4			0.746	50				7	A	1.01	8.52	1.41	2.80	4.78	5.16	5.70	
EPDBPE2006-5-14-ATH	●				5			0.795	50				7	A	1.01	7.91	1.41	2.80	5.80	6.23	6.83	
EPDBPE2006-6-14-ATH	●	0.3	0.6		6	0.4	0.57	0.844	50				10	A	1.01	7.39	1.41	2.80	7.04	7.63	8.45	
EPDBPE2006-8-14-ATH	●				8			0.941	50				10	A	1.01	6.52	1.41	2.80	9.08	9.78	10.71	
EPDBPE2006-10-14-ATH	●				10			1.039	50				10	A	1.01	5.83	1.41	2.80	11.13	11.92	12.94	
EPDBPE2006-20-14-ATH	★				20			1.528	60				10	A	1.01	3.82	1.41	2.80	21.31	22.47	23.84	
EPDBPE2006-6-29-ATH	★				6			1.137	50				10	A	0.69	7.79	0.77	0.90	1.12	1.58	7.45	
EPDBPE2006-8-29-ATH	★				8			1.340	50				10	A	0.69	6.95	0.77	0.90	1.12	1.58	9.49	
EPDBPE2006-12-29-ATH	★				12			1.745	55				10	A	0.69	5.71	0.77	0.90	1.12	1.58	13.56	
EPDBPE2006-20-29-ATH	★				20			2.556	60				10	B	0.69	4.15	0.77	0.90	1.12	1.58	21.68	
EPDBPE2008-4-04-ATH	●				4			0.819	50				7	A	2.64	8.22	4.61	4.99	5.28	5.53	5.97	
EPDBPE2008-6-04-ATH	●				6			0.847	50				7	A	2.64	7.01	6.66	7.14	7.50	7.79	8.30	
EPDBPE2008-8-04-ATH	●				8			0.875	50				10	A	2.64	6.11	8.85	9.56	10.06	10.49	11.21	
EPDBPE2008-12-04-ATH	★				12			0.931	55				10	A	2.64	4.86	12.93	13.83	14.44	14.94	15.77	
EPDBPE2008-8-09-ATH	●	0.4	0.8		8	0.5	0.77	1.006	50				10	A	1.45	6.24	2.77	8.96	9.66	10.17	10.97	
EPDBPE2008-12-09-ATH	●				12			1.131	55				10	A	1.45	4.99	2.77	13.04	13.93	14.54	15.48	
EPDBPE2008-16-09-ATH	●				16			1.257	55				10	A	1.45	4.15	2.77	17.12	18.16	18.85	19.90	
EPDBPE2008-16-29-ATH	★				16			2.340	55				10	B	0.79	4.67	0.87	1.00	1.22	1.69	17.62	
EPDBPE2008-20-29-ATH	★				20			2.746	60				10	B	0.79	3.97	0.87	1.00	1.22	1.69	21.68	
EPDBPE2009-4-04-ATH	★				4			0.907	50				4			3.46	8.15	4.50	4.75	4.94	5.11	5.41
EPDBPE2009-8-04-ATH	★				8			0.963	55				7			3.46	6.03	8.75	9.30	9.70	10.03	10.60
EPDBPE2009-12-04-ATH	★				12			1.019	55				10			3.46	4.78	12.99	13.86	14.46	14.95	15.78
EPDBPE2009-16-04-ATH	★				16			1.075	60				10			3.46	3.96	17.07	18.08	18.77	19.33	20.54
EPDBPE2009-18-04-ATH	★	0.45	0.9		18	0.6	0.86	1.103	65				10	A		3.46	3.65	19.10	20.19	20.91	21.50	23.11
EPDBPE2009-20-04-ATH	★				20			1.131	65				10			3.46	3.38	21.13	22.29	23.05	23.66	25.68
EPDBPE2009-22-04-ATH	★				22			1.159	65				10			3.46	3.15	23.17	24.38	25.17	25.81	28.24
EPDBPE2009-24-04-ATH	★				24			1.187	70				10			3.46	2.95	25.20	26.47	27.29	27.96	No interference
EPDBPE2010-6-04-ATH	●				6			1.013	50				7			5.09	8.26	6.82	7.24	7.57	7.85	8.34
EPDBPE2010-8-04-ATH	●				8			1.041	55				7			5.09	7.44	8.85	9.36	9.74	10.07	10.62
EPDBPE2010-10-04-ATH	●				10			1.068	55				10			5.09	6.76	11.07	11.79	12.33	12.78	13.54
EPDBPE2010-15-04-ATH	●				15			1.138	60				10			5.09	5.51	16.16	17.08	17.73	18.27	19.31
EPDBPE2010-20-04-ATH	●				20			1.208	65				10			5.09	4.65	21.23	22.33	23.08	23.69	25.73
EPDBPE2010-25-04-ATH	★				25			1.278	70				10			5.09	4.02	26.31	27.56	28.38	29.05	32.15
EPDBPE2010-30-04-ATH	★				30			1.348	75				10			5.09	3.54	31.37	32.76	33.66	34.82	38.57
EPDBPE2010-50-04-ATH	★				50			1.627	95				10			5.09	2.40	51.62	53.44	55.27	57.96	No interference
EPDBPE2010-70-04-ATH	★				70			1.906	115				10			5.09	1.81	71.83	73.98	77.33	No interference	No interference
EPDBPE2010-6-09-ATH	●				6			1.103	50				7			2.70	8.36	5.47	6.91	7.32	7.65	8.19
EPDBPE2010-10-09-ATH	●	0.5	1		10	0.8	0.94	1.229	55				10	A		2.70	6.88	5.47	11.20	11.91	12.44	13.28
EPDBPE2010-15-09-ATH	●				15			1.386	60				10			2.70	5.64	5.47	16.28	17.19	17.84	18.84
EPDBPE2010-16-09-ATH	●				16			1.418	60				10			2.70	5.44	5.47	17.29	18.24	18.91	19.94
EPDBPE2010-20-09-ATH	●				20			1.543	65				10			2.70	4.77	5.47	21.35	22.44	23.18	24.68
EPDBPE2010-25-09-ATH	●				25			1.700	70				10			2.70	4.14	5.47	26.42	27.66	28.48	30.83
EPDBPE2010-30-09-ATH	●				30			1.857	75				10			2.70	3.65	5.47	31.49	32.86	33.75	36.98
EPDBPE2010-35-09-ATH	●				35			2.015	80				10			2.70	3.27	5.47	36.55	38.04	39.00	43.12
EPDBPE2010-40-09-ATH	●				40			2.172	85				10			2.70	2.96	5.47	41.61	43.22	44.46	No interference
EPDBPE2010-50-09-ATH	●				50			2.486	95				10			2.70	2.48	5.47	51.73	53.53	55.55	No interference
EPDBPE2010-60-09-ATH	★				60			2.800	105				10			2.70	2.14	5.47	61.84	63.81	66.63	No interference
EPDBPE2010-70-09-ATH	★				70			3.114	115				10			2.70	1.88	5.47	71.94	74.09	No interference	No interference

