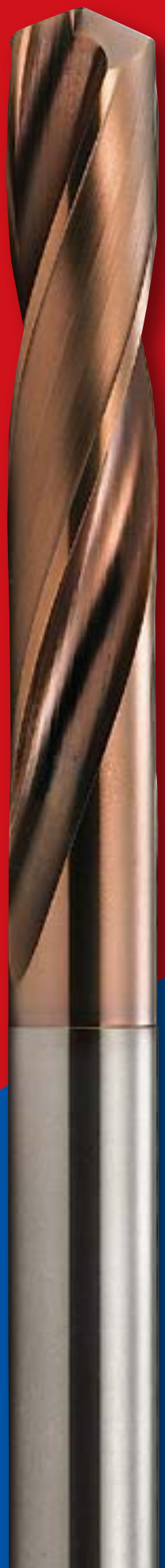
MOLDINO
The Edge To Innovation



Carbide Drill for Hardened Steel

EHSE-TH

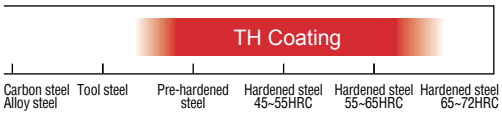
Epoch TH Hard Drill

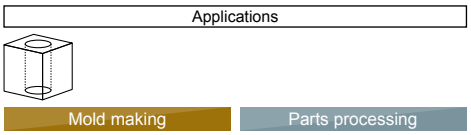
Mitsubishi Hitachi Tool Engineering, Ltd.

New Product News | No.405E-4 | 2017-7

TH coating and 4 guides with double margins make it last even longer.

EDM, which is generally used for drilling hardend steel, has been the biggest impediment to reduction of maching cost. The Epoch TH Hard Drill for hardend steel was developed to solve this problem.





EHSE-TH

ϕ2～ϕ16.1 [80 Items]

Features 01 Features for Epoch TH Hard Drill

01 TH coating has greatly improved surface hardness and heat resistance, resulting in machining efficiency and a longer life for the tool.

02 Your problems can be solved by micro grain carbide with toughness and wear resistance.

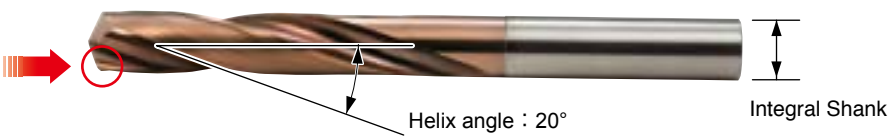
03 Four guides with double margins and a thick web enable stable drilling without run out the drill tip.

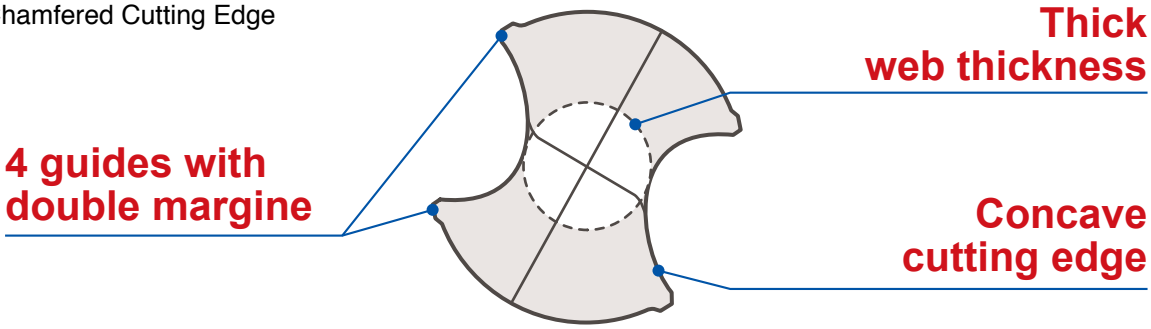
04 The 20° helix angle and concave cutting edge can constantly remove small chips.

