

Micro step drill for hardened steel

EMSBH-ATH

Epoch Micro Step Borer Hard-ATH



Micro step borer for small-diameter deep drilling of high-hardened steels.

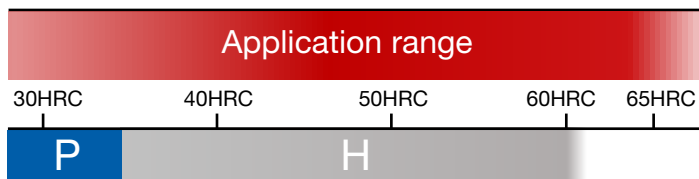
Features of EMSBH-ATH

- 01** Special flute design for high-hardened steels
- 02** Chip-removal stopper
- 03** ATH coating

Line-up: 36 items
DC: 0,1 - 2 mm



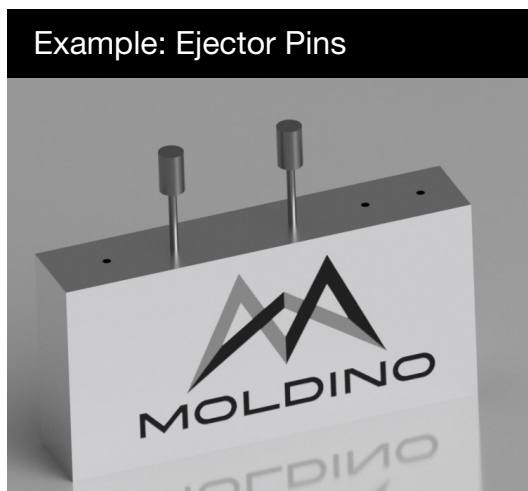
Recommended usage



Applications

Customer need and product benefit

Small-diameter deep drilling in high-hardened steels.



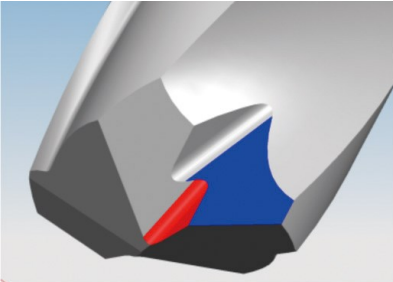
Challenge

Lack of availability and process safety of small-diameter drills for high-hardened steels. Expensive and slow EDM processes.

Solution

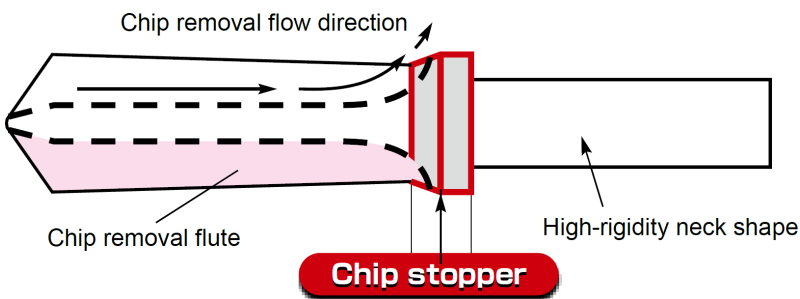
Stable micro step drilling process of steels up to 60HRC with EMSBH-ATH.

Feature 01 Special flute design for high-hardened steels



Special flute design for high-hardened steels enables process reliable drilling and chip flow.

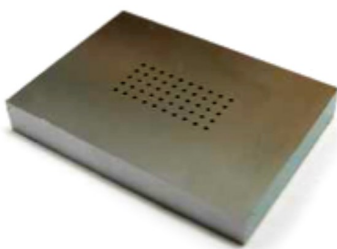
Feature 02 Chip-removal stopper



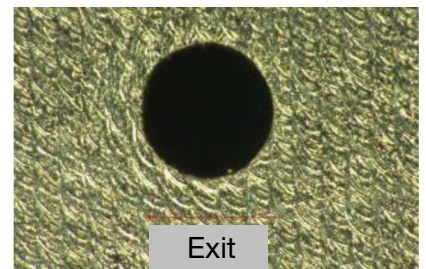
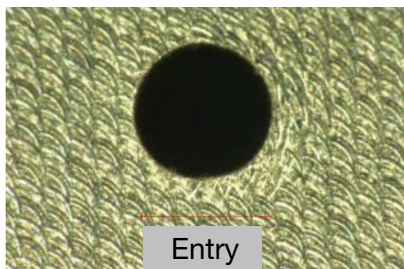
Chip-removal stopper technology and high-rigidity neck shape enables high-accuracy drilling of minute holes.