Features

Dimensions

High efficiency cutting condition

High accuracy cutting condition

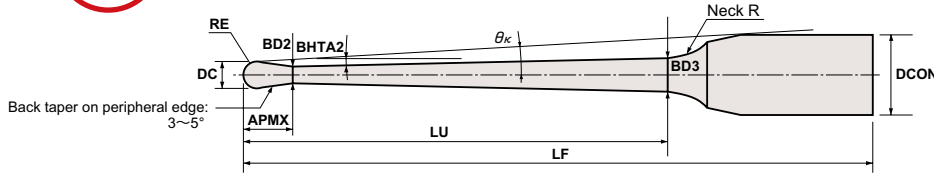
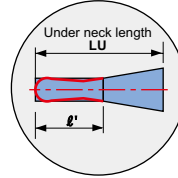
Technical Data

# Line Up

**ATHcoating**



[Note] ※ : R2 or higher does not have backdraft shape.



(mm)	
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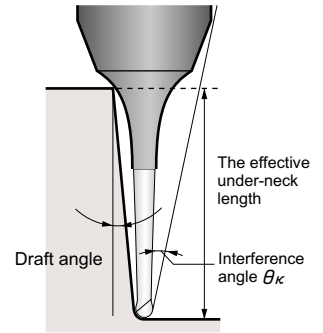
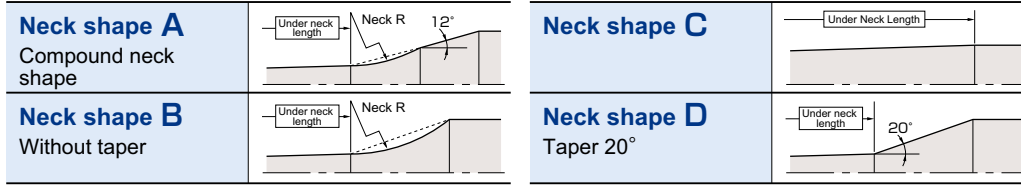
## EPDBPE2-ATH