05 Chamfered cutting edge can moderate stress concentration at blind holes and corners of hole bottoms.

Shape

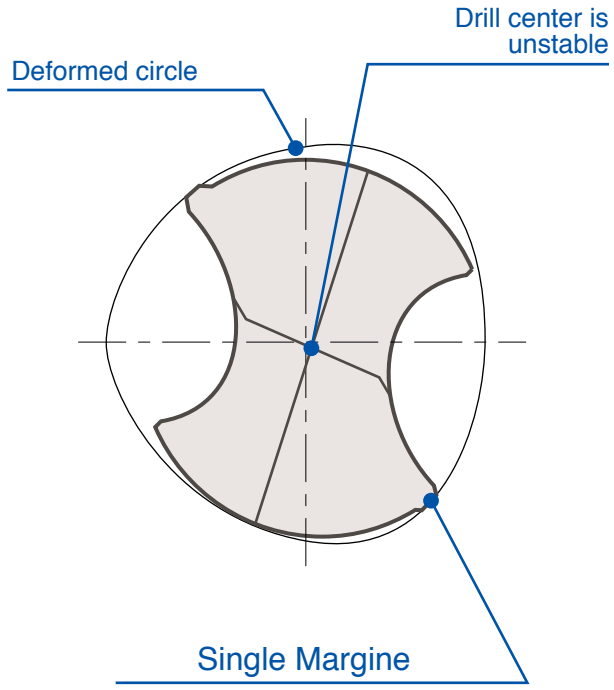
Chamfered Cutting Edge





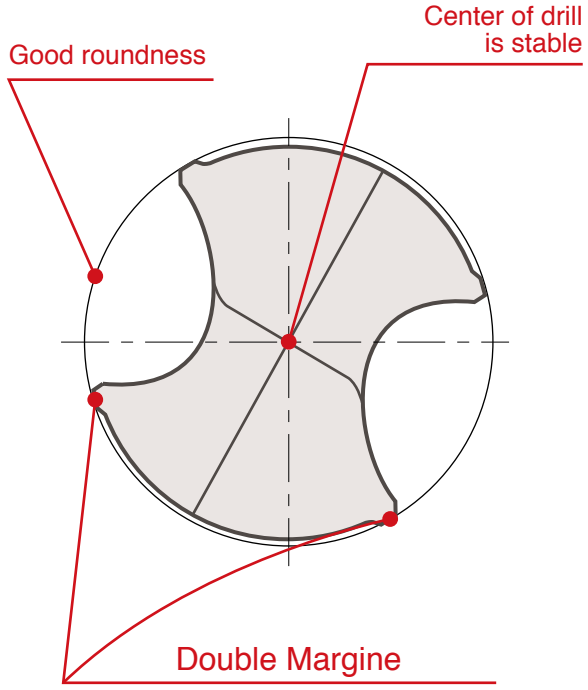
Features 02 Condition of cutting edge in cutting

Two guides with single margine



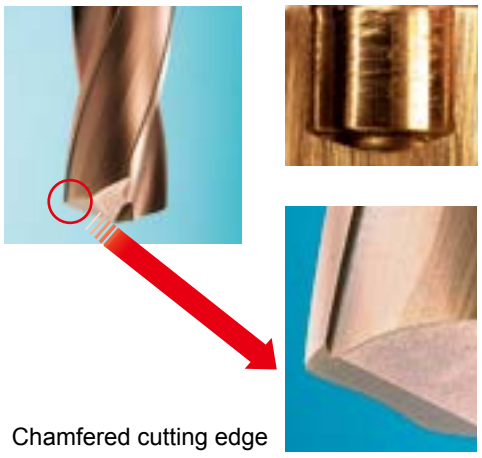
High cutting resistance causes cutting edge deflection, resulting in deformed holes, cutting edge wear or chipping of the edge.

Four guides with double margins



Four guides with double margins decrease cutting resistance and prevent cutting edge deflection and chipping of the edge.

Effect of Chamfered cutting edge



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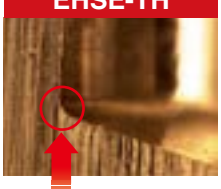


Confered cutting edge at corner moderates concentration of stress.

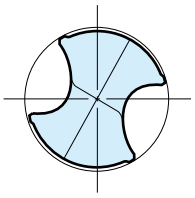
Prevents cracks in dies and improves tool life.