Feature 03 ATH coating

Material: SUS440CH (60HRC)



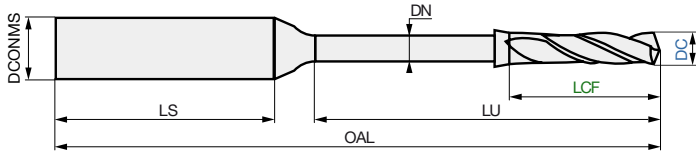
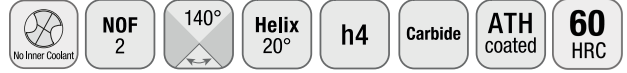
Hole condition after 50th drilling process



Possible drilling of up to 50 holes of LU/DC=10 on 60HRC material!

ID Code	Item code	DC	LU	RPM min ⁻¹	Vc m/min	Vf mm/min	f mm/rev	Step mm	Coolant
CD1062	EMSBH-0050-5-ATH	0.5	5	10.000	15	50	0.005	0.05	External Water

EMS BH-ATH Lineup and dimensions



Diameter Tolerance (mm)	
+0.001 / +0.006 mm	

ID Code	Item code	Stock	Size (mm)						
			DC	LCF	LU	DN	LS	OAL	DCONMS
CD1050	EMS BH-0010-1-ATH	•	0.1	0.52	1.02	0.09	37.2	45.02	3
CD1051	EMS BH-0010-2-ATH	•	0.1	0.52	2.02	0.09	36.2	45.02	3
CD1052	EMS BH-0010-3-ATH	•	0.1	0.52	3.02	0.09	35.2	45.02	3
CD1053	EMS BH-0020-2-ATH	•	0.2	1.04	2.04	0.19	36.4	45.04	3
CD1054	EMS BH-0020-4-ATH	•	0.2	1.04	4.04	0.19	34.4	45.04	3
CD1055	EMS BH-0020-6-ATH	•	0.2	1.04	6.04	0.19	32.4	45.04	3
CD1056	EMS BH-0030-3-ATH	•	0.3	1.55	3.05	0.28	35.7	45.05	3
CD1057	EMS BH-0030-6-ATH	•	0.3	1.55	6.05	0.28	32.7	45.05	3
CD1058	EMS BH-0030-9-ATH	•	0.3	1.55	9.05	0.28	29.7	45.05	3
CD1059	EMS BH-0040-4-ATH	•	0.4	2.07	4.07	0.38	39.9	50.07	3
CD1060	EMS BH-0040-8-ATH	•	0.4	2.07	8.07	0.38	35.9	50.07	3
CD1061	EMS BH-0040-12-ATH	•	0.4	2.07	12.07	0.38	31.9	50.07	3
CD1062	EMS BH-0050-5-ATH	•	0.5	2.59	5.09	0.48	39.1	50.09	3
CD1063	EMS BH-0050-10-ATH	•	0.5	2.59	10.09	0.48	34.1	50.09	3
CD1064	EMS BH-0050-15-ATH	•	0.5	2.59	15.09	0.48	29.1	50.09	3
CD1065	EMS BH-0060-6-ATH	•	0.6	3.11	6.11	0.57	43.3	55.11	3
CD1066	EMS BH-0060-12-ATH	•	0.6	3.11	12.11	0.57	37.3	55.11	3
CD1067	EMS BH-0060-18-ATH	•	0.6	3.11	18.11	0.57	31.3	55.11	3
CD1068	EMS BH-0070-7-ATH	•	0.7	3.63	7.13	0.67	45.2	60.13	4
CD1069	EMS BH-0070-14-ATH	•	0.7	3.63	14.13	0.67	38.2	60.13	4
CD1070	EMS BH-0070-21-ATH	•	0.7	3.63	21.13	0.67	31.2	60.13	4
CD1071	EMS BH-0080-8-ATH	•	0.8	4.15	8.15	0.76	44.4	60.15	4
CD1072	EMS BH-0080-16-ATH	•	0.8	4.15	16.15	0.76	36.4	60.15	4
CD1073	EMS BH-0080-24-ATH	•	0.8	4.15	24.15	0.76	28.4	60.15	4
CD1074	EMS BH-0090-9-ATH	•	0.9	4.66	9.16	0.85	48.6	65.16	4
CD1075	EMS BH-0090-18-ATH	•	0.9	4.66	18.16	0.85	39.6	65.16	4
CD1076	EMS BH-0090-27-ATH	•	0.9	4.66	27.16	0.85	30.6	65.16	4
CD1077	EMS BH-0100-10-ATH	•	1.0	5.18	10.18	0.95	52.9	70.18	4
CD1078	EMS BH-0100-20-ATH	•	1.0	5.18	20.18	0.95	42.9	70.18	4
CD1079	EMS BH-0100-30-ATH	•	1.0	5.18	30.18	0.95	32.9	70.18	4
CD1080	EMS BH-0150-15-ATH	•	1.5	15.27	15.27	-	49.2	70.27	4
CD1081	EMS BH-0150-30-ATH	•	1.5	15.27	30.27	1.44	34.0	70.27	4
CD1082	EMS BH-0150-45-ATH	•	1.5	15.27	45.27	1.44	49.0	100.27	4
CD1083	EMS BH-0200-20-ATH	•	2.0	20.36	20.36	-	45.3	70.36	4
CD1084	EMS BH-0200-40-ATH	•	2.0	20.36	40.36	1.92	55.2	100.36	4
CD1085	EMS BH-0200-60-ATH	•	2.0	20.36	60.36	1.92	35.2	100.36	4