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																				RE	DC	BHTA2	LU	APMX
EPDBPE2010-6-14-ATH	●	0.5	1	1.4	6	0.8	0.94	1.194	50	6	7	A	2.02	8.47	2.87	5.85	7.41	8.01						
EPDBPE2010-12-14-ATH	●				12			1.487	60		10	A	2.02	6.45	2.87	5.85	13.36	14.14	15.20					
EPDBPE2010-16-14-ATH	●				16			1.683	60		10	A	2.02	5.57	2.87	5.85	17.42	18.36	19.56					
EPDBPE2010-20-14-ATH	●				20			1.878	65		10	A	2.02	4.90	2.87	5.85	21.48	22.55	23.88					
EPDBPE2010-22-14-ATH	★				22			1.976	70		10	A	2.02	4.62	2.87	5.85	23.50	24.64	26.03					
EPDBPE2010-25-14-ATH	★			25	2.123			70	10		A	2.02	4.26	2.87	5.85	26.55	27.76	29.51						
EPDBPE2010-50-14-ATH	★			50	3.345			95	10		A	2.02	2.57	2.87	5.85	51.84	53.63	No interference						
EPDBPE2010-90-14-ATH	★			90	5.300			135	10		B	2.02	1.56	2.87	5.85	92.23	No interference	No interference						
EPDBPE2010-10-29-ATH	●			0.6	1.2			2.9	10		1.1	1.13	1.872	55	6	10	A	1.39	7.42	1.57	1.86	2.35	3.39	11.74
EPDBPE2010-15-29-ATH	●								15				2.379	60		10	A	1.39	6.20	1.57	1.86	2.35	3.39	16.81
EPDBPE2010-20-29-ATH	●	20	2.885			65	10		A	1.39			5.33	1.57		1.86	2.35	3.39	21.88					
EPDBPE2010-30-29-ATH	●	30	3.898			75	10		A	1.39			4.16	1.57		1.86	2.35	3.39	32.00					
EPDBPE2010-40-29-ATH	●	40	4.912			85	10		B	1.39			3.35	1.57		1.86	2.35	3.39	42.11					
EPDBPE2010-50-29-ATH	★	50	6.000			130	-	C	1.39	2.89			1.57	1.86		2.35	3.39	No interference						
EPDBPE2010-20-49-ATH	★	20	4.232			65	10	B	1.14	6.04			1.22	1.31		1.43	1.60	2.19						
EPDBPE2012-20-29-ATH	★	0.6	1.2			2.9	20	1.1	1.13	3.045			65	6		10	A	1.79	5.21	2.03	2.41	3.07	4.45	21.98
EPDBPE2012-35-29-ATH	★						35			4.565			80			10	B	1.79	3.61	2.03	2.41	3.07	4.45	37.15
EPDBPE2015-8-04-ATH	●	0.75	1.5			0.4	8	1.35	1.42	1.513			55	6		7	A	7.07	7.21	8.95	9.41	9.78	10.09	10.62
EPDBPE2015-10-04-ATH	●			10	1.541		55			7	A	7.07	6.51		10.97	11.52	11.93	12.28	12.90					
EPDBPE2015-12-04-ATH	●			12	1.569		55			7	A	7.07	5.93		13.00	13.62	14.07	14.45	15.47					
EPDBPE2015-30-04-ATH	★			30	1.820		75			10	A	7.07	3.30		31.46	32.79	33.68	34.85	38.57					
EPDBPE2015-10-09-ATH	●			10	1.692		55			7	A	3.89	6.63		7.83	11.08	11.61	12.02	12.67					
EPDBPE2015-15-09-ATH	●			15	1.849	60	10			A	3.89	5.36	7.83		16.40	17.25	17.88	18.86						
EPDBPE2015-20-09-ATH	●			20	2.006	65	10			A	3.89	4.50	7.83		21.47	22.49	23.21	24.72						
EPDBPE2015-30-09-ATH	●			30	2.320	75	10			A	3.89	3.40	7.83		31.59	32.90	33.78	37.01						
EPDBPE2015-10-14-ATH	★			10	1.843	55	7			A	2.98	6.75	4.23		8.59	11.19	11.70	12.45						
EPDBPE2015-20-14-ATH	★			20	2.332	65	10			A	2.98	4.62	4.23		8.59	21.61	22.61	23.91						
EPDBPE2015-30-14-ATH	★	30	2.820	75	10	A	2.98	3.51	4.23	8.59	31.73	33.02	35.45											
EPDBPE2015-40-14-ATH	★	40	3.309	85	10	A	2.98	2.83	4.23	8.59	41.84	43.36	No interference											
EPDBPE2015-50-14-ATH	★	50	3.798	95	10	A	2.98	2.37	4.23	8.59	51.95	53.67	No interference											
EPDBPE2015-20-29-ATH	★	0.9	1.8	0.4	20	1.6	1.73	3.310	65	6	10	A	2.13	5.03	2.42	2.87	3.63	5.25	22.05					
EPDBPE2015-46-29-ATH	★				46			6.000	95		-	C	2.13	2.84	2.42	2.87	3.63	5.25	No interference					
EPDBPE2018-4-04-ATH	★	0.9	1.8	0.4	4	1.6	1.73	1.764	50	6	4	A	4.38	9.14	4.63	4.82	4.99	5.14	5.40					
EPDBPE2018-8-04-ATH	★				8			1.819	50		4		6.61	7.07	8.68	9.01	9.27	9.49	10.27					
EPDBPE2018-12-04-ATH	★				12			1.875	55		7		6.61	5.77	12.97	13.59	14.05	14.43	15.40					
EPDBPE2018-16-04-ATH	★				16			1.931	60		7		6.61	4.87	17.02	17.77	18.30	18.73	20.53					
EPDBPE2018-20-04-ATH	★				20			1.987	65		10		6.61	4.21	21.29	22.35	23.08	23.68	25.67					
EPDBPE2018-24-04-ATH	★				24			2.043	65		10		6.61	3.71	25.35	26.53	27.33	27.97	30.80					
EPDBPE2018-28-04-ATH	★				28			2.099	70		10		6.61	3.32	29.40	30.69	31.55	32.49	35.94					
EPDBPE2018-32-04-ATH	★				32			2.154	70		10		6.61	3.00	33.45	34.85	35.76	37.11	No interference					
EPDBPE2018-36-04-ATH	★				36			2.210	75		10		6.61	2.74	37.50	38.99	39.96	41.74	No interference					
EPDBPE2018-38-04-ATH	★				38			2.238	80		10		6.61	2.62	39.53	41.06	42.05	44.06	No interference					
EPDBPE2018-40-04-ATH	★	40	2.266	80	10	6.61	2.52	41.55	43.13	44.24	46.37	No interference												
EPDBPE2020-8-04-ATH	●	1	2	0.4	8	1.7	1.92	2.008	50	6	4	A	7.42	6.96	8.70	9.03	9.28	9.50	10.27					
EPDBPE2020-12-04-ATH	●				12			2.064	55		7		7.42	5.64	13.00	13.61	14.06	14.43	15.40					
EPDBPE2020-16-04-ATH	●				16			2.120	60		7		7.42	4.74	17.05	17.79	18.31	18.74	20.54					
EPDBPE2020-20-04-ATH	●				20			2.176	65		10		7.42	4.09	21.33	22.37	23.09	23.68	25.67					
EPDBPE2020-25-04-ATH	●				25			2.245	65		10		7.42	3.49	26.40	27.59	28.39	29.05	32.09					
EPDBPE2020-30-04-ATH	●				30			2.315	70		10		7.42	3.04	31.46	32.79	33.67	34.81	38.51					
EPDBPE2020-40-04-ATH	●				40			2.455	80		10		7.42	2.42	41.58	43.14	44.26	46.39	No interference					
EPDBPE2020-80-04-ATH	★				80			3.013	120		10		7.42	1.34	81.99	84.47	No interference	No interference	No interference					

