NEW

MOLDINO
The Edge To Innovation

Ultra-deep fine-hole drills

EMSBSE-PN
EMSBHE-ATH

Epoch Micro Step Borer Evolution series

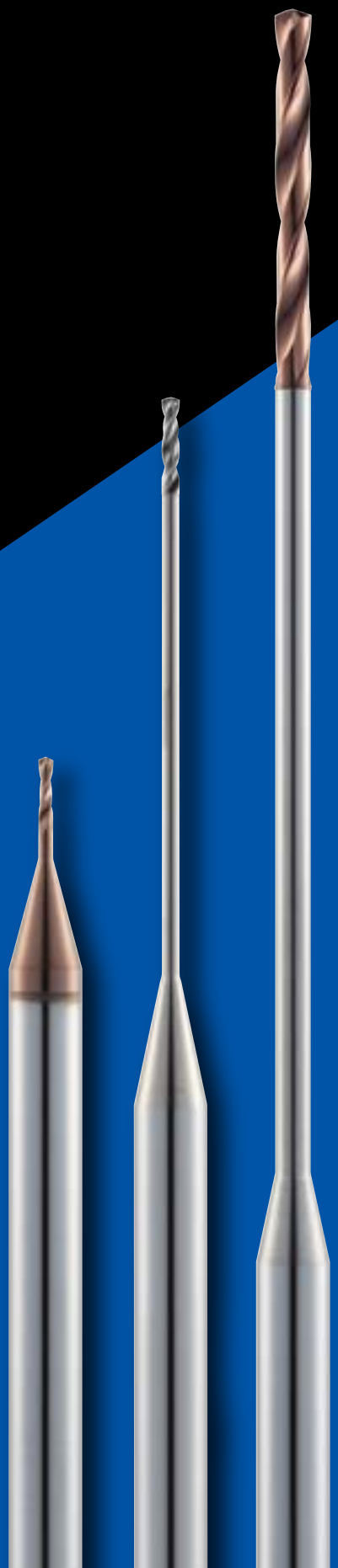
EMSBSE-PN

0.04 to 1.0 mm DC; Max. L/D = 50
Lineup includes tools from 0.04 to 0.3 mm DC in 0.01 mm increments.
Allows extended tool life for fine deep hole machining in steel/non-ferrous materials

EMSBHE-ATH

"From small hole EDM to drilling"
A total of 242 products ideal for various types of pin hole drilling

(Meets gauge pin hole standards for injection needle molds.)



MOLDINO Tool Engineering, Ltd.
New Product News | No.2505E-3 | 2026-3

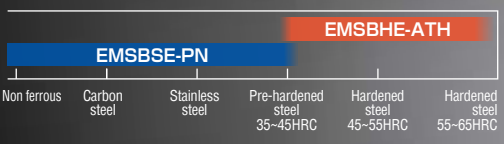
This marks the next step in the evolution of the Epoch Micro Step Borer.

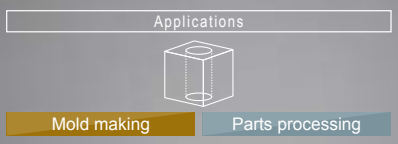
Aiming for drilling straight micro-holes

EMSBSE-PN Epoch Micro Step Borer S Evolution

From small hole EDM to drilling

EMSBHE-ATH Epoch Micro Step Borer H Evolution





EMSBSE-PN
ϕ0.04～ϕ1 [162 Items]

EMSBHE-ATH
ϕ0.1～ϕ2 [242 Items]

Are you encountering issues with small-diameter deep hole drilling?

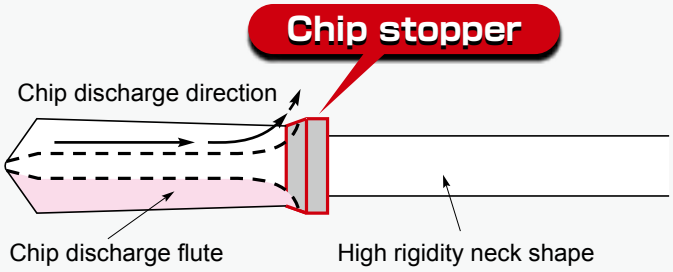
With conventional small-diameter drills…

- Longer flutes for finer deeper holes lead to reduced tool rigidity and bent holes.
- Tools break during machining.
- Tool life is reduced for smaller diameter drills.

Drilling with Micro Step Borer

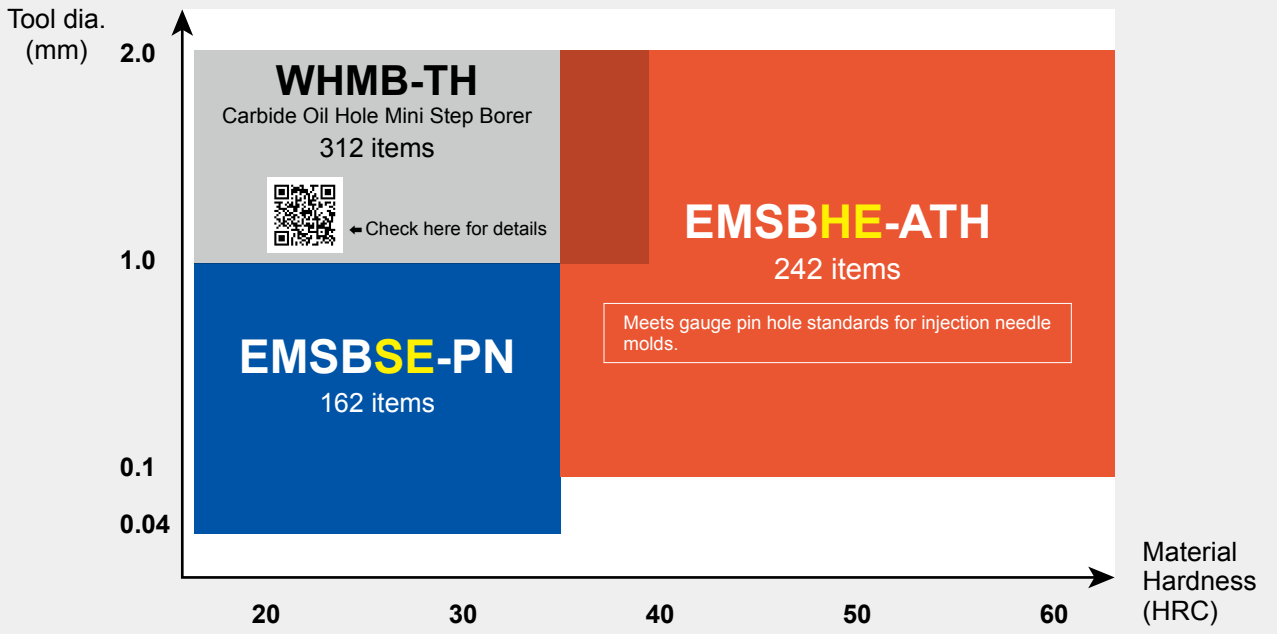
- High-rigidity neck shapes minimize hole bending and tool breakage.
- Dedicated cutting edge design ensures long tool life and maintains hole shape for extended periods.

Chip stopper and high rigidity neck shape



Reliably removes chips; improves guidance during drilling.
Flute-free neck section ensures rigidity for high-precision deep-hole drilling.

How to select of EMSBS/H Evolution



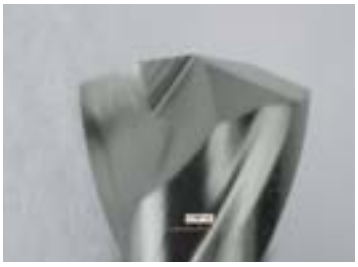
EMSBSE-PN Sharp

Target Fine holes in semiconductor inspection equipment part and nozzles

Features PN coating ensures improved service life with steel materials/non-ferrous.

Line up DC: ϕ0.04 to ϕ1, L/D = 5, 10, 20, 30, 50

【Tool diameter tolerance】
0
−0.005mm



Sharp cutting edge

EMSBHE-ATH Hard

Target Switching from small-hole EDM for ejector pin pilot holes
Gauge pin hole machining for injection needle molds

Features Optimized surface treatment suppresses variation of tool life

Line up DC: ϕ0.1 to ϕ2, L/D = 5, 10, 20, 30

【Tool diameter tolerance】
+0.006
+0.001mm

High-rigidity cutting edge

PN Coating

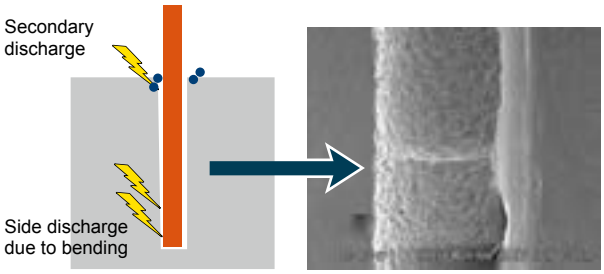
Incorporates PN coating with excellent adhesion and proven track record in machining areas where adhesion to the tool is likely to occur.

ATH Coating

Uses proven ATH coating for high hardness steel machining.

Do you have problems with EDM for deep, small-diameter pin holes?

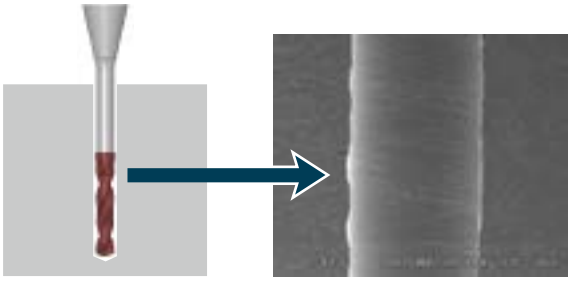
When using small hole EDM on molds…



- Requires switching from milling machine to EDM.
- Requires frequent replacement of pipe electrodes.
- Results in lower machining quality due to secondary discharge.
- Results in lower machining efficiency due to side contact of electrodes.

Machine can't be left unattended.

Drilling with EMSBHE-ATH



- Eliminates the need to switch from milling machine to EDM.
- Reduces burrs and improves hole accuracy and surface quality.
- Ensures long, consistent tool life and nighttime operation.

Results in significant labor savings and allows unmanned operation.