General drill

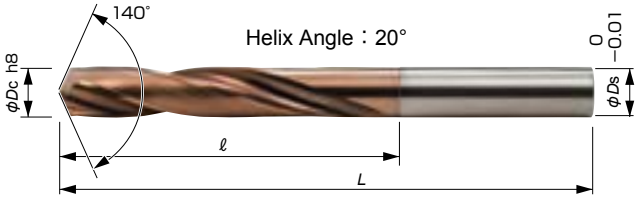
Stress is concentrated at corner of cutting edge.

Causes trouble such as cracks in dies.

Line Up



Plane, S-X thinning



EHSE○○.○-TH

Item Code	Stock	Size (mm)			
		Tool Dia. *Dc*	Flute Length *ℓ*	Overall Length *L*	Shank Dia. *Ds*
EHSE2.0-TH	●	2.0	15	50	3
EHSE2.1-TH	●	2.1	15	50	3
EHSE2.2-TH	●	2.2	16	50	3
EHSE2.3-TH	●	2.3	16	50	3
EHSE2.4-TH	●	2.4	17	50	3
EHSE2.5-TH	●	2.5	17	55	3
EHSE2.6-TH	●	2.6	17	55	3
EHSE2.7-TH	●	2.7	19	55	3
EHSE2.8-TH	●	2.8	19	55	3
EHSE2.9-TH	●	2.9	19	55	3
EHSE3.0-TH	●	3.0	21	60	3
EHSE3.1-TH	●	3.1	24	60	4
EHSE3.2-TH	●	3.2	24	60	4
EHSE3.3-TH	●	3.3	24	60	4
EHSE3.4-TH	●	3.4	24	60	4
EHSE3.5-TH	●	3.5	24	60	4
EHSE3.6-TH	●	3.6	27	60	4
EHSE3.7-TH	●	3.7	27	60	4
EHSE3.8-TH	●	3.8	27	60	4
EHSE3.9-TH	●	3.9	27	60	4
EHSE4.0-TH	●	4.0	27	60	4
EHSE4.1-TH	●	4.1	29	63	5
EHSE4.2-TH	●	4.2	29	63	5
EHSE4.3-TH	●	4.3	29	63	5
EHSE4.4-TH	●	4.4	29	63	5
EHSE4.5-TH	●	4.5	29	63	5
EHSE4.6-TH	●	4.6	32	68	5
EHSE4.7-TH	●	4.7	32	68	5
EHSE4.8-TH	●	4.8	32	68	5
EHSE4.9-TH	●	4.9	32	68	5
EHSE5.0-TH	●	5.0	32	68	5
EHSE5.1-TH	●	5.1	34	72	6
EHSE5.2-TH	●	5.2	34	72	6
EHSE5.3-TH	●	5.3	34	72	6
EHSE5.4-TH	●	5.4	34	72	6
EHSE5.5-TH	●	5.5	34	72	6
EHSE5.6-TH	●	5.6	36	74	6
EHSE5.7-TH	●	5.7	36	74	6
EHSE5.8-TH	●	5.8	36	74	6
EHSE5.9-TH	●	5.9	36	74	6