● : Inventory maintained in US ★ : Inventory maintained in Japan

Detail of neck shape



# EPDBPE200000-000000-000000-ATH

Order No.	Stock	Size(mm)											Interference Angle $\theta_{\kappa}$ (°)	The effective under-neck length for the various draft angles.								
		Ball radius	Tool dia.	Neck angle	Under neck length	Flute length	Neck dia.	Under neck dia.	Overall length	Shank dia.	Neck R	Neck shape		Approx neck length $l'$	0.5°	1°	1.5°	2°	3°			
		RE	DC	BHTA2	LU	APMX	BD2	BD3	LF	DCON												
EPDBPE2020-12-09-ATH	●				12			2.244	55					7	A	4.24	5.76	8.30	13.11	13.70	14.14	14.84
EPDBPE2020-16-09-ATH	●				16			2.369	60					7	A	4.24	4.86	8.30	17.16	17.88	18.39	19.76
EPDBPE2020-20-09-ATH	●				20			2.495	65					10	A	4.24	4.20	8.30	21.48	22.49	23.20	24.68
EPDBPE2020-25-09-ATH	●				25			2.652	65					10	A	4.24	3.60	8.30	26.54	27.70	28.50	30.82
EPDBPE2020-30-09-ATH	●				30			2.809	70					10	A	4.24	3.14	8.30	31.60	32.90	33.77	36.97
EPDBPE2020-35-09-ATH	●			0.9	35			2.966	75					10	A	4.24	2.79	8.30	36.66	38.08	39.02	No interference
EPDBPE2020-40-09-ATH	●				40			3.123	80					10	A	4.24	2.51	8.30	41.72	43.25	44.50	No interference
EPDBPE2020-50-09-ATH	●				50			3.438	90					10	A	4.24	2.09	8.30	51.82	53.56	55.58	No interference
EPDBPE2020-60-09-ATH	●				60			3.752	100					10	A	4.24	1.79	8.30	61.92	63.84	No interference	No interference
EPDBPE2020-70-09-ATH	●				70			4.066	110					10	A	4.24	1.56	8.30	72.02	74.15	No interference	No interference
EPDBPE2020-75-09-ATH	★				75			4.223	115					10	B	4.24	1.47	8.30	77.06	No interference	No interference	No interference
EPDBPE2020-10-14-ATH	●	1	2		10	1.7	1.92	2.326	55				6	7	A	3.33	6.47	4.63	9.19	11.20	11.70	12.43
EPDBPE2020-16-14-ATH	●				16			2.619	60					7	A	3.33	4.98	4.63	9.19	17.27	17.97	18.98
EPDBPE2020-20-14-ATH	●				20			2.814	65					10	A	3.33	4.32	4.63	9.19	21.62	22.61	23.90
EPDBPE2020-22-14-ATH	★				22			2.912	65					10	A	3.33	4.05	4.63	9.19	23.65	24.70	26.05
EPDBPE2020-25-14-ATH	★			1.4	25			3.059	65					10	A	3.33	3.71	4.63	9.19	26.68	27.82	29.55
EPDBPE2020-30-14-ATH	★				30			3.303	70					10	A	3.33	3.24	4.63	9.19	31.74	33.02	35.42
EPDBPE2020-40-14-ATH	★				40			3.792	80					10	A	3.33	2.60	4.63	9.19	41.85	43.36	No interference
EPDBPE2020-50-14-ATH	★				50			4.281	90					10	B	3.33	2.16	4.63	9.19	51.96	53.67	No interference
EPDBPE2020-75-14-ATH	★				75			5.503	115					10	B	3.33	1.51	4.63	9.19	77.19	No interference	No interference
EPDBPE2020-12-29-ATH	●				12			2.964	55					7	A	2.48	6.30	2.80	3.27	4.09	5.83	13.57
EPDBPE2020-15-29-ATH	●				15			3.267	60					7	A	2.48	5.60	2.80	3.27	4.09	5.83	16.59
EPDBPE2020-20-29-ATH	●			2.9	20			3.774	65					10	A	2.48	4.72	2.80	3.27	4.09	5.83	22.08
EPDBPE2020-41-29-ATH	★				41			6.000	130					-	C	2.48	2.85	2.8	3.27	4.09	5.83	No interference
EPDBPE2020-20-49-ATH	●			4.9	20			5.058	65					10	B	2.16	5.19	2.29	2.46	2.68	2.98	4.04
EPDBPE2030-8-04-ATH	●				8			2.937	50					4	A	8.50	6.25	8.87	9.13	9.35	9.55	10.33
EPDBPE2030-16-04-ATH	●				16			3.048	55					7	A	12.52	4.01	17.25	17.89	18.38	18.79	20.60
EPDBPE2030-20-04-ATH	●				20			3.104	60					7	A	12.52	3.40	21.29	22.04	22.60	23.34	25.74
EPDBPE2030-30-04-ATH	●			0.4	30			3.244	70					10	A	12.52	2.46	31.67	32.88	33.73	34.92	No interference
EPDBPE2030-40-04-ATH	★				40			3.384	80					10	A	12.52	1.93	41.78	43.23	44.38	No interference	No interference
EPDBPE2030-50-04-ATH	★				50			3.523	90					10	A	12.52	1.59	51.87	53.53	55.41	No interference	No interference
EPDBPE2030-80-04-ATH	★				80			3.942	120					10	A	12.52	1.04	82.14	84.60	No interference	No interference	No interference
EPDBPE2030-15-09-ATH	●				15			3.253	55					7	A	6.95	4.30	13.78	16.35	16.95	17.41	18.64
EPDBPE2030-20-09-ATH	●				20			3.410	60					7	A	6.95	3.50	13.78	21.40	22.14	22.68	24.78
EPDBPE2030-30-09-ATH	●				30			3.724	70					10	A	6.95	2.54	13.78	31.82	33.00	33.84	No interference
EPDBPE2030-35-09-ATH	●	1.5	3		35	2.5	2.86	3.881	75					10	A	6.95	2.24	13.78	36.87	38.18	39.11	No interference
EPDBPE2030-40-09-ATH	●			0.9	40			4.038	80					10	A	6.95	2.00	13.78	41.92	43.34	No interference	No interference
EPDBPE2030-50-09-ATH	●				50			4.352	90					10	B	6.95	1.64	13.78	52.01	53.64	No interference	No interference
EPDBPE2030-60-09-ATH	●				60			4.667	100					10	B	6.95	1.39	13.78	62.10	No interference	No interference	No interference
EPDBPE2030-70-09-ATH	●				70			4.981	110					10	B	6.95	1.20	13.78	72.19	No interference	No interference	No interference
EPDBPE2030-90-09-ATH	★				90			5.609	130					10	B	6.95	0.95	13.78	No interference	No interference	No interference	No interference
EPDBPE2030-30-14-ATH	●				30			4.204	70					10	B	5.36	2.63	7.51	15.05	31.97	33.13	No interference
EPDBPE2030-40-14-ATH	●			1.4	40			4.693	80					10	B	5.36	2.05	7.51	15.05	42.06	43.46	No interference
EPDBPE2030-50-14-ATH	★				50			5.182	90					10	B	5.36	1.68	7.51	15.05	52.16	No interference	No interference
EPDBPE2030-66-14-ATH	★				66			6.000	140					-	C	5.36	1.34	7.51	15.05	No interference	No interference	No interference
EPDBPE2030-30-29-ATH	★			2.9	30			5.646	70					10	B	3.88	2.83	4.37	5.14	6.45	9.22	No interference