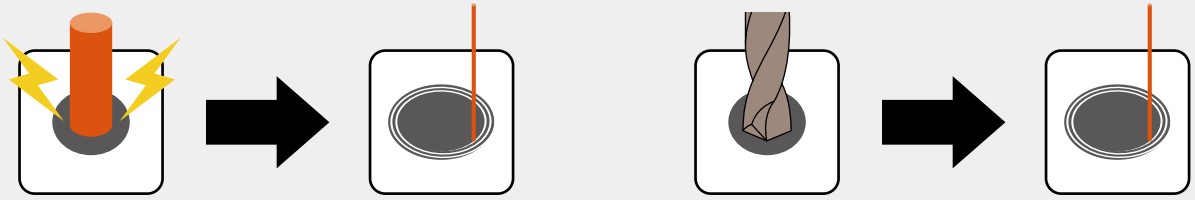
Example: ϕ1 ejector pin hole

Conventional process

ϕ0.9 small-hole EDM copper tube → Wire EDM removal amount: 0.050 mm

Proposed process

ϕ0.95 drilling → Wire EDM removal amount: 0.025 mm

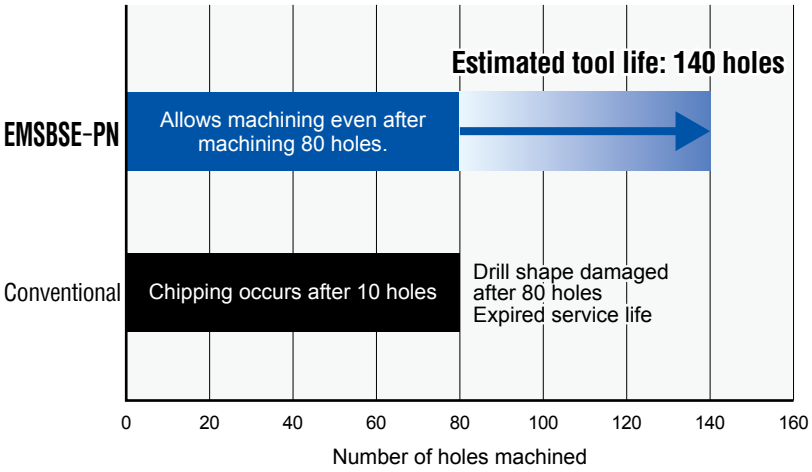


Reducing the wire EDM load reduces processing time and improves quality

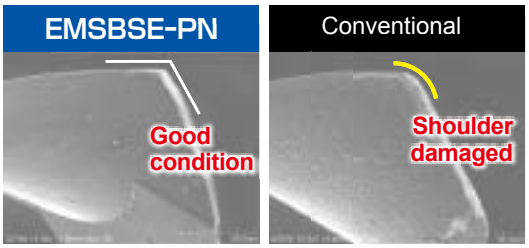
Cutting performance of EMSBSE-PN

Comparison with conventional tool when machining SUS630 (H900)

Tool：ϕ0.2 × Under neck length 2mm　　Machine：Vertical MC (HSK-E32)
Cutting conditions：n=19,099min^{-1} (v_c=12m/min)　v_f=76mm/min (f=0.004mm/rev)　Step feed：0.02mm
Coolant：Water-based coolant　　G83 Peck drilling cycle



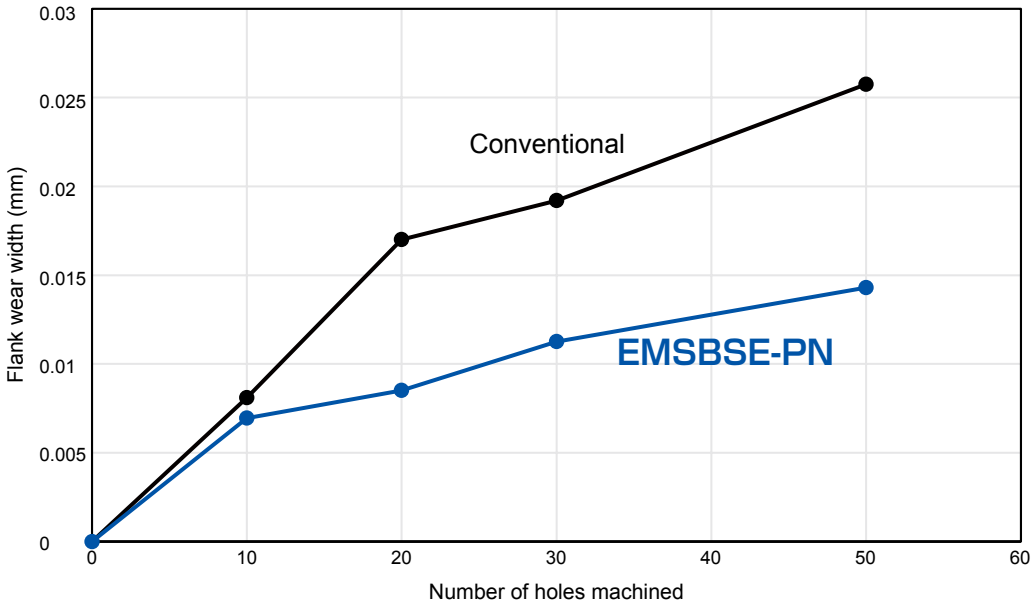
After machining 80 holes



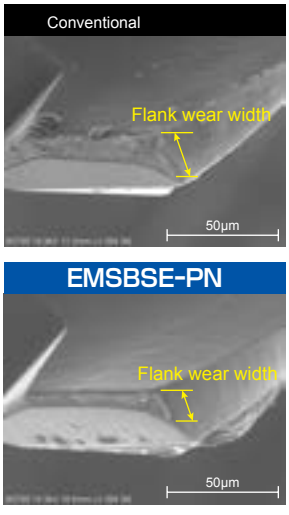
Maintains shoulder shape longer than conventional tools.

Comparison with conventional tool when machining S50C

Tool：ϕ0.2 × Under neck length 2mm　　Machine：Vertical MC (HSK-E32)
Cutting conditions：n=20,690min^{-1}(v_c=13m/min)　v_f=83mm/min(f=0.004mm/rev)　Step feed：0.02mm
Coolant：Water-based coolant　　G83 Peck drilling cycle



Ctting edge after 20 holes machining

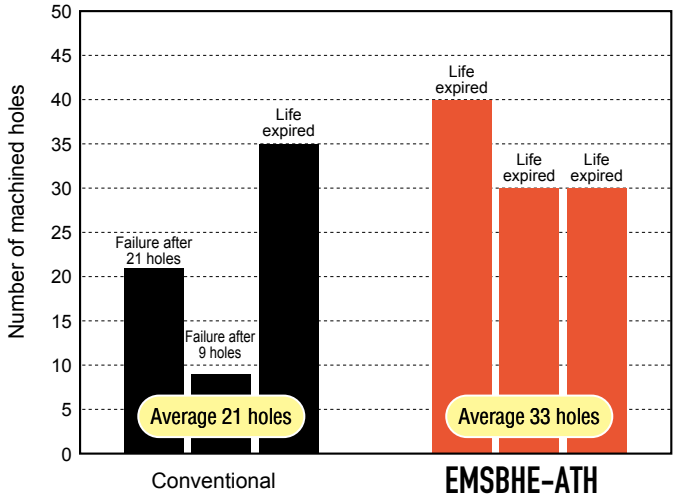


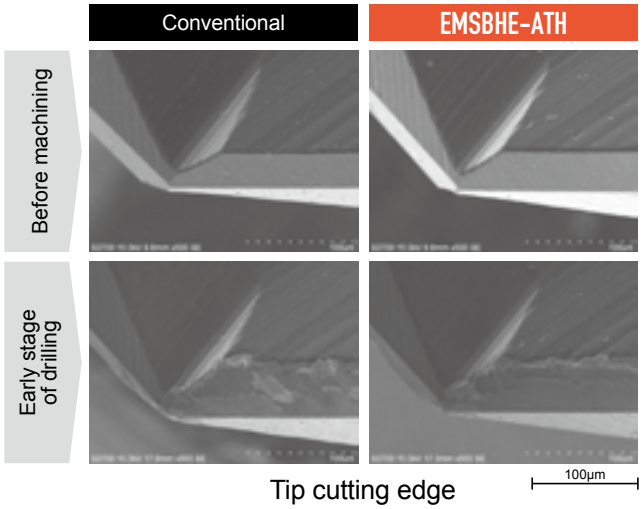
Greatly reduced flank wear compared to conventional tools.

Cutting performance of EMSBHE-ATH

Comparison to conventional tools with SKD11(60HRC)

Tool：ϕ0.5 × Under neck length 15mm　Machine：Vertical MC (HSK-E25)　Work material：SKD11(60HRC)
Cutting conditions：n=10,000min^{-1} (vc=16m/min)　v_f=50mm/min (f =0.005mm/rev)　Step feed：0.05mm
Coolant：Water-based coolant　G83 Peck drilling cycle

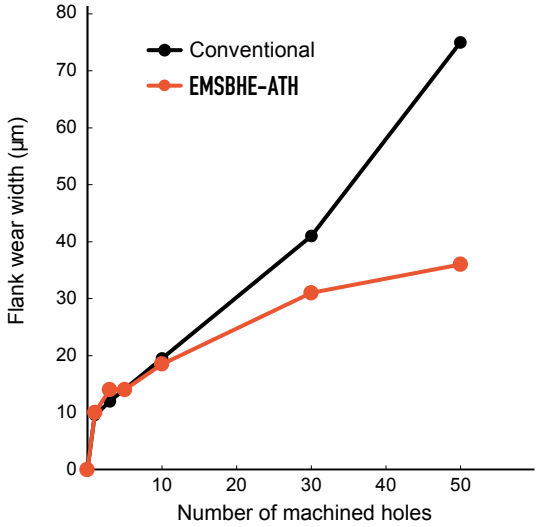


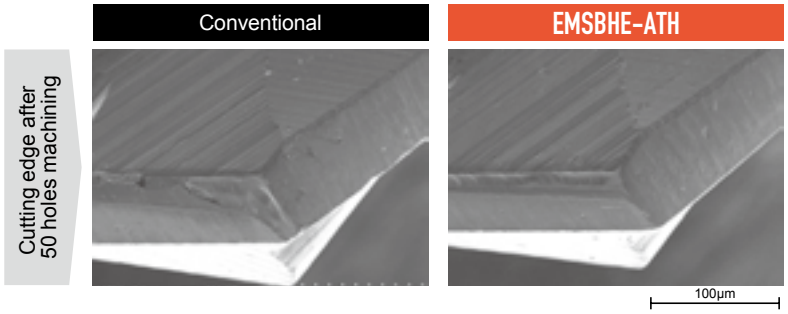


EMSBHE consistently reaches end of life without breakage.
Improved machining stability with 60HRC class high hardness steel

Comparison to conventional tools with PD613(58HRC)

Tool：ϕ0.5 × Under neck length 15mm　Machine：Vertical MC（HSK-E25）　Work material：PD613（58HRC）
Cutting conditions：n=10,000min^{-1}(v_c=16m/min)　v_f=50mm/min(f =0.005mm/rev)　Step feed：0.05mm
Coolant：Water-based coolant　G83Peck drilling cycle



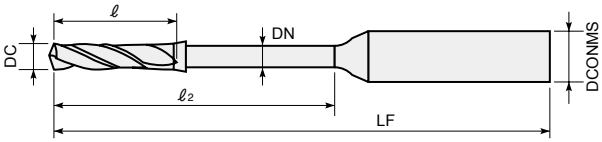


Chipping
Life expired

Reduced wear
Allows continuous operation.

Flank wear reduced to less than half that of conventional tools.
Allows continuous cutting—estimated life of at least 100 holes.