Item Code	Stock	Size (mm)			
		Tool Dia. *Dc*	Flute Length *ℓ*	Overall Length *L*	Shank Dia. *Ds*
EHSE6.0-TH	●	6.0	41	81	6
EHSE6.5-TH	●	6.5	41	81	7
EHSE6.8-TH	●	6.8	43	83	7
EHSE6.9-TH	●	6.9	43	83	7
EHSE7.0-TH	●	7.0	43	83	7
EHSE7.5-TH	●	7.5	45	87	8
EHSE7.8-TH	●	7.8	48	90	8
EHSE8.0-TH	●	8.0	48	90	8
EHSE8.5-TH	●	8.5	53	96	9
EHSE8.6-TH	●	8.6	55	98	9
EHSE8.7-TH	●	8.7	55	98	9
EHSE8.8-TH	●	8.8	55	98	9
EHSE9.0-TH	●	9.0	55	98	9
EHSE9.5-TH	●	9.5	58	102	10
EHSE9.8-TH	●	9.8	60	105	10
EHSE10.0-TH	●	10.0	60	105	10
EHSE10.3-TH	●	10.3	66	112	11
EHSE10.4-TH	●	10.4	66	112	11
EHSE10.5-TH	●	10.5	66	112	11
EHSE10.8-TH	●	10.8	68	114	11
EHSE11.0-TH	●	11.0	68	114	11
EHSE11.5-TH	●	11.5	71	118	12
EHSE11.8-TH	●	11.8	73	121	12
EHSE12.0-TH	●	12.0	73	121	12
EHSE12.1-TH	●	12.1	76	135	13
EHSE12.2-TH	●	12.2	76	135	13
EHSE12.5-TH	●	12.5	76	135	13
EHSE12.6-TH	●	12.6	78	137	13
EHSE13.0-TH	●	13.0	78	137	13
EHSE13.5-TH		13.5	84	144	14
EHSE14.0-TH		14.0	86	147	14
EHSE14.1-TH	●	14.1	89	151	15
EHSE14.2-TH		14.2	89	151	15
EHSE14.5-TH		14.5	89	151	15
EHSE14.6-TH	●	14.6	91	153	15
EHSE15.0-TH		15.0	91	153	15
EHSE15.5-TH		15.5	94	157	16
EHSE15.6-TH	●	15.6	96	160	16
EHSE16.0-TH		16.0	96	160	16
EHSE16.1-TH	●	16.1	102	167	17

● : Stocked Items. No mark : Manufactured upon request only

Recommended Cutting Conditions, Re-grinding

Recommended Cutting Conditions for Wet (Dilution of less than 20times)

Work material (Hardness)	Cutting speed m/min	Cutting Conditions	Tool Dia. (mm)							
			Φ2	Φ4	Φ6	Φ8	Φ10	Φ12	Φ14	Φ16
Hot working Tool Steel SKD61 SKT (50～55HRC)	15～20～30	Revolution Speed (min-1)	3,180	1,600	1,050	800	640	530	450	400
		Feed Rate (mm/min)	64	64	64	64	64	64	64	64
		Feed per Rev (mm/rev)	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16
Cold working Tool Steel SKD11 SKT (55～60HRC)	10～15～20	Revolution Speed (min-1)	2,390	1,200	800	600	480	400	340	300
		Feed Rate (mm/min)	48	48	48	48	43	40	37	36
		Feed per Rev (mm/rev)	0.02	0.04	0.06	0.08	0.09	0.10	0.11	0.12
High Speed Steel SKH (60～65HRC)	8～10～12	Revolution Speed (min-1)	1,590	800	530	400	320	270	230	200
		Feed Rate (mm/min)	20	20	20	20	20	20	20	20
		Feed per Rev (mm/rev)	0.012	0.025	0.04	0.05	0.06	0.07	0.08	0.1

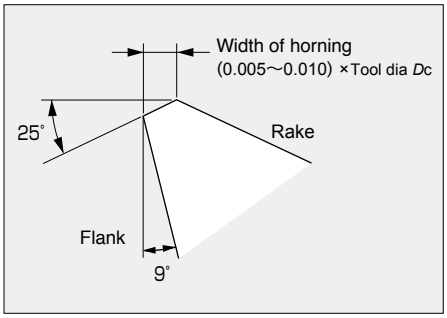
【Note】
1. The above conditions apply to a hole-depth of 3 times the diameter or less.
2. Mount the drill on a collet without any flaws. Adjust the drill run out to 0.02mm or less.
3. Use a machine with high rigidity.
4. Supply a sufficient amount of cutting fluid (Water-soluble, dilution of 20 times or less) to machining points.

Selection of cutting conditions

① The above conditions apply to a hole-depth of 3 times the diameter or less.
② Cutting performance may vary according to the material being cut and its hardness.
③ Mount the drill on a collet without any flaws. Adjust the drill run out to 0.02mm or less.
④ Supply a sufficient amount of cutting fluid (Water-soluble, dilution of 20 times or less) to machining points.
⑤ Sufficient cutting fluid is not supplied in the case of a turning machine or other machine used in a longitudinal direction. Use values of 70% or less of those in the above chart.
⑥ The drill can start drilling with high performance and accuracy. It is not recommended to conduct positioning using a center drill or a starting drill because it may cause chipping
When conducting positioning, set the feeding length to one third of the value above.
⑦ Carbide non step borer is recommended for machining works of a hardness less than 45 HRC.