Features

Dimensions

High efficiency cutting condition

High accuracy cutting condition

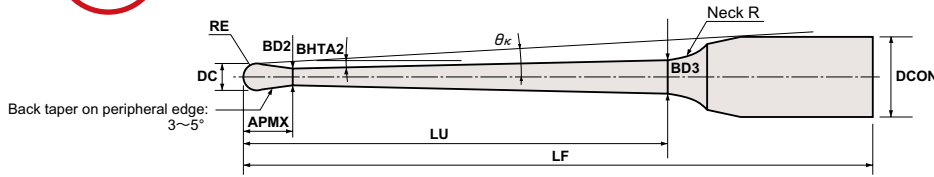
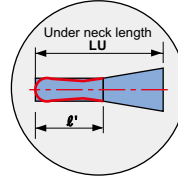
Technical Data

# Line Up

**ATHcoating**



[Note] ※ : R2 or higher does not have backdraft shape.



Ball radius RE	Tolerance on RE
RE ≤ 0.25	±0.003
0.25 < RE ≤ 3	±0.005
3 < RE	±0.01 Excluding some sizes.

## EPDBPE2-ATH

※ ±0.015 for RE4 to RE5 types or types with under neck lengths of more than 80. ±0.015 for all RE6 types.

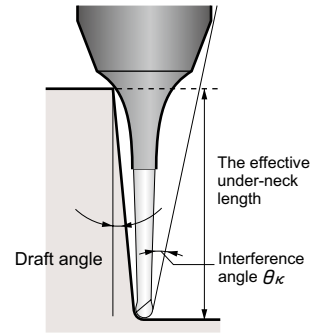
Order No.	Stock	Size(mm)											Interference Angle $\theta_k$ (°)	The effective under-neck length for the various draft angles.											
		Ball radius RE	Tool dia. DC	Neck angle BHTA2	Under neck length LU	Flute length APMX	Neck dia. BD2	Under neck dia. BD3	Overall length LF	Shank dia. DCON	Neck R	Neck shape		Approx neck length $\phi'$	0.5°	1°	1.5°	2°	3°						
		EPDBPE2040-60-04-ATH	★	2	4	0.4	60	8	3.86	4.586	110	8		10	A	18.02	1.74	62.14	63.88	66.58	No interference	No interference			
EPDBPE2040-100-04-ATH	★	100	5.145				150			10	B		18.02	1.10	102.44	105.83	No interference	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2040-20-09-ATH	●	20	4.237				70			7	A		12.45	4.26	20.79	21.76	22.37	22.87	25.16	No interference	No interference	No interference	No interference	No interference	
EPDBPE2040-30-09-ATH	●	30	4.551				80			7	A		12.45	3.17	25.53	31.83	32.66	33.95	37.45	No interference	No interference	No interference	No interference	No interference	
EPDBPE2040-35-09-ATH	●	35	4.708				85			7	A		12.45	2.82	25.53	36.87	37.79	39.50	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2040-40-09-ATH	●	40	4.865				90			10	B		12.45	2.53	25.53	42.31	43.56	45.04	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2040-50-09-ATH	●	50	5.180			100	10	B	12.45	2.10	25.53	52.39	53.84	56.12	No interference	No interference	No interference	No interference	No interference	No interference					
EPDBPE2040-60-09-ATH	●	60	5.494			110	10	B	12.45	1.80	25.53	62.46	64.14	No interference	No interference	No interference	No interference	No interference	No interference	No interference					
EPDBPE2040-120-09-ATH	★	120	7.379			170	-	D	12.45	0.97	25.53	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference					
EPDBPE2040-45-14-ATH	●	1.4	4			0.9	45	8	3.86	5.669	95	8	10	B	10.86	2.37	15.79	33.06	47.66	48.93	No interference	No interference			
EPDBPE2040-80-14-ATH	★						80			7.379	130		10	B	10.86	1.43	15.79	33.06	No interference	No interference	No interference	No interference	No interference	No interference	No interference
EPDBPE2040-25-29-ATH	★						25			5.582	75		7	B	9.38	3.99	10.91	13.27	17.30	25.73	27.74	No interference	No interference	No interference	No interference
EPDBPE2050-100-04-ATH	★			100	6.117		150			10	B		20.02	0.85	102.48	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2050-30-09-ATH	★			30	5.488		80			7	B		14.45	2.58	29.41	31.92	32.71	34.04	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2050-40-09-ATH	★			40	5.803		90			7	B		14.45	2.02	29.41	41.98	43.12	45.12	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2050-60-09-ATH	★	2.5	5	0.9	60	10	4.86	6.431	110	8	10	B	14.45	1.40	29.41	62.56	No interference	No interference	No interference	No interference					
EPDBPE2050-90-09-ATH	★				90			7.373	140		10	B	14.45	0.96	29.41	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2050-60-14-ATH	★				60			7.304	110		10	B	12.86	1.43	18.62	38.82	No interference	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2050-74-14-ATH	★				74			8.000	150		-	C	12.86	1.21	18.62	38.82	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2050-40-29-ATH	★				40			8.000	90		-	C	11.38	2.28	13.23	16.06	20.92	31.18	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2060-120-04-ATH	★				120			7.368	200		8	-	D	22.02	0.49	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	