Diameter of EMS BH-ATH has a positive tolerance in order to compensate hole shrink after boring, and keep clearance for ejector pins in die applications.

EMSBH-ATH Usage instruction

Setting of cutting conditions

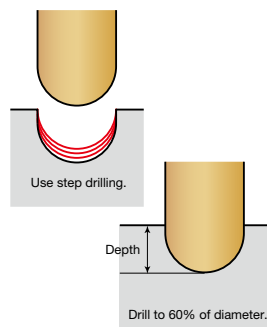


- Please use EPDBEH-TH3 as a starter for DC=0.1 mm.
- Always perform step drilling using G83 mode (peck drilling cycle).
- Usable length (LU) conforms to through-hole drilling depth.
- When drilling holes, always add 30% of tool diameter to drilling depth (compared to nominal depth of through hole).
 Ex.: For work thickness T=5mm and tool = DC 0.5x5mm, drilling depth should be 5.15mm (from tip of tool).
- Water-soluble or oil-based coolant should be used to ensure chip removal.

Drilling process and attentions on drilling

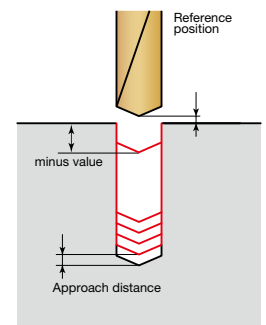
About starter

- Use of EPDBEH as starter is recommended.
- Perform step drilling for DC0.1 using a G83 program.
- In case of DC>0.1 please use helical (0.5°) milling to create starter hole.
- Be sure to machine starter hole to a depth of 60% of tool diameter.



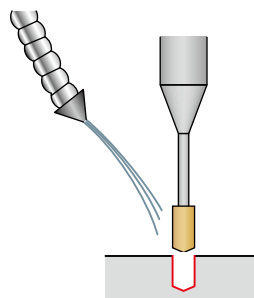
About machining programs

- Always perform drilling using a G83 program (peck drilling cycle).
- Recommended reference position: 0.05 to 0.1mm.
- To remove chips during drilling, retract EMSBH repeatedly but stay inside the boring hole (minus value).
- Minus value = tip length + 0.2*DC
- Recommended approach distance: 0.05mm.



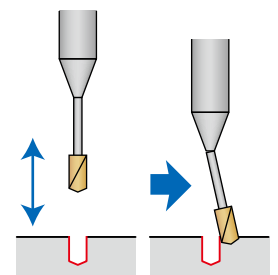
About coolants

- Oil-based or water-soluble coolants are recommended.
- When using, set it up so that the coolant hits the flute tip.



About fast feed rates

- When the underneck length is long, if the fast feed rate is too fast, bit may be broken.
- Recommended: 20m/min. or less.
- For >30D, 5m/min. or less.



EMSBH-ATH Production50® application example

○ Merits of drilling hardened steel (ejector pin drilling of SUS420J2 / 1.4028 | 52 HRC)

EDM process

Fine hole EDM

Heat treatment

Finish by wire EDM

EMSBH process

Micro step drilling of hardened steel



Process to be 1/3. By stock hardened blanks, delivery time can be reduced.