Epoch Micro Step Borer S Evolution EMSBSE-PN



EMSBSE○○○○-○○.○○-PN

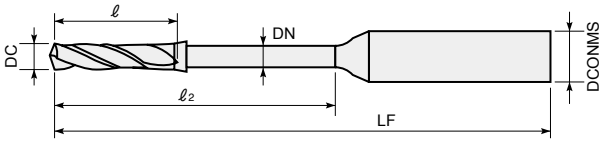
Carbide PN 140° Helix ~20° Dia. tolerance 0 −0.005 h4 (mm)

Item code	Stock	Size(mm) Tool dia. DC	Flute length ℓ	Under neck length ℓ2	Neck dia. DN	Overall length LF	Shank dia. DCONMS
EMSBSE0004-0.2-PN	★	0.04	0.20	0.20	-	40	3
EMSBSE0004-0.48-PN	★			0.48	0.033		
EMSBSE0004-0.8-PN	★			0.80			
EMSBSE0004-1.2-PN	★			1.20			
EMSBSE0005-0.25-PN	★	0.05	0.25	0.25	-	40	3
EMSBSE0005-0.6-PN	★			0.60	0.043		
EMSBSE0005-1-PN	★			1.00			
EMSBSE0005-1.5-PN	★			1.50			
EMSBSE0006-0.3-PN	★	0.06	0.30	0.30	-	40	3
EMSBSE0006-0.72-PN	★			0.72	0.053		
EMSBSE0006-1.2-PN	★			1.20			
EMSBSE0006-1.8-PN	★			1.80			
EMSBSE0007-0.35-PN	★	0.07	0.35	0.35	-	40	3
EMSBSE0007-0.84-PN	★			0.84	0.063		
EMSBSE0007-1.4-PN	★			1.40			
EMSBSE0007-2.1-PN	★			2.10			
EMSBSE0008-0.4-PN	★	0.08	0.40	0.40	-	40	3
EMSBSE0008-0.96-PN	★			0.96	0.073		
EMSBSE0008-1.6-PN	★			1.60			
EMSBSE0008-2.4-PN	★			2.40			
EMSBSE0009-0.45-PN	★	0.09	0.45	0.45	-	40	3
EMSBSE0009-1.08-PN	★			1.08	0.083		
EMSBSE0009-1.8-PN	★			1.80			
EMSBSE0009-2.7-PN	★			2.70			
EMSBSE0010-0.5-PN	★	0.1	0.50	0.50	-	45	3
EMSBSE0010-1.2-PN	★			1.20	0.09		
EMSBSE0010-2-PN	★			2.00			
EMSBSE0010-3-PN	★			3.00			
EMSBSE0010-5-PN	★			5.00			
EMSBSE0011-0.55-PN	★	0.11	0.55	0.55	-	45	3
EMSBSE0011-1.32-PN	★			1.32	0.10		
EMSBSE0011-2.2-PN	★			2.20			
EMSBSE0012-0.6-PN	★	0.12	0.60	0.60	-	45	3
EMSBSE0012-1.44-PN	★			1.44	0.11		
EMSBSE0012-2.4-PN	★			2.40			
EMSBSE0013-0.65-PN	★	0.13	0.65	0.65	-	45	3
EMSBSE0013-1.56-PN	★			1.56	0.12		
EMSBSE0013-2.6-PN	★			2.60			
EMSBSE0014-0.7-PN	★	0.14	0.70	0.70	-	45	3
EMSBSE0014-1.68-PN	★			1.68	0.13		
EMSBSE0014-2.8-PN	★			2.80			

Item code	Stock	Size(mm) Tool dia. DC	Flute length ℓ	Under neck length ℓ2	Neck dia. DN	Overall length LF	Shank dia. DCONMS
EMSBSE0015-0.75-PN	★	0.15	0.75	0.75	-	45	3
EMSBSE0015-1.8-PN	★			1.80	0.14		
EMSBSE0015-3-PN	★			3.00			
EMSBSE0015-4.5-PN	★			4.50			
EMSBSE0015-7.5-PN	★			7.50			
EMSBSE0016-0.8-PN	★	0.16	0.80	0.80	-	45	3
EMSBSE0016-1.92-PN	★			1.92	0.15		
EMSBSE0016-3.2-PN	★			3.20			
EMSBSE0017-0.85-PN	★	0.17	0.85	0.85	-	45	3
EMSBSE0017-2.04-PN	★			2.04	0.16		
EMSBSE0017-3.4-PN	★			3.40			
EMSBSE0018-0.9-PN	★	0.18	0.90	0.90	-	45	3
EMSBSE0018-2.16-PN	★			2.16	0.17		
EMSBSE0018-3.6-PN	★			3.60			
EMSBSE0018-5.4-PN	★			5.40			
EMSBSE0019-0.95-PN	★	0.19	0.95	0.95	-	45	3
EMSBSE0019-2.28-PN	★			2.28	0.18		
EMSBSE0019-3.8-PN	★			3.80			
EMSBSE0020-1-PN	★	0.2	1.00	1.00	-	45	3
EMSBSE0020-2.4-PN	★			2.40	0.19		
EMSBSE0020-4-PN	★			4.00			
EMSBSE0020-6-PN	★			6.00			
EMSBSE0020-10-PN	★			10.00			
EMSBSE0021-1.05-PN	★	0.21	1.05	1.05	-	45	3
EMSBSE0021-2.52-PN	★			2.52	0.19		
EMSBSE0022-1.1-PN	★	0.22	1.10	1.10	-	45	3
EMSBSE0022-2.64-PN	★			2.64	0.20		
EMSBSE0022-4.4-PN	★			4.40			
EMSBSE0022-6.6-PN	★			6.60			
EMSBSE0023-1.15-PN	★	0.23	1.15	1.15	-	45	3
EMSBSE0023-2.76-PN	★			2.76	0.21		
EMSBSE0024-1.2-PN	★	0.24	1.20	1.20	-	45	3
EMSBSE0024-2.88-PN	★			2.88	0.22		
EMSBSE0025-1.25-PN	★	0.25	1.25	1.25	-	45	3
EMSBSE0025-3-PN	★			3.00	0.23		
EMSBSE0025-5-PN	★			5.00			
EMSBSE0025-7.5-PN	★			7.50			
EMSBSE0025-12.5-PN	★			12.50		50	
EMSBSE0026-1.3-PN	★	0.26	1.30	1.30	-	45	3
EMSBSE0026-3.12-PN	★			3.12	0.24		

★ : Stocked items of new products.

Epoch Micro Step Borer S Evolution EMSBSE-PN



EMSBSE○○○-○○.○○-PN

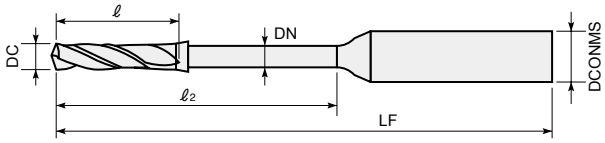
Carbide PN 140° Helix ~20° Dia. tolerance 0 −0.005 h4 (mm)

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBSE0027-1.35-PN	★	0.27	1.35	1.35	-	45	3
EMSBSE0027-3.24-PN	★			3.24	0.25		
EMSBSE0028-1.4-PN	★	0.28	1.40	1.40	-	45	3
EMSBSE0028-3.36-PN	★			3.36	0.26		
EMSBSE0029-1.45-PN	★	0.29	1.45	1.45	-	45	3
EMSBSE0029-3.48-PN	★			3.48	0.27		
EMSBSE0030-1.5-PN	★	0.3	1.50	1.50	-	45	3
EMSBSE0030-3-PN	★			3.00	0.28		
EMSBSE0030-6-PN	★			6.00			
EMSBSE0030-9-PN	★			9.00			
EMSBSE0030-15-PN	★			15.00		50	
EMSBSE0035-1.75-PN	★	0.35	1.75	1.75	-	50	3
EMSBSE0035-3.5-PN	★			3.50	0.33		
EMSBSE0035-7-PN	★			7.00			
EMSBSE0035-10.5-PN	★			10.50			
EMSBSE0035-17.5-PN	★			17.50		55	
EMSBSE0040-2-PN	★	0.4	2.00	2.00	-	50	3
EMSBSE0040-4-PN	★			4.00	0.38		
EMSBSE0040-8-PN	★			8.00			
EMSBSE0040-12-PN	★			12.00			
EMSBSE0040-20-PN	★			20.00		55	
EMSBSE0045-2.25-PN	★	0.45	2.25	2.25	-	50	3
EMSBSE0045-4.5-PN	★			4.50	0.43		
EMSBSE0045-9-PN	★			9.00			
EMSBSE0045-13.5-PN	★			13.50			
EMSBSE0045-22.5-PN	★			22.50		60	
EMSBSE0050-2.5-PN	★	0.5	2.50	2.50	-	50	3
EMSBSE0050-5-PN	★			5.00	0.48		
EMSBSE0050-10-PN	★			10.00			
EMSBSE0050-15-PN	★			15.00			
EMSBSE0050-25-PN	★			25.00		60	
EMSBSE0055-2.75-PN	★	0.55	2.75	2.75	-	50	3
EMSBSE0055-5.5-PN	★			5.50	0.52	55	
EMSBSE0055-11-PN	★			11.00			
EMSBSE0055-16.5-PN	★			16.50			
EMSBSE0055-27.5-PN	★			27.50		65	
EMSBSE0060-3-PN	★	0.6	3.00	3.00	-	50	3
EMSBSE0060-6-PN	★			6.00	0.57	55	
EMSBSE0060-12-PN	★			12.00			
EMSBSE0060-18-PN	★			18.00			
EMSBSE0060-30-PN	★			30.00		70	

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBSE0065-3.25-PN	★	0.65	3.25	3.25	-	50	3
EMSBSE0065-6.5-PN	★			6.50	0.62	55	
EMSBSE0065-13-PN	★			13.00			
EMSBSE0065-19.5-PN	★			19.50			
EMSBSE0065-32.5-PN	★			32.50		70	
EMSBSE0070-3.5-PN	★	0.7	3.50	3.50	-	50	4
EMSBSE0070-7-PN	★			7.00	0.67	60	
EMSBSE0070-14-PN	★			14.00			
EMSBSE0070-21-PN	★			21.00			
EMSBSE0070-35-PN	★			35.00		70	
EMSBSE0075-3.75-PN	★	0.75	3.75	3.75	-	50	4
EMSBSE0075-7.5-PN	★			7.50	0.71	60	
EMSBSE0075-15-PN	★			15.00			
EMSBSE0075-22.5-PN	★			22.50			
EMSBSE0075-37.5-PN	★			37.50		75	
EMSBSE0080-4-PN	★	0.8	4.00	4.00	-	50	4
EMSBSE0080-8-PN	★			8.00	0.76	60	
EMSBSE0080-16-PN	★			16.00			
EMSBSE0080-24-PN	★			24.00			
EMSBSE0080-40-PN	★			40.00		75	
EMSBSE0085-4.25-PN	★	0.85	4.25	4.25	-	50	4
EMSBSE0085-8.5-PN	★			8.50	0.80	60	
EMSBSE0085-17-PN	★			17.00			
EMSBSE0085-25.5-PN	★			25.50			
EMSBSE0085-42.5-PN	★			42.50		80	
EMSBSE0090-4.5-PN	★	0.9	4.50	4.50	-	50	4
EMSBSE0090-9-PN	★			9.00	0.85	65	
EMSBSE0090-18-PN	★			18.00			
EMSBSE0090-27-PN	★			27.00			
EMSBSE0090-45-PN	★			45.00		80	
EMSBSE0095-4.75-PN	★	0.95	4.75	4.75	-	50	4
EMSBSE0095-9.5-PN	★			9.50	0.90	65	
EMSBSE0095-19-PN	★			19.00			
EMSBSE0095-28.5-PN	★			28.50			
EMSBSE0095-47.5-PN	★			47.50		85	
EMSBSE0100-5-PN	★	1	5.00	5.00	-	50	4
EMSBSE0100-10-PN	★			10.00	0.95	70	
EMSBSE0100-20-PN	★			20.00			
EMSBSE0100-30-PN	★			30.00			
EMSBSE0100-50-PN	★			50.00		85	