EPDBPE2060-30-09-ATH	●	3	6	0.4	30	12	5.86	6.426	80	8	7	B	16.45	1.87	30.63	32.00	32.76	No interference	No interference						
EPDBPE2060-40-09-ATH	●				40			6.740	90		8	7	B	16.45	1.44	33.29	42.06	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2060-45-09-ATH	●				45			6.897	95		8	7	B	16.45	1.29	33.29	47.09	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2060-50-09-ATH	●				50			7.054	100		8	7	B	16.45	1.16	33.29	52.12	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2060-60-09-ATH	●				60			7.368	110		10	10	B	16.45	1.82	33.29	62.65	64.34	No interference	No interference	No interference	No interference	No interference		
EPDBPE2060-70-09-ATH	★				70			7.682	120		10	10	B	16.45	1.59	33.29	72.71	74.90	No interference	No interference	No interference	No interference	No interference		
EPDBPE2060-80-09-ATH	★			80	7.996	130	10	10	B	16.45	1.41	33.29	82.78	No interference	No interference	No interference	No interference	No interference	No interference						
EPDBPE2060-120-09-ATH	★			120	9.253	200	10	-	D	16.45	0.98	33.29	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference					
EPDBPE2060-50-14-ATH	●			1.4	6	0.9	50	12	5.86	7.717	100	8	7	B	14.86	2.19	21.46	44.58	52.43	54.41	No interference	No interference			
EPDBPE2060-96-14-ATH	★						96			10.000	200		10	-	C	14.86	1.24	21.46	44.58	No interference	No interference	No interference	No interference	No interference	No interference
EPDBPE2060-30-29-ATH	★						30			7.684	80		10	7	B	13.38	3.53	15.54	18.85	24.53	31.45	33.60	No interference	No interference	No interference
EPDBPE2070-45-09-ATH	★						45			7.834	95		10	7	B	18.45	1.85	37.16	47.17	48.59	No interference	No interference	No interference	No interference	No interference
EPDBPE2070-60-14-ATH	★	60	9.108				110			10	7		B	16.86	1.46	24.29	50.33	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2070-40-29-ATH	★	40	9.494				90			10	7		B	15.38	2.24	17.85	21.64	28.14	40.93	No interference	No interference	No interference	No interference		
EPDBPE2080-120-04-ATH	★	120	9.340	200	10	-	D	24.02	0.50	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference	No interference							
EPDBPE2080-50-09-ATH	●	4	8	0.4	50	14	7.86	8.991	110	10	7	B	18.45	1.18	36.54	52.17	No interference	No interference	No interference						
EPDBPE2080-55-09-ATH	●				55			9.148	115		10	7	B	18.45	1.08	36.54	57.20	No interference	No interference	No interference	No interference	No interference			
EPDBPE2080-60-09-ATH	★				60			9.305	120		10	7	B	18.45	0.99	36.54	No interference	No interference	No interference	No interference	No interference	No interference			
EPDBPE2080-70-09-ATH	★				70			9.619	130		10	7	B	18.45	0.85	36.54	No interference	No interference	No interference	No interference	No interference	No interference			
EPDBPE2080-80-09-ATH	★				80			9.934	140		12	10	B	18.45	1.42	36.54	82.83	No interference	No interference	No interference	No interference	No interference			
EPDBPE2080-120-09-ATH	★				120			11.190	200		12	-	D	18.45	0.98	36.54	No interference	No interference	No interference	No interference	No interference	No interference	No interference		
EPDBPE2080-50-14-ATH	●			1.4	8	0.9	50	14	7.86	9.620	110	10	7	B	16.86	1.21	24.01	49.10	No interference	No interference	No interference				
EPDBPE2080-98-14-ATH	★						98			12.000	200		12	-	C	16.86	1.22	24.01	49.10	No interference	No interference	No interference	No interference	No interference	
EPDBPE2080-35-29-ATH	●						35			10.000	95		10	-	C	15.38	1.85	17.75	21.38	27.61	No interference	No interference	No interference	No interference	