○ Comparison of process costs (Production50® approach)

		EDM process	EMSBH process
		D0.3*150mm copper pile electrode wire	EMSBH-0050-15-ATH
Tool cost	€/pcs.	2,00 €	205,10 €
Tool life	hole/pcs.	6	300
Holes per month	hole/month	300	300
Tools per month	pcs/month	50	1
Processing time per hole	min/hole	10	2,5
Processing time per month	min/month	3.000	750
Tool cost per month	€/month	100,00 €	205,10 €
Tool replacement time	min/pcs.	1	1
Machine cost	€/h	50	50
Processing cost per month	€/month	2.641,67 €	830,93 €

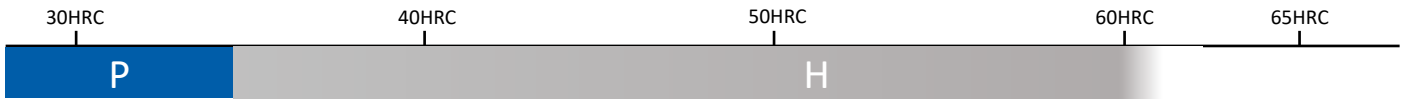


Hole depth is 11mm.
Cost of processing are reduced by about 69% compared to EDM processing!

ID Code	Item code	DC	LU	RPM min ⁻¹	Vc m/min	Vf mm/min	f mm/rev	Step mm	Coolant
CD1064	EMSBH-0050-15-ATH	0.5	15	10.000	15	50	0.005	0.05	External Water

EMSBH-ATH General technical information

Application range

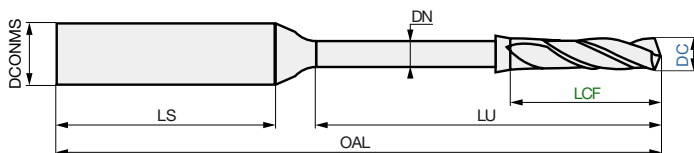


ISO 513 Symbol	Description	Examples
P	Non-alloy steel, low alloy steel, high alloy steel, ferritic/martensitic stainless steel, tool steel	1.2343 / X38CrMoV5-1; 1.2738 / 40CrMnNiMo8; 1.0503 / C45; 1.0570 / ST52-3; 1.1730 / C45W; 1.7131 / 16MnCr5; 1.7225 / 42CrMo4; 1.3343 / HS6-5-2; 1.0511 / C40; 1.2312 / 40CrMnMoS8-6; 1.2311 / 40CrMnMo7; 1.2344 / X40CrMoV5-1; 1.2767 / X45NiCrMo4; 1.2083 / X42Cr13; 1.2085 / X33CrS16; 1.2714 / 55NiCrMoV7; 1.2842 / 90MnCrV8;
M	Austenitic stainless steel	1.4301 / X5CrNi18-9; 1.4401 / X5CrNiMo17-12-2; 1.4404 / X2CrNiMo17-13-2; 1.4828 / X15CrNiSi20 12
K	Grey cast iron (GG), nodular cast iron (GGG), malleable cast iron	0.6025 / GG-25; GGG-40.3; 0.8155 / GTS-55-04
N	Aluminum wrought all, copper alloy, aluminum-cast, alloyed, non-metallic	2.0060 / E-Cu57; 2.0321 / CuZn37; 3.0255 / Al99.5; 3.5103 / MgSE3Zn27r1
S	High temperature alloys, titanium and Ti alloys	1.4864 / X12NiCrSi36 16; 2.4856 / NiCr22Mo9Nb; 1.4977 / X40CoCrNi20 20; 2.4669 / NiCr15Fe7TiAl
H	Hardened steel, chilled cast iron, cast iron	

Recommended: **P** **M** **K** **N** **S** **H**

Suitable: **P** **M** **K** **N** **S** **H**

NOT recommended: **P** **M** **K** **N** **S** **H**



Drawing nomenclature	
DC	Diameter Cutting
DCONMS	Connection Diameter Machine Side
DN	Neck Diameter
LCF	Cutting Edge Length
LU	Length Usage
LS	Length Shank
OAL	Overall Length

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) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) 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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The diagrams and table data are examples of test results and are not guaranteed values.

For more details please check our digital tool database



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