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

Epoch Micro Step Borer H Evolution EMSBHE-ATH



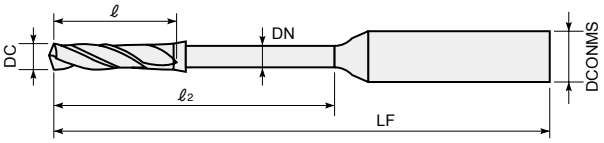
EMSBHE○○○○-○○.○○-ATH

Carbide | ATH | 140° | Low helix 17~20° | Dia. tolerance +0.006 +0.001 | h4 | (mm)

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBHE0010-0.5-ATH	●	0.1	0.5	0.5	-	45	3
EMSBHE0010-1-ATH	●			1	0.09		
EMSBHE0010-2-ATH	●			2			
EMSBHE0010-3-ATH	●			3			
EMSBHE0015-0.75-ATH	●	0.15	0.75	0.75	-	45	3
EMSBHE0015-1.5-ATH	●			1.5	0.14		
EMSBHE0015-3-ATH	●			3			
EMSBHE0015-4.5-ATH	●			4.5			
EMSBHE0016-0.8-ATH	★	0.16	0.8	0.8	-	45	3
EMSBHE0016-1.6-ATH	★			1.6	0.15		
EMSBHE0017-0.85-ATH	★	0.17	0.85	0.85	-	45	3
EMSBHE0017-1.7-ATH	★			1.7	0.16		
EMSBHE0019-0.95-ATH	★	0.19	0.95	0.95	-	45	3
EMSBHE0019-1.9-ATH	★			1.9	0.18		
EMSBHE0020-1-ATH	●	0.2	1	1	-	45	3
EMSBHE0020-2-ATH	●			2	0.19		
EMSBHE0020-4-ATH	●			4			
EMSBHE0020-6-ATH	●			6			
EMSBHE0021-1.05-ATH	★	0.21	1.05	1.05	-	45	3
EMSBHE0021-2.1-ATH	★			2.1	0.19		
EMSBHE0022-1.1-ATH	★	0.22	1.1	1.1	-	45	3
EMSBHE0022-2.2-ATH	★			2.2	0.20		
EMSBHE0023-1.15-ATH	★	0.23	1.15	1.15	-	45	3
EMSBHE0023-2.3-ATH	★			2.3	0.21		
EMSBHE0024-1.2-ATH	★	0.24	1.2	1.2	-	45	3
EMSBHE0024-2.4-ATH	★			2.4	0.22		
EMSBHE0025-1.25-ATH	●	0.25	1.25	1.25	-	45	3
EMSBHE0025-2.5-ATH	●			2.5	0.23		
EMSBHE0025-5-ATH	●			5			
EMSBHE0025-7.5-ATH	●			7.5			
EMSBHE0026-1.3-ATH	★	0.26	1.3	1.3	-	45	3
EMSBHE0026-2.6-ATH	★			2.6	0.24		
EMSBHE0027-1.35-ATH	★	0.27	1.35	1.35	-	45	3
EMSBHE0027-2.7-ATH	★			2.7	0.25		
EMSBHE0028-1.4-ATH	★	0.28	1.4	1.4	-	45	3
EMSBHE0028-2.8-ATH	★			2.8	0.26		
EMSBHE0029-1.45-ATH	★	0.29	1.45	1.45	-	45	3
EMSBHE0029-2.9-ATH	★			2.9	0.27		
EMSBHE0030-1.5-ATH	●	0.3	1.5	1.5	-	45	3
EMSBHE0030-3-ATH	●			3	0.28		
EMSBHE0030-6-ATH	●			6			
EMSBHE0030-9-ATH	●			9			

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBHE0031-1.55-ATH	★	0.31	1.55	1.55	-	50	3
EMSBHE0031-3.1-ATH	★			3.1	0.29		
EMSBHE0032-1.6-ATH	★	0.32	1.6	1.6	-	50	3
EMSBHE0032-3.2-ATH	★			3.2	0.3		
EMSBHE0033-1.65-ATH	★	0.33	1.65	1.65	-	50	3
EMSBHE0033-3.3-ATH	★			3.3	0.31		
EMSBHE0034-1.7-ATH	★	0.34	1.7	1.7	-	50	3
EMSBHE0034-3.4-ATH	★			3.4	0.32		
EMSBHE0035-1.75-ATH	●	0.35	1.75	1.75	-	50	3
EMSBHE0035-3.5-ATH	●			3.5	0.33		
EMSBHE0035-7-ATH	●			7			
EMSBHE0035-10.5-ATH	●			10.5			
EMSBHE0036-1.8-ATH	★	0.36	1.8	1.8	-	50	3
EMSBHE0036-3.6-ATH	★			3.6	0.34		
EMSBHE0037-1.85-ATH	★	0.37	1.85	1.85	-	50	3
EMSBHE0037-3.7-ATH	★			3.7	0.34		
EMSBHE0040-2-ATH	●	0.4	2	2	-	50	3
EMSBHE0040-4-ATH	●			4	0.38		
EMSBHE0040-8-ATH	●			8			
EMSBHE0040-12-ATH	●			12			
EMSBHE0041-2.05-ATH	★	0.41	2.05	2.05	-	50	3
EMSBHE0041-4.1-ATH	★			4.1	0.39		
EMSBHE0042-2.1-ATH	★	0.42	2.1	2.1	-	50	3
EMSBHE0042-4.2-ATH	★			4.2	0.4		
EMSBHE0044-2.2-ATH	★	0.44	2.2	2.2	-	50	3
EMSBHE0044-4.4-ATH	★			4.4	0.42		
EMSBHE0045-2.25-ATH	●	0.45	2.25	2.25	-	50	3
EMSBHE0045-4.5-ATH	●			4.5	0.43		
EMSBHE0045-9-ATH	●			9			
EMSBHE0045-13.5-ATH	●			13.5			
EMSBHE0046-2.3-ATH	★	0.46	2.3	2.3	-	50	3
EMSBHE0046-4.6-ATH	★			4.6	0.44		
EMSBHE0047-2.35-ATH	★	0.47	2.35	2.35	-	50	3
EMSBHE0047-4.7-ATH	★			4.7	0.45		
EMSBHE0050-2.5-ATH	●	0.5	2.5	2.5	-	50	3
EMSBHE0050-5-ATH	●			5	0.48		
EMSBHE0050-10-ATH	●			10			
EMSBHE0050-15-ATH	●			15			
EMSBHE0051-2.55-ATH	★	0.51	2.55	2.55	-	50	3
EMSBHE0051-5.1-ATH	★			5.1	0.48		
EMSBHE0052-2.6-ATH	★	0.52	2.6	2.6	-	50	3
EMSBHE0052-5.2-ATH	★			5.2	0.49		

Epoch Micro Step Borer H Evolution EMSBHE-ATH



EMSBHE○○○-○○.○○-ATH

Carbide | ATH | 140° | Low helix 17°~20° | Dia. tolerance +0.006 +0.001 | h4 | (mm)

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBHE0053-2.65-ATH	★	0.53	2.65	2.65	-	50	3
EMSBHE0053-5.3-ATH	★			5.3	0.5		
EMSBHE0054-2.7-ATH	★	0.54	2.7	2.7	-	50	3
EMSBHE0054-5.4-ATH	★			5.4	0.51		
EMSBHE0055-2.75-ATH	●	0.55	2.75	2.75	-	50	3
EMSBHE0055-5.5-ATH	●			5.5	0.52	55	
EMSBHE0055-11-ATH	●			11			
EMSBHE0055-16.5-ATH	●			16.5			
EMSBHE0056-2.8-ATH	★	0.56	2.8	2.8	-	50	3
EMSBHE0056-5.6-ATH	★			5.6	0.53		
EMSBHE0057-2.85-ATH	★	0.57	2.85	2.85	-	50	3
EMSBHE0057-5.7-ATH	★			5.7	0.54		
EMSBHE0060-3-ATH	●	0.6	3	3	-	50	3
EMSBHE0060-6-ATH	●			6	0.57	55	
EMSBHE0060-12-ATH	●			12			
EMSBHE0060-18-ATH	●			18			
EMSBHE0061-3.05-ATH	★	0.61	3.05	3.05	-	50	3
EMSBHE0061-6.1-ATH	★			6.1	0.58		
EMSBHE0062-3.1-ATH	★	0.62	3.1	3.1	-	50	3
EMSBHE0062-6.2-ATH	★			6.2	0.59		
EMSBHE0063-3.15-ATH	★	0.63	3.15	3.15	-	50	3
EMSBHE0063-6.3-ATH	★			6.3	0.6		
EMSBHE0064-3.2-ATH	★	0.64	3.2	3.2	-	50	3
EMSBHE0064-6.4-ATH	★			6.4	0.61		
EMSBHE0065-3.25-ATH	●	0.65	3.25	3.25	-	50	3
EMSBHE0065-6.5-ATH	●			6.5	0.62	55	
EMSBHE0065-13-ATH	●			13			
EMSBHE0065-19.5-ATH	●			19.5			
EMSBHE0066-3.3-ATH	★	0.66	3.3	3.3	-	50	3
EMSBHE0066-6.6-ATH	★			6.6	0.63		
EMSBHE0067-3.35-ATH	★	0.67	3.35	3.35	-	50	3
EMSBHE0067-6.7-ATH	★			6.7	0.64		
EMSBHE0069-3.45-ATH	★	0.69	3.45	3.45	-	50	3
EMSBHE0069-6.9-ATH	★			6.9	0.66		
EMSBHE0070-3.5-ATH	●	0.7	3.5	3.5	-	50	4
EMSBHE0070-7-ATH	●			7	0.67	60	
EMSBHE0070-14-ATH	●			14			
EMSBHE0070-21-ATH	●			21			
EMSBHE0071-3.55-ATH	★	0.71	3.55	3.55	-	50	4
EMSBHE0071-7.1-ATH	★			7.1	0.67		
EMSBHE0072-3.6-ATH	★	0.72	3.6	3.6	-	50	4
EMSBHE0072-7.2-ATH	★			7.2	0.68		