● : Inventory maintained in US ★ : Inventory maintained in Japan



■ Detail of neck shape

<p><b>Neck shape A</b> Compound neck shape</p>	<p><b>Neck shape C</b></p>
<p><b>Neck shape B</b> Without taper</p>	<p><b>Neck shape D</b> Taper 20°</p>



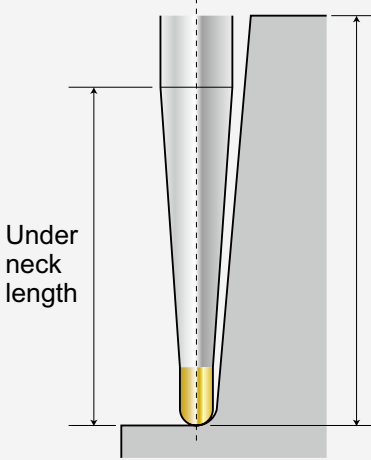
**EPDBPE2** ○○○○ - ○○○○ . ○ - ○○○ - ATH

Order No.	Stock	Size(mm)													Interference Angle $\theta_{\kappa}$ (°)	The effective under-neck length for the various draft angles.				
		Ball radius	Tool dia.	Neck angle	Under neck length	Flute length	Neck dia.	Under neck dia.	Overall length	Shank dia.	Neck R	Neck shape	Approx neck length $l'$	0.5°		1°	1.5°	2°	3°	
		RE	DC	BHTA2	LU	APMX	BD2	BD3	LF	DCON										
EPDBPE2100-120-04-ATH	★	5	10	0.4	120	18	9.86	11.284	200	12	-	D	28.02	0.50	No interference	No interference	No interference	No interference	No interference	
EPDBPE2100-60-09-ATH	●				60			11.180	130	12	7	B	22.45	1.00	44.30	No interference	No interference	No interference	No interference	No interference
EPDBPE2100-65-09-ATH	●				65			11.337	135	12	7	B	22.45	0.93	44.30	No interference	No interference	No interference	No interference	No interference
EPDBPE2100-75-09-ATH	●			75	11.651			140	12	7	B	22.45	0.81	44.30	No interference	No interference	No interference	No interference	No interference	
EPDBPE2100-86-09-ATH	●			86	12.000			200	12	-	C	22.45	0.71	44.30	No interference	No interference	No interference	No interference	No interference	
EPDBPE2100-55-14-ATH	★			1.4	55			11.669	125	12	7	B	20.86	1.12	29.68	55.87	No interference	No interference	No interference	No interference
EPDBPE2100-120-14-ATH	★			120	14.846			200	16	-	D	20.86	1.48	29.68	60.62	No interference	No interference	No interference	No interference	
EPDBPE2100-35-29-ATH	★	2.9	35	11.582	105	12	4	B	19.38	1.84	22.37	26.96	34.84	No interference	No interference	No interference	No interference			
EPDBPE2120-120-04-ATH	★	6	12	0.4	120	22	11.86	13.228	200	14	-	D	32.02	0.50	No interference	No interference	No interference	No interference	No interference	
EPDBPE2120-75-09-ATH	●				75			13.525	150	14	-	D	26.45	0.83	52.05	No interference	No interference	No interference	No interference	
EPDBPE2120-120-09-ATH	★				120			14.939	200	16	-	D	26.45	1.00	52.05	No interference	No interference	No interference	No interference	
EPDBPE2120-80-14-ATH	●			80	14.695			160	16	-	D	24.86	1.52	35.35	72.13	81.75	No interference	No interference		
EPDBPE2120-106-14-ATH	★			106	16.000			200	16	-	C	24.86	1.15	35.35	72.13	No interference	No interference	No interference		
EPDBPE2120-60-29-ATH	★			2.9	60			15.710	140	16	-	D	23.38	2.11	27.00	32.54	42.06	60.10	No interference	

○ Regarding over-hang length for products with neck shape C

Products with neck shape C have a neck taper section that runs directly into the shank, and can be used with over-hang lengths longer than the under-neck length. Further, when using over-hang lengths longer than the under-neck length, the cutting conditions should be adjusted accordingly.

Item Code
EPDBPE2010-50-29-ATH
EPDBPE2015-46-29-ATH
EPDBPE2020-41-29-ATH
EPDBPE2030-66-14-ATH
EPDBPE2050-74-14-ATH
EPDBPE2050-40-29-ATH
EPDBPE2060-96-14-ATH
EPDBPE2080-98-14-ATH
EPDBPE2080-35-29-ATH
EPDBPE2100-86-09-ATH
EPDBPE2120-106-14-ATH



Even if the processing depth is longer than the under-neck length, processing can be performed by adjusting the over-hang length.

Features  
Dimensions  
High efficiency cutting condition  
High accuracy cutting condition  
Technical Data



















# Field data

## ATH coating for good wear resistance.

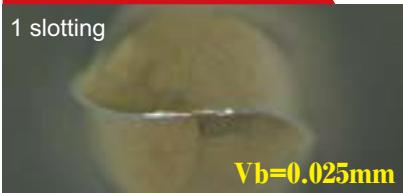
Rib slotting of plastic mold Equivalent to 4140(H) 30HRC

Tool : EPDBPE2008-12-09-ATH (R0.4 × Under neck 12mm × Neck taper 0.9°)

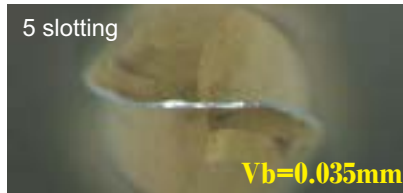
**This is amazing! Good wear resistance**