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBHE0073-3.65-ATH	★	0.73	3.65	3.65	-	50	4
EMSBHE0073-7.3-ATH	★			7.3	0.69		
EMSBHE0075-3.75-ATH	●	0.75	3.75	3.75	-	50	4
EMSBHE0075-7.5-ATH	●			7.5	0.71	60	
EMSBHE0075-15-ATH	●			15			
EMSBHE0075-22.5-ATH	●			22.5			
EMSBHE0076-3.8-ATH	★	0.76	3.8	3.8	-	50	4
EMSBHE0076-7.6-ATH	★			7.6	0.72		
EMSBHE0077-3.85-ATH	★	0.77	3.85	3.85	-	50	4
EMSBHE0077-7.7-ATH	★			7.7	0.73		
EMSBHE0078-3.9-ATH	★	0.78	3.9	3.9	-	50	4
EMSBHE0078-7.8-ATH	★			7.8	0.74		
EMSBHE0079-3.95-ATH	★	0.79	3.95	3.95	-	50	4
EMSBHE0079-7.9-ATH	★			7.9	0.75		
EMSBHE0080-4-ATH	●	0.8	4	4	-	50	4
EMSBHE0080-8-ATH	●			8	0.76	60	
EMSBHE0080-16-ATH	●			16			
EMSBHE0080-24-ATH	●			24			
EMSBHE0081-4.05-ATH	★	0.81	4.05	4.05	-	50	4
EMSBHE0081-8.1-ATH	★			8.1	0.76		
EMSBHE0082-4.1-ATH	★	0.82	4.1	4.1	-	50	4
EMSBHE0082-8.2-ATH	★			8.2	0.77		
EMSBHE0083-4.15-ATH	★	0.83	4.15	4.15	-	50	4
EMSBHE0083-8.3-ATH	★			8.3	0.78		
EMSBHE0085-4.25-ATH	●	0.85	4.25	4.25	-	50	4
EMSBHE0085-8.5-ATH	●			8.5	0.8	60	
EMSBHE0085-17-ATH	●			17			
EMSBHE0085-25.5-ATH	●			25.5			
EMSBHE0086-4.3-ATH	★	0.86	4.3	4.3	-	50	4
EMSBHE0086-8.6-ATH	★			8.6	0.81		
EMSBHE0087-4.35-ATH	★	0.87	4.35	4.35	-	50	4
EMSBHE0087-8.7-ATH	★			8.7	0.82		
EMSBHE0088-4.4-ATH	★	0.88	4.4	4.4	-	50	4
EMSBHE0088-8.8-ATH	★			8.8	0.83		
EMSBHE0089-4.45-ATH	★	0.89	4.45	4.45	-	50	4
EMSBHE0089-8.9-ATH	★			8.9	0.84		
EMSBHE0090-4.5-ATH	●	0.9	4.5	4.5	-	50	4
EMSBHE0090-9-ATH	●			9	0.85	65	
EMSBHE0090-18-ATH	●			18			
EMSBHE0090-27-ATH	●			27			
EMSBHE0091-4.55-ATH	★	0.91	4.55	4.55	-	50	4
EMSBHE0091-9.1-ATH	★			9.1	0.86		

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

EMSBHE○○○○-○○.○○-ATH

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBHE0092-4.6-ATH	★	0.92	4.6	4.6	-	50	4
EMSBHE0092-9.2-ATH	★			9.2	0.87		
EMSBHE0094-4.7-ATH	★	0.94	4.7	4.7	-	50	4
EMSBHE0094-9.4-ATH	★			9.4	0.89		
EMSBHE0095-4.75-ATH	●	0.95	4.75	4.75	-	50	4
EMSBHE0095-9.5-ATH	●			9.5	0.9	65	
EMSBHE0095-19-ATH	●			19			
EMSBHE0095-28.5-ATH	●			28.5			
EMSBHE0096-4.8-ATH	★	0.96	4.8	4.8	-	50	4
EMSBHE0096-9.6-ATH	★			9.6	0.91		
EMSBHE0097-4.85-ATH	★	0.97	4.85	4.85	-	50	4
EMSBHE0097-9.7-ATH	★			9.7	0.92		
EMSBHE0100-5-ATH	●	1	5	5	-	50	4
EMSBHE0100-10-ATH	●			10	0.95	70	
EMSBHE0100-20-ATH	●			20			
EMSBHE0100-30-ATH	●			30			
EMSBHE0110-5.5-ATH	●	1.1	5.5	5.5	-	50	4
EMSBHE0110-11-ATH	●		11	11	1.06	70	
EMSBHE0110-22-ATH	●			22			
EMSBHE0110-33-ATH	●			33			
EMSBHE0120-6-ATH	●	1.2	6	6	-	50	4
EMSBHE0120-12-ATH	●		12	12	1.15	70	
EMSBHE0120-24-ATH	●			24			
EMSBHE0120-36-ATH	●			36		100	
EMSBHE0130-6.5-ATH	●	1.3	6.5	6.5	-	50	4
EMSBHE0130-13-ATH	●		13	13	1.25	70	
EMSBHE0130-26-ATH	●			26			
EMSBHE0130-39-ATH	●			39		100	
EMSBHE0131-6.55-ATH	★	1.31	6.55	6.55	-	50	4
EMSBHE0131-13.1-ATH	★		13.1	13.1		70	
EMSBHE0132-6.6-ATH	★	1.32	6.6	6.6	-	50	4
EMSBHE0132-13.2-ATH	★		13.2	13.2		70	
EMSBHE0135-6.75-ATH	★	1.35	6.75	6.75	-	50	4
EMSBHE0135-13.5-ATH	★		13.5	13.5		70	
EMSBHE0136-6.8-ATH	★	1.36	6.8	6.8	-	50	4
EMSBHE0136-13.6-ATH	★		13.6	13.6		70	
EMSBHE0137-6.85-ATH	★	1.37	6.85	6.85	-	50	4
EMSBHE0137-13.7-ATH	★		13.7	13.7		70	

Item code	Stock	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ2	DN	LF	DCONMS
EMSBHE0140-7-ATH	●	1.4	7	7	-	50	4
EMSBHE0140-14-ATH	●		14	14	1.34	70	
EMSBHE0140-28-ATH	●			28			
EMSBHE0140-42-ATH	●			42		100	
EMSBHE0145-7.25-ATH	●	1.45	7.25	7.25	-	50	4
EMSBHE0145-14.5-ATH	●		14.5	14.5	1.39	70	
EMSBHE0145-29-ATH	●			29			
EMSBHE0145-43.5-ATH	●			43.5		100	
EMSBHE0150-7.5-ATH	●	1.5	7.5	7.5	-	50	4
EMSBHE0150-15-ATH	●		15	15	1.44	70	
EMSBHE0150-30-ATH	●			30			
EMSBHE0150-45-ATH	●			45		100	
EMSBHE0160-8-ATH	●	1.6	8	8	-	50	4
EMSBHE0160-16-ATH	●		16	16	1.54	70	
EMSBHE0160-32-ATH	●			32			
EMSBHE0160-48-ATH	●			48		100	
EMSBHE0170-8.5-ATH	●	1.7	8.5	8.5	-	50	4
EMSBHE0170-17-ATH	●		17	17	1.63	70	
EMSBHE0170-34-ATH	●			34		100	
EMSBHE0170-51-ATH	●			51			
EMSBHE0180-9-ATH	●	1.8	9	9	-	50	4
EMSBHE0180-18-ATH	●		18	18	1.73	70	
EMSBHE0180-36-ATH	●			36		100	
EMSBHE0180-54-ATH	●			54			
EMSBHE0190-9.5-ATH	●	1.9	9.5	9.5	-	50	4
EMSBHE0190-19-ATH	●		19	19	1.82	70	
EMSBHE0190-38-ATH	●			38		100	
EMSBHE0190-57-ATH	●			57			
EMSBHE0195-9.75-ATH	●	1.95	9.75	9.75	-	50	4
EMSBHE0195-19.5-ATH	●		19.5	19.5	1.87	70	
EMSBHE0195-39-ATH	●			39		100	
EMSBHE0195-58.5-ATH	●			58.5			
EMSBHE0200-10-ATH	●	2	10	10	-	50	4
EMSBHE0200-20-ATH	●		20	20	1.92	70	
EMSBHE0200-40-ATH	●			40		100	
EMSBHE0200-60-ATH	●			60			

(Note) For products with tool dimensions other than those listed above, separate consultation is needed. Please contact our sales representative.

Recommended Cutting Conditions

Epoch Micro Step Borer S Evolution EMSBSE-PN

Item Code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Aluminium, Resin, Acrylic		Carbon steels (180～250HB)		Alloy steels / Stainless steels (25～35HRC)		Pre-harden steels (35～45HRC)	
				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
EMSBSE0004-0.2-PN	**0.04**	0.2	0.004	39,800	80	35,800	72	31,800	64	27,900	56
EMSBSE0004-0.48-PN		0.48									
EMSBSE0004-0.8-PN		0.8									
EMSBSE0004-1.2-PN		1.2									
EMSBSE0005-0.25-PN	**0.05**	0.25	0.005	38,200	76	31,800	64	28,600	57	25,500	51
EMSBSE0005-0.6-PN		0.6									
EMSBSE0005-1-PN		1									
EMSBSE0005-1.5-PN		1.5									
EMSBSE0006-0.3-PN	**0.06**	0.3	0.006	37,100	74	29,200	58	26,500	53	23,900	48
EMSBSE0006-0.72-PN		0.72									
EMSBSE0006-1.2-PN		1.2									
EMSBSE0006-1.8-PN		1.8									
EMSBSE0007-0.35-PN	**0.07**	0.35	0.007	36,400	73	27,300	55	25,000	50	22,700	45
EMSBSE0007-0.84-PN		0.84									
EMSBSE0007-1.4-PN		1.4									
EMSBSE0007-2.1-PN		2.1									
EMSBSE0008-0.4-PN	**0.08**	0.4	0.008	35,800	72	27,900	56	25,900	52	23,900	48
EMSBSE0008-0.96-PN		0.96									
EMSBSE0008-1.6-PN		1.6									
EMSBSE0008-2.4-PN		2.4									
EMSBSE0009-0.45-PN	**0.09**	0.45	0.009	35,400	71	26,500	53	24,800	50	23,000	46
EMSBSE0009-1.08-PN		1.08									
EMSBSE0009-1.8-PN		1.8									
EMSBSE0009-2.7-PN		2.7									
EMSBSE0010-0.5-PN	**0.1**	0.5	0.01	35,000	105	25,500	76	23,900	72	22,300	67
EMSBSE0010-1.2-PN		1.2									
EMSBSE0010-2-PN		2									
EMSBSE0010-3-PN		3									
EMSBSE0010-5-PN		5		28,000	84	20,400	61	19,100	57	17,800	53
EMSBSE0011-0.55-PN	**0.11**	0.55	0.011	32,400	97	24,900	75	23,100	69	21,700	65
EMSBSE0011-1.32-PN		1.32									
EMSBSE0011-2.2-PN		2.2									
EMSBSE0012-0.6-PN	**0.12**	0.6	0.012	30,200	91	24,400	73	22,500	68	21,200	64
EMSBSE0012-1.44-PN		1.44									
EMSBSE0012-2.4-PN		2.4									
EMSBSE0013-0.65-PN	**0.13**	0.65	0.013	28,400	85	24,000	72	22,000	66	20,800	62
EMSBSE0013-1.56-PN		1.56									
EMSBSE0013-2.6-PN		2.6									
EMSBSE0014-0.7-PN	**0.14**	0.7	0.014	26,800	80	23,600	71	21,600	65	20,500	61
EMSBSE0014-1.68-PN		1.68									
EMSBSE0014-2.8-PN		2.8									
EMSBSE0015-0.75-PN	**0.15**	0.75	0.015	25,500	76	23,300	70	21,200	64	20,200	60
EMSBSE0015-1.8-PN		1.8									

Item Code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Aluminium, Resin, Acrylic		Carbon steels (180～250HB)		Alloy steels / Stainless steels (25～35HRC)		Pre-harden steels (35～45HRC)	
				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
EMSBSE0015-3-PN	**0.15**	3	0.015	25,500	76	23,300	70	21,200	64	20,200	60
EMSBSE0015-4.5-PN		4.5									
EMSBSE0015-7.5-PN		7.5		20,400	61	18,700	56	17,000	51	16,100	48
EMSBSE0016-0.8-PN	**0.16**	0.8	0.016	25,100	80	22,700	73	20,700	66	19,500	62
EMSBSE0016-1.92-PN		1.92									
EMSBSE0016-3.2-PN		3.2									
EMSBSE0017-0.85-PN	**0.17**	0.85	0.017	24,700	84	22,100	75	20,200	69	18,900	64
EMSBSE0017-2.04-PN		2.04									
EMSBSE0017-3.4-PN		3.4									
EMSBSE0018-0.9-PN	**0.18**	0.9	0.018	24,400	88	21,600	78	19,800	71	18,400	66
EMSBSE0018-2.16-PN		2.16									
EMSBSE0018-3.6-PN		3.6									
EMSBSE0018-5.4-PN		5.4									
EMSBSE0019-0.95-PN	**0.19**	0.95	0.019	24,100	92	21,100	80	19,400	74	17,900	68
EMSBSE0019-2.28-PN		2.28									
EMSBSE0019-3.8-PN		3.8									
EMSBSE0020-1-PN	**0.2**	1	0.02	23,900	95	20,700	83	19,100	76	17,500	70
EMSBSE0020-2.4-PN		2.4									
EMSBSE0020-4-PN		4									
EMSBSE0020-6-PN		6									
EMSBSE0020-10-PN		10		19,100	76	16,600	66	15,300	61	14,000	56
EMSBSE0021-1.05-PN	**0.21**	1.05	0.021	22,700	91	19,900	79	18,300	73	16,800	67
EMSBSE0021-2.52-PN		2.52									
EMSBSE0022-1.1-PN	**0.22**	1.1	0.022	21,700	87	19,100	76	17,700	71	16,200	65
EMSBSE0022-2.64-PN		2.64									
EMSBSE0022-4.4-PN		4.4									
EMSBSE0022-6.6-PN		6.6									
EMSBSE0023-1.15-PN	**0.23**	1.15	0.023	20,800	83	18,400	74	17,000	68	15,600	63
EMSBSE0023-2.76-PN		2.76									
EMSBSE0024-1.2-PN	**0.24**	1.2	0.024	19,900	80	17,800	71	16,400	66	15,100	60
EMSBSE0024-2.88-PN		2.88									
EMSBSE0025-1.25-PN	**0.25**	1.25	0.025	19,100	76	17,200	69	15,900	64	14,600	59
EMSBSE0025-3-PN		3									
EMSBSE0025-5-PN		5									
EMSBSE0025-7.5-PN		7.5									
EMSBSE0025-12.5-PN		12.5		15,300	61	13,800	55	12,700	51	11,700	47
EMSBSE0026-1.3-PN	**0.26**	1.3	0.026	18,400	73	16,700	67	15,400	62	14,200	57
EMSBSE0026-3.12-PN		3.12									
EMSBSE0027-1.35-PN	**0.27**	1.35	0.027	17,700	71	16,200	65	15,000	60	13,800	55
EMSBSE0027-3.24-PN		3.24									
EMSBSE0028-1.4-PN	**0.28**	1.4	0.028	17,100	68	15,700	63	14,600	58	13,400	54
EMSBSE0028-3.36-PN		3.36									
EMSBSE0029-1.45-PN	**0.29**	1.45	0.029	16,500	66	15,300	61	14,200	57	13,100	52

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

Recommended Cutting Conditions

Epoch Micro Step Borer S Evolution EMSBSE-PN

Item Code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Aluminium, Resin, Acrylic		Carbon steels (180～250HB)		Alloy steels / Stainless steels (25～35HRC)		Pre-harden steels (35～45HRC)	
				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
EMSBSE0029-3.48-PN	**0.29**	3.48	0.029	16,500	66	15,300	61	14,200	57	13,100	52
EMSBSE0030-1.5-PN		1.5									
EMSBSE0030-3-PN		3									
EMSBSE0030-6-PN	**0.3**	6	0.03	15,900	64	14,900	59	13,800	55	12,700	51
EMSBSE0030-9-PN		9									
EMSBSE0030-15-PN		15		12,700	51	11,900	48	11,000	44	10,200	41
EMSBSE0035-1.75-PN		1.75									
EMSBSE0035-3.5-PN		3.5									
EMSBSE0035-7-PN	**0.35**	7	0.035	14,600	58	13,600	55	12,700	51	12,300	49
EMSBSE0035-10.5-PN		10.5									
EMSBSE0035-17.5-PN		17.5		11,600	47	11,600	47	10,200	41	9,800	39
EMSBSE0040-2-PN		2									
EMSBSE0040-4-PN		4									
EMSBSE0040-8-PN	**0.4**	8	0.04	13,500	54	12,300	49	11,900	48	11,500	46
EMSBSE0040-12-PN		12									
EMSBSE0040-20-PN		20		10,800	43	9,900	39	9,500	38	9,200	37
EMSBSE0045-2.25-PN		2.25									
EMSBSE0045-4.5-PN		4.5									
EMSBSE0045-9-PN	**0.45**	9	0.045	12,000	54	11,000	49	10,600	48	10,300	46
EMSBSE0045-13.5-PN		13.5									
EMSBSE0045-22.5-PN		22.5		9,600	43	8,800	39	8,500	38	8,200	37
EMSBSE0050-2.5-PN		2.5									
EMSBSE0050-5-PN		5									
EMSBSE0050-10-PN	**0.5**	10	0.05	10,800	54	9,900	49	9,500	48	9,200	46
EMSBSE0050-15-PN		15									
EMSBSE0050-25-PN		25		8,700	43	7,900	39	7,600	38	7,400	37
EMSBSE0055-2.75-PN		2.75									
EMSBSE0055-5.5-PN		5.5									
EMSBSE0055-11-PN	**0.55**	11	0.055	9,800	54	9,000	49	8,700	48	8,400	46
EMSBSE0055-16.5-PN		16.5									
EMSBSE0055-27.5-PN		27.5		7,900	43	7,200	39	6,900	38	6,700	37
EMSBSE0060-3-PN		3									
EMSBSE0060-6-PN		6									
EMSBSE0060-12-PN	**0.6**	12	0.06	9,000	54	8,200	49	8,000	48	7,700	46
EMSBSE0060-18-PN		18									
EMSBSE0060-30-PN		30		7,200	43	6,600	39	6,400	38	6,200	37
EMSBSE0065-3.25-PN		3.25									
EMSBSE0065-6.5-PN		6.5									
EMSBSE0065-13-PN	**0.65**	13	0.065	8,300	54	7,600	49	7,300	48	7,100	46
EMSBSE0065-19.5-PN		19.5									
EMSBSE0065-32.5-PN		32.5		6,700	43	6,100	39	5,900	38	5,700	37
EMSBSE0070-3.5-PN	**0.7**	3.5	0.07	7,700	54	7,000	49	6,800	48	6,600	46
EMSBSE0070-7-PN		7									

Item Code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Aluminium, Resin, Acrylic		Carbon steels (180～250HB)		Alloy steels / Stainless steels (25～35HRC)		Pre-harden steels (35～45HRC)	
				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
EMSBSE0070-14-PN	**0.7**	14	0.07	7,700	54	7,000	49	6,800	48	6,600	46
EMSBSE0070-21-PN		21									
EMSBSE0070-35-PN		35		6,200	43	5,600	39	5,500	38	5,300	37
EMSBSE0075-3.75-PN	**0.75**	3.75	0.075	7,200	54	6,600	49	6,400	48	6,200	46
EMSBSE0075-7.5-PN		7.5									
EMSBSE0075-15-PN		15									
EMSBSE0075-22.5-PN		22.5									
EMSBSE0075-37.5-PN		37.5		5,800	43	5,300	39	5,100	38	4,900	37
EMSBSE0080-4-PN	**0.8**	4	0.08	6,800	54	6,200	49	6,000	48	5,800	46
EMSBSE0080-8-PN		8									
EMSBSE0080-16-PN		16									
EMSBSE0080-24-PN		24									
EMSBSE0080-40-PN		40		5,400	43	4,900	39	4,800	38	4,600	37
EMSBSE0085-4.25-PN	**0.85**	4.25	0.085	6,400	54	5,800	49	5,600	48	5,400	46
EMSBSE0085-8.5-PN		8.5									
EMSBSE0085-17-PN		17									
EMSBSE0085-25.5-PN		25.5									
EMSBSE0085-42.5-PN		42.5		5,100	43	4,600	39	4,500	38	4,300	37
EMSBSE0090-4.5-PN	**0.9**	4.5	0.09	6,000	54	5,500	49	5,300	48	5,100	46
EMSBSE0090-9-PN		9									
EMSBSE0090-18-PN		18									
EMSBSE0090-27-PN		27									
EMSBSE0090-45-PN		45		4,800	43	4,400	39	4,200	38	4,100	37
EMSBSE0095-4.75-PN	**0.95**	4.75	0.095	5,700	54	5,200	49	5,000	48	4,900	46
EMSBSE0095-9.5-PN		9.5									
EMSBSE0095-19-PN		19									
EMSBSE0095-28.5-PN		28.5									
EMSBSE0095-47.5-PN		47.5		4,600	43	4,200	39	4,000	38	3,900	37
EMSBSE0100-5-PN	**1**	5	0.1	5,400	54	4,900	49	4,800	48	4,600	46
EMSBSE0100-10-PN		10									
EMSBSE0100-20-PN		20									
EMSBSE0100-30-PN		30									
EMSBSE0100-50-PN		50		4,300	43	3,900	39	3,800	38	3,700	37

- This standard cutting condition table is intended for reference use. For actual drilling, adjust cutting conditions to suit the machined profile, purpose, machine tool used, etc.
- Use the 5D type for pilot hole drilling.
- Always use the G83 program (peck drilling cycle).
- Under-neck length (ℓ_2) conforms to through-hole drilling depth.
- When drilling through holes, drill from the tip of the tool to a depth of 20% to 30% of the diameter.
  Example: For work thickness T=4mm and tool: ϕ0.5 × 5 mm under neck length
  Hole depth should be 4.14 mm (from tip of tool).
- Use water-based or oil-based coolant to ensure sufficient chip removal.
- For diameters less than 0.3 mm, we recommend use in a high-precision machining environment.

【Note】 Please read "Drilling methods and precautions" on the page 19 before use.