**EPDBPE2008-12-09-ATH**

1 slotting



5 slotting



**Conventional**

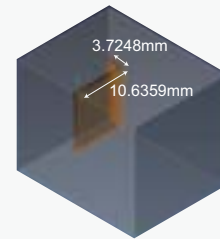
1 slotting



5 slotting

**Wear was so great that the test was stopped.**

### Rib slot evaluation



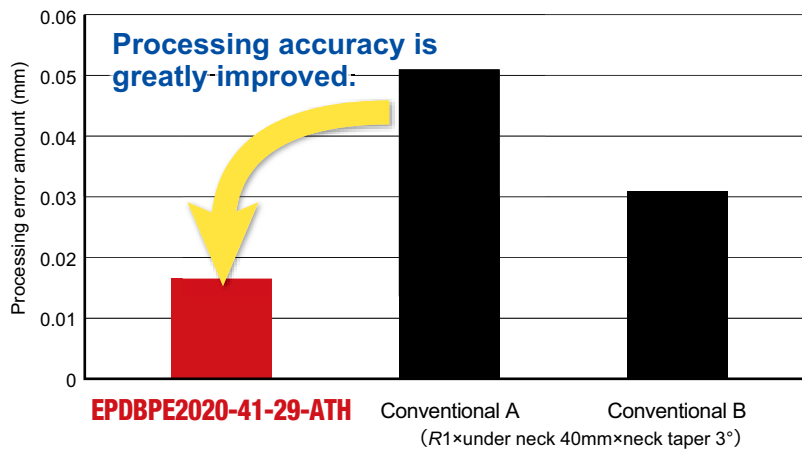
Rib slot width : Top surface=1.2562mm  
Depth 7.5mm=0.8634mm  
Incline angle =1.5°

$n=21,760\text{min}^{-1}$  ( $v_c=55\text{m/min}$ )  
 $v_f=1,253\text{mm/min}$   
( $f_z=0.029\text{mm/t}$ )  
 $a_p \times a_e=0.023\text{mm} \times 0.1\text{mm}$   
1 slot CT = 24min. 40sec.

## Even in a deep application, the compound neck shape allows high accuracy cutting.

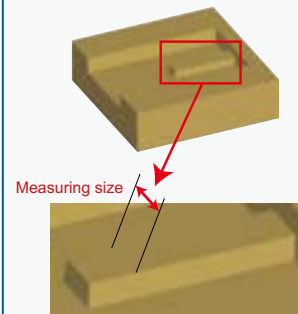
Cutting for Pre-hardened steel 40HRC

Tool : EPDBPE2020-41-29-ATH (R1 × Under neck 41mm × Neck taper 2.9°)



**Even for extremely unstable processes (L/D=20), the stock remains were still less than conventional tools.**

### Cutting shape



Measurement of cutting remainder amount relative to theoretical dimensions

$n=10,710\text{min}^{-1}$  ( $v_c=67.2\text{m/min}$ )  
 $v_f=1,500\text{mm/min}$   
( $f_z=0.07\text{mm/t}$ )  
 $a_p \times a_e=0.059\text{mm} \times 0.059\text{mm}$   
Wet, Cutting time 11min

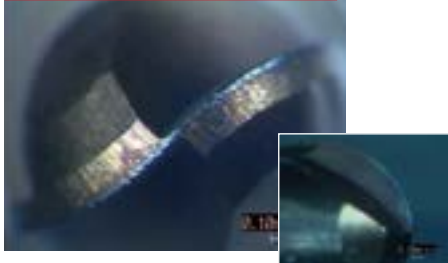


## Enables processing with less chipping.

### Cutting for 420 Stainless Steel(H) 52HRC

Tool : EPDBPE2020-12-04-ATH (R1.0 × Under neck 12mm × Neck taper 0.4°)

#### EPDBPE2020-12-04-ATH



**Minimal wear variation  
and no chipping**

Tool wear condition after cutting 2 ribs  
(processing time: 1 hour)

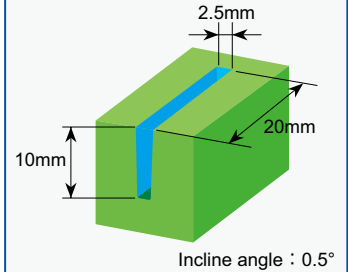
#### Conventional



After processing 1 rib, the tip of the  
conventional product showed major chipping.

Tool wear condition after cutting 1 rib  
(processing time: 30 minutes)

#### Cutting condition



Coolant : Wet  
 $n=9,880\text{min}^{-1}$  ( $v_c=62\text{m/min}$ )  
 $v_f=1,581\text{mm/min}$  ( $f_z=0.08\text{mm/t}$ )  
 $a_p \times a_e=0.059\text{mm} \times 0.059\text{mm}$



## Backdraft enables processing with less vibrations.

### Cutting for 420 Stainless Steel(H) 52HRC

Process	Tool	Under neck (mm)	Cutting depth (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	$a_p$ (mm/min)	$a_e$ (mm/min)	Remaining amount (mm)
① Rouging	EPDBPE2010-10-04-ATH	10	10	24,000	910	0.01	0.09	0.01
② Semi-finishing	EPDBPE2010-10-04-ATH	10	10	10,000	200	0.01	0.09	0.01
③ Finishing	EPDBPE2010-10-ATH	10	10	10,000	200	0.01		0

Bottom width : 1.2mm  
Cutting depth : 10mm  
Incline angle : 1°



Surface roughness of sloped surface of stopper



**Stop rib slotting with  
minimal chattering  
vibrations**



## Safety notes

### 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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