Recommended Cutting Conditions

Epoch Micro Step Borer S Evolution EMSBHE-ATH

Item code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Pre-hardened steels (35～45HRC) Revolution n min^{-1}	Pre-hardened steels (35～45HRC) Feed rate v_f mm/min	Hardened steels (45～65HRC) Revolution n min^{-1}	Hardened steels (45～65HRC) Feed rate v_f mm/min
EMSBHE0010-0.5-ATH	0.1	0.5	0.01	22,300	67	12,420	41
EMSBHE0010-1-ATH		1					
EMSBHE0010-2-ATH		2					
EMSBHE0010-3-ATH		3					
EMSBHE0015-0.75-ATH	0.15	0.75	0.015	22,300	65	12,420	45
EMSBHE0015-1.5-ATH		1.5					
EMSBHE0015-3-ATH		3					
EMSBHE0015-4.5-ATH		4.5					
EMSBHE0016-0.8-ATH	0.16	0.8	0.016	21,900	66	11,900	42
EMSBHE0016-1.6-ATH		1.6					
EMSBHE0017-0.85-ATH	0.17	0.85	0.017	20,600	62	11,600	41
EMSBHE0017-1.7-ATH		1.7					
EMSBHE0019-0.95-ATH	0.19	0.95	0.019	18,400	65	11,400	40
EMSBHE0019-1.9-ATH		1.9					
EMSBHE0020-1-ATH	0.2	1	0.02	15,800	63	11,150	50
EMSBHE0020-2-ATH		2					
EMSBHE0020-4-ATH		4					
EMSBHE0020-6-ATH		6					
EMSBHE0021-1.05-ATH	0.21	1.05	0.021	15,800	63	11,100	50
EMSBHE0021-2.1-ATH		2.1					
EMSBHE0022-1.1-ATH	0.22	1.1	0.022	15,800	63	11,100	50
EMSBHE0022-2.2-ATH		2.2					
EMSBHE0023-1.15-ATH	0.23	1.15	0.023	15,800	63	11,100	50
EMSBHE0023-2.3-ATH		2.3					
EMSBHE0024-1.2-ATH	0.24	1.2	0.024	15,800	63	11,100	50
EMSBHE0024-2.4-ATH		2.4					
EMSBHE0025-1.25-ATH	0.25	1.25	0.025	15,800	63	11,150	50
EMSBHE0025-2.5-ATH		2.5					
EMSBHE0025-5-ATH		5					
EMSBHE0025-7.5-ATH		7.5					
EMSBHE0026-1.3-ATH	0.26	1.3	0.026	14,700	59	11,000	50
EMSBHE0026-2.6-ATH		2.6					
EMSBHE0027-1.35-ATH	0.27	1.35	0.027	14,200	57	11,000	49
EMSBHE0027-2.7-ATH		2.7					
EMSBHE0028-1.4-ATH	0.28	1.4	0.028	13,600	55	11,000	50
EMSBHE0028-2.8-ATH		2.8					
EMSBHE0029-1.45-ATH	0.29	1.45	0.029	13,200	53	11,000	49
EMSBHE0029-2.9-ATH		2.9					
EMSBHE0030-1.5-ATH	0.3	1.5	0.03	13,000	51	11,150	43
EMSBHE0030-3-ATH		3					
EMSBHE0030-6-ATH		6					
EMSBHE0030-9-ATH		9					

Item code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Pre-hardened steels (35～45HRC) Revolution n min^{-1}	Pre-hardened steels (35～45HRC) Feed rate v_f mm/min	Hardened steels (45～65HRC) Revolution n min^{-1}	Hardened steels (45～65HRC) Feed rate v_f mm/min
EMSBHE0031-1.55-ATH	0.31	1.55	0.031	12,300	49	11,300	45
EMSBHE0031-3.1-ATH		3.1					
EMSBHE0032-1.6-ATH	0.32	1.6	0.032	12,400	50	10,900	44
EMSBHE0032-3.2-ATH		3.2					
EMSBHE0033-1.65-ATH	0.33	1.65	0.033	12,500	50	10,600	42
EMSBHE0033-3.3-ATH		3.3					
EMSBHE0034-1.7-ATH	0.34	1.7	0.034	12,200	49	10,300	41
EMSBHE0034-3.4-ATH		3.4					
EMSBHE0035-1.75-ATH	0.35	1.75	0.035	11,800	52	11,000	48
EMSBHE0035-3.5-ATH		3.5					
EMSBHE0035-7-ATH		7					
EMSBHE0035-10.5-ATH		10.5					
EMSBHE0036-1.8-ATH	0.36	1.8	0.036	12,400	54	11,500	51
EMSBHE0036-3.6-ATH		3.6					
EMSBHE0037-1.85-ATH	0.37	1.85	0.037	12,050	53	11,200	49
EMSBHE0037-3.7-ATH		3.7					
EMSBHE0040-2-ATH	0.4	2	0.04	11,200	55	10,350	52
EMSBHE0040-4-ATH		4					
EMSBHE0040-8-ATH		8					
EMSBHE0040-12-ATH		12					
EMSBHE0041-2.05-ATH	0.41	2.05	0.041	11,700	57	10,900	54
EMSBHE0041-4.1-ATH		4.1					
EMSBHE0042-2.1-ATH	0.42	2.1	0.042	11,400	56	10,600	53
EMSBHE0042-4.2-ATH		4.2					
EMSBHE0044-2.2-ATH	0.44	2.2	0.044	10,500	51	10,100	51
EMSBHE0044-4.4-ATH		4.4					
EMSBHE0045-2.25-ATH	0.45	2.25	0.045	10,600	52	10,300	51
EMSBHE0045-4.5-ATH		4.5					
EMSBHE0045-9-ATH		9					
EMSBHE0045-13.5-ATH		13.5					
EMSBHE0046-2.3-ATH	0.46	2.3	0.046	10,700	53	10,400	52
EMSBHE0046-4.6-ATH		4.6					
EMSBHE0047-2.35-ATH	0.47	2.35	0.047	10,800	53	10,800	54
EMSBHE0047-4.7-ATH		4.7					
EMSBHE0050-2.5-ATH	0.5	2.5	0.05	10,500	52	10,000	50
EMSBHE0050-5-ATH		5					
EMSBHE0050-10-ATH		10					
EMSBHE0050-15-ATH		15					
EMSBHE0051-2.55-ATH	0.51	2.55	0.051	10,000	51	10,000	51
EMSBHE0051-5.1-ATH		5.1					
EMSBHE0052-2.6-ATH	0.52	2.6	0.052	10,100	52	9,800	51
EMSBHE0052-5.2-ATH		5.2					

Item code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Pre-hardened steels (35～45HRC)		Hardened steels (45～65HRC)	
				Revolution *n* min^{-1}	Feed rate *Vf* mm/min	Revolution *n* min^{-1}	Feed rate *Vf* mm/min
EMSBHE0053-2.65-ATH	0.53	2.65	0.053	10,200	53	9,600	50
EMSBHE0053-5.3-ATH		5.3					
EMSBHE0054-2.7-ATH	0.54	2.7	0.054	10,000	52	9,400	50
EMSBHE0054-5.4-ATH		5.4					
EMSBHE0055-2.75-ATH	0.55	2.75	0.055	10,300	54	9,900	53
EMSBHE0055-5.5-ATH		5.5					
EMSBHE0055-11-ATH		11					
EMSBHE0055-16.5-ATH		16.5					
EMSBHE0056-2.8-ATH	0.56	2.8	0.056	10,200	55	9,700	53
EMSBHE0056-5.6-ATH		5.6					
EMSBHE0057-2.85-ATH	0.57	2.85	0.057	10,100	55	9,500	53
EMSBHE0057-5.7-ATH		5.7					
EMSBHE0060-3-ATH	0.6	3	0.06	10,060	56	9,560	55
EMSBHE0060-6-ATH		6					
EMSBHE0060-12-ATH		12					
EMSBHE0060-18-ATH		18					
EMSBHE0061-3.05-ATH	0.61	3.05	0.061	9,900	57	9,400	55
EMSBHE0061-6.1-ATH		6.1					
EMSBHE0062-3.1-ATH	0.62	3.1	0.062	9,800	56	9,200	54
EMSBHE0062-6.2-ATH		6.2					
EMSBHE0063-3.15-ATH	0.63	3.15	0.063	9,600	56	9,100	53
EMSBHE0063-6.3-ATH		6.3					
EMSBHE0064-3.2-ATH	0.64	3.2	0.064	9,500	55	9,000	52
EMSBHE0064-6.4-ATH		6.4					
EMSBHE0065-3.25-ATH	0.65	3.25	0.065	9,800	57	9,300	54
EMSBHE0065-6.5-ATH		6.5					
EMSBHE0065-13-ATH		13					
EMSBHE0065-19.5-ATH		19.5					
EMSBHE0066-3.3-ATH	0.66	3.3	0.066	9,700	57	9,200	53
EMSBHE0066-6.6-ATH		6.6					
EMSBHE0067-3.35-ATH	0.67	3.35	0.067	10,000	60	9,000	52
EMSBHE0067-6.7-ATH		6.7					
EMSBHE0069-3.45-ATH	0.69	3.45	0.069	9,700	58	8,800	51
EMSBHE0069-6.9-ATH		6.9					
EMSBHE0070-3.5-ATH	0.7	3.5	0.07	9,600	59	9,100	54
EMSBHE0070-7-ATH		7					
EMSBHE0070-14-ATH		14					
EMSBHE0070-21-ATH		21					
EMSBHE0071-3.55-ATH	0.71	3.55	0.071	9,400	57	9,000	54
EMSBHE0071-7.1-ATH		7.1					
EMSBHE0072-3.6-ATH	0.72	3.6	0.072	9,300	57	8,800	53
EMSBHE0072-7.2-ATH		7.2					
EMSBHE0073-3.65-ATH	0.73	3.65	0.073	9,200	57	8,700	52
EMSBHE0073-7.3-ATH		7.3					

Item code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Pre-hardened steels (35～45HRC)		Hardened steels (45～65HRC)	
				Revolution *n* min^{-1}	Feed rate *Vf* mm/min	Revolution *n* min^{-1}	Feed rate *Vf* mm/min
EMSBHE0075-3.75-ATH	0.75	3.75	0.075	9,400	58	8,900	54
EMSBHE0075-7.5-ATH		7.5					
EMSBHE0075-15-ATH		15					
EMSBHE0075-22.5-ATH		22.5					
EMSBHE0076-3.8-ATH	0.76	3.8	0.076	9,200	57	8,800	54
EMSBHE0076-7.6-ATH		7.6					
EMSBHE0077-3.85-ATH	0.77	3.85	0.077	9,100	56	8,700	54
EMSBHE0077-7.7-ATH		7.7					
EMSBHE0078-3.9-ATH	0.78	3.9	0.078	9,400	58	9,000	56
EMSBHE0078-7.8-ATH		7.8					
EMSBHE0079-3.95-ATH	0.79	3.95	0.079	9,300	57	8,900	55
EMSBHE0079-7.9-ATH		7.9					
EMSBHE0080-4-ATH	0.8	4	0.08	9,260	57	8,760	55
EMSBHE0080-8-ATH		8					
EMSBHE0080-16-ATH		16					
EMSBHE0080-24-ATH		24					
EMSBHE0081-4.05-ATH	0.81	4.05	0.081	9,400	59	9,000	57
EMSBHE0081-8.1-ATH		8.1					
EMSBHE0082-4.1-ATH	0.82	4.1	0.082	9,300	58	8,900	56
EMSBHE0082-8.2-ATH		8.2					
EMSBHE0083-4.15-ATH	0.83	4.15	0.083	9,200	58	8,800	56
EMSBHE0083-8.3-ATH		8.3					
EMSBHE0085-4.25-ATH	0.85	4.25	0.085	9,100	58	8,600	55
EMSBHE0085-8.5-ATH		8.5					
EMSBHE0085-17-ATH		17					
EMSBHE0085-25.5-ATH		25.5					
EMSBHE0086-4.3-ATH	0.86	4.3	0.086	8,900	58	8,900	56
EMSBHE0086-8.6-ATH		8.6					
EMSBHE0087-4.35-ATH	0.87	4.35	0.087	8,800	57	8,800	57
EMSBHE0087-8.7-ATH		8.7					
EMSBHE0088-4.4-ATH	0.88	4.4	0.088	9,000	60	8,700	56
EMSBHE0088-8.8-ATH		8.8					
EMSBHE0089-4.45-ATH	0.89	4.45	0.089	8,900	59	8,600	56
EMSBHE0089-8.9-ATH		8.9					
EMSBHE0090-4.5-ATH	0.9	4.5	0.09	9,000	60	8,500	56
EMSBHE0090-9-ATH		9					
EMSBHE0090-18-ATH		18					
EMSBHE0090-27-ATH		27					
EMSBHE0091-4.55-ATH	0.91	4.55	0.091	8,700	59	8,400	56
EMSBHE0091-9.1-ATH		9.1					
EMSBHE0092-4.6-ATH	0.92	4.6	0.092	8,700	60	8,300	56
EMSBHE0092-9.2-ATH		9.2					
EMSBHE0094-4.7-ATH	0.94	4.7	0.094	8,800	61	8,100	56
EMSBHE0094-9.4-ATH		9.4					

【Note】 Upon usage, please refer to comments below table on page P.18

Recommended Cutting Conditions

Epoch Micro Step Borer S Evolution EMSBHE-ATH

Item code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Pre-hardened steels (35～45HRC) Revolution n min^{-1}	Pre-hardened steels (35～45HRC) Feed rate v_f mm/min	Hardened steels (45～65HRC) Revolution n min^{-1}	Hardened steels (45～65HRC) Feed rate v_f mm/min
EMSBHE0095-4.75-ATH	0.95	4.75	0.095	8,700	62	8,000	55
EMSBHE0095-9.5-ATH		9.5					
EMSBHE0095-19-ATH		19					
EMSBHE0095-28.5-ATH		28.5					
EMSBHE0096-4.8-ATH	0.96	4.8	0.096	8,600	61	8,000	55
EMSBHE0096-9.6-ATH		9.6					
EMSBHE0097-4.85-ATH	0.97	4.85	0.097	8,500	61	7,900	55
EMSBHE0097-9.7-ATH		9.7					
EMSBHE0100-5-ATH	1	5	0.1	8,500	63	8,000	56
EMSBHE0100-10-ATH		10					
EMSBHE0100-20-ATH		20					
EMSBHE0100-30-ATH		30					
EMSBHE0110-5.5-ATH	1.1	5.5	0.11	7,800	63	5,800	44
EMSBHE0110-11-ATH		11					
EMSBHE0110-22-ATH		22					
EMSBHE0110-33-ATH		33					
EMSBHE0120-6-ATH	1.2	6	0.12	7,200	62	5,300	44
EMSBHE0120-12-ATH		12					
EMSBHE0120-24-ATH		24					
EMSBHE0120-36-ATH		36					
EMSBHE0130-6.5-ATH	1.3	6.5	0.13	6,600	61	4,900	43
EMSBHE0130-13-ATH		13					
EMSBHE0130-26-ATH		26					
EMSBHE0130-39-ATH		39					
EMSBHE0131-6.55-ATH	1.31	6.55	0.131	6,600	61	4,900	43
EMSBHE0131-13.1-ATH		13.1					
EMSBHE0132-6.6-ATH	1.32	6.6	0.132	6,500	61	4,800	43
EMSBHE0132-13.2-ATH		13.2					
EMSBHE0135-6.75-ATH	1.35	6.75	0.135	6,400	61	4,700	43
EMSBHE0135-13.5-ATH		13.5					
EMSBHE0136-6.8-ATH	1.36	6.8	0.136	6,300	61	4,700	43
EMSBHE0136-13.6-ATH		13.6					
EMSBHE0137-6.85-ATH	1.37	6.85	0.137	6,300	61	4,600	43
EMSBHE0137-13.7-ATH		13.7					

Item code	Tool dia. (mm)	Under neck length (mm)	Step feed (mm)	Pre-hardened steels (35～45HRC) Revolution n min^{-1}	Pre-hardened steels (35～45HRC) Feed rate v_f mm/min	Hardened steels (45～65HRC) Revolution n min^{-1}	Hardened steels (45～65HRC) Feed rate v_f mm/min
EMSBHE0140-7-ATH	1.4	7	0.14	6,100	60	4,600	43
EMSBHE0140-14-ATH		14					
EMSBHE0140-28-ATH		28					
EMSBHE0140-42-ATH		42					
EMSBHE0145-7.25-ATH	1.45	7.25	0.145	5,900	60	4,400	43
EMSBHE0145-14.5-ATH		14.5					
EMSBHE0145-29-ATH		29					
EMSBHE0145-43.5-ATH		43.5					
EMSBHE0150-7.5-ATH	1.5	7.5	0.15	5,750	60	4,250	43
EMSBHE0150-15-ATH		15					
EMSBHE0150-30-ATH		30					
EMSBHE0150-45-ATH		45					
EMSBHE0160-8-ATH	1.6	8	0.16	5,400	58	4,000	43
EMSBHE0160-16-ATH		16					
EMSBHE0160-32-ATH		32					
EMSBHE0160-48-ATH		48					
EMSBHE0170-8.5-ATH	1.7	8.5	0.17	5,300	58	3,800	43
EMSBHE0170-17-ATH		17					
EMSBHE0170-34-ATH		34					
EMSBHE0170-51-ATH		51					
EMSBHE0180-9-ATH	1.8	9	0.18	5,100	58	3,500	43
EMSBHE0180-18-ATH		18					
EMSBHE0180-36-ATH		36					
EMSBHE0180-54-ATH		54					
EMSBHE0190-9.5-ATH	1.9	9.5	0.19	5,000	59	3,400	43
EMSBHE0190-19-ATH		19					
EMSBHE0190-38-ATH		38					
EMSBHE0190-57-ATH		57					
EMSBHE0195-9.75-ATH	1.95	9.75	0.195	4,900	58	3,300	43
EMSBHE0195-19.5-ATH		19.5					
EMSBHE0195-39-ATH		39					
EMSBHE0195-58.5-ATH		58.5					
EMSBHE0200-10-ATH	2	10	0.2	5,000	60	3,190	43
EMSBHE0200-20-ATH		20					
EMSBHE0200-40-ATH		40					
EMSBHE0200-60-ATH		60					

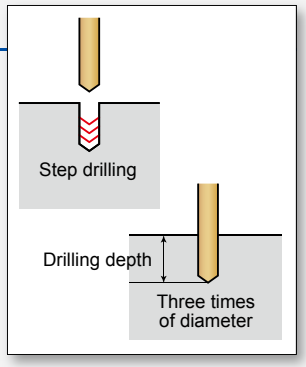
- This standard cutting condition table is intended for reference use. For actual drilling, adjust cutting conditions to suit the machined profile, purpose, machine tool used, etc.
- Use the 5D type for pilot hole drilling.
- Always use the G83 program (peck drilling cycle).
- Under-neck length ($\ell 2$) conforms to through-hole drilling depth.
- When drilling through holes, drill from the tip of the tool to a depth of 20% to 30% of the diameter.
  Example: For work thickness T=4mm and tool: ϕ0.5 × 5 mm under neck length
  Hole depth should be 4.14 mm (from tip of tool).
- Use water-based or oil-based coolant to ensure sufficient chip removal.
- For diameters less than 0.3 mm, we recommend use in a high-precision machining environment.

【Note】 Please read "Drilling methods and precautions" on the page 19 before use.

Drilling method and precautions

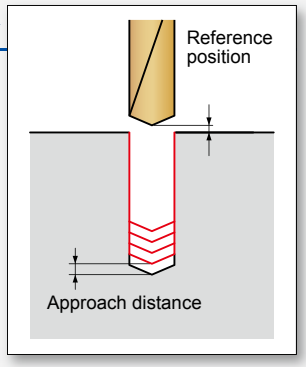
<Pilot hole details>

Use a 5D type of the same diameter.
Drilling depth: 3～5 × diameter



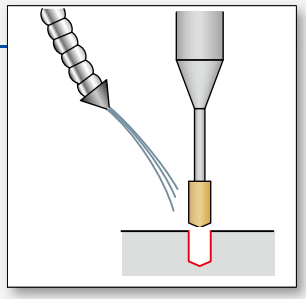
<Machining program details>

Always use G83 (peck drilling cycle) for machining.
Recommended reference position: 0.05 to 0.1 mm
If exceeding 50D, set the reference position at 30% of the diameter below the workpiece surface.
(Example: ϕ1 × neck length 100 mm → reference position = -0.3 mm)
Recommended approach distance: 0.05 mm
*Adjust in the machine parameter settings screen. Larger values may increase machining time.



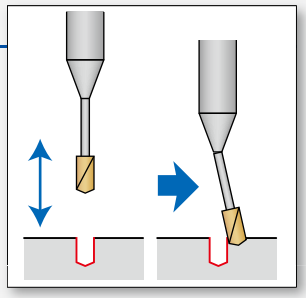
<Coolant details>

We recommend using an oil-based or water-basedcoolant.
Ensure the coolant contacts the cutting edge.



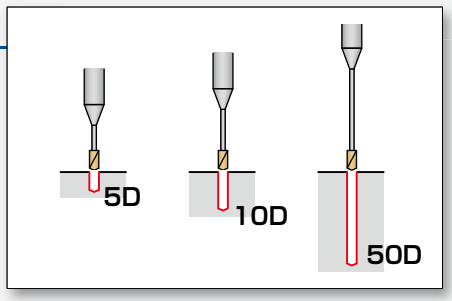
<Rapid traverse rate details>

If the neck length is too long, an excessive rapid traverse rate may cause tool breakage.
Recommended: 20 m/min or less
(For 30D: 5 m/min or less)



< When machining to a depth of L/D=30 or greater>

Breakage can be reduced by adding a 10D process after machining the pilot holes.
If the length exceeds 50D, be sure to add a 10D process before machining.



Troubleshooting

Phenomenons	Factors	Actions
Breakage	Problems with chip removal	Check the coolant pressure. Ensure to feed coolant to the cutting edge.
	Occurrence of tool runout	・Change the reference position to between 0.2 and 0.5 mm. ・Change the rapid traverse rate to 2 m/min or less. This is to minimize the effects of vibration during rapid traverse. The issue is particularly noticeable on machining centers equivalent to BT40 and BT50.
Inconsistent tool life	Occurrence of tool runout	Ensure to attach tool with runout accuracy of 0.005 mm or less when chucking. Use clean, undamaged holders and collets to improve tool runout accuracy.
	Feed rate cannot keep up during stepping	In an environment where the actual feed rate is not increasing, wear due to friction can be suppressed by lowering the rotation speed.

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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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