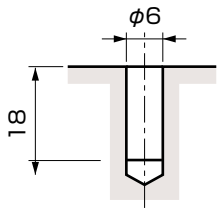
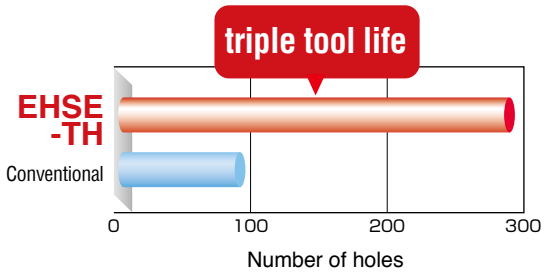
Re-grinding

① Regrind the drill when flank wear becomes Drill Dia.×0.05mm or more or when the chips change from a sheared shape to a streamlined shape.
② Performance may deteriorate to 20 to 40% of the initial performance due to the method of regrinding and Re-Coating.
Without recoating after regrinding, performance may be further reduced and cause chipping orbreakage of the drill.
It is recommended that you ask us to regrind and recoat your drill to maintain its performance.
③ When regrinding yourself, take the greatest care, and finish the cutting edge surface so that its roughness is 1.6Sor less and the lip height difference is 0.02mm or less.

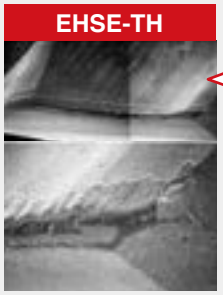


Field data

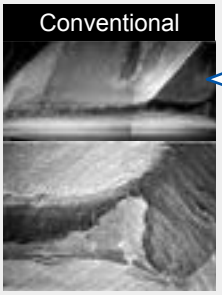
Drilling for Machine parts

Work material	Cutting Conditions	Result
Machine parts SKD61 (52HRC) 	Item Code：EHSE6.0-TH v_c=30m/min n=1,592min^{-1} f=0.12mm/rev v_f=191mm/min Cutting fluid: Water-soluble coolant Machine : M/C	

■ Cutting edge condition after drilling 150 holes

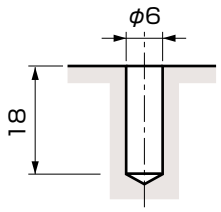
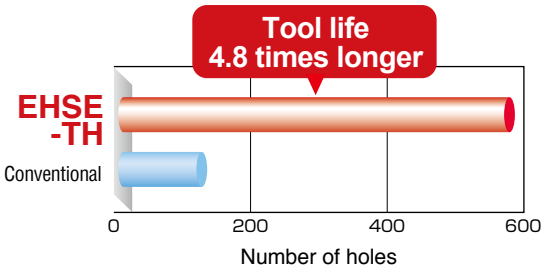


After drilling 150 holes
Normal wear, capable of more drilling



After drilling 96 holes
Worn-out, incapable of more drilling

Drilling for Cold work die steel

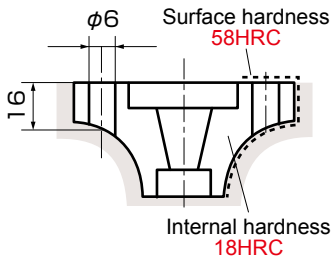
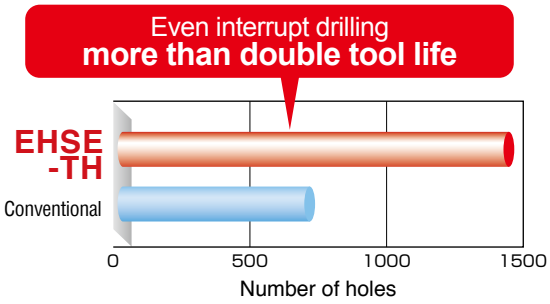
Work material	Cutting Conditions			Result
Cold Work Die Steel SKD11 (60HRC) 	Item Code	Conventional	EHSE-TH	
	v_c (m/min)	15	20	
	n (min^{-1})	796	1,061	
	f (mm/rev)	0.06	0.06	
	v_f (mm/min)	48	64	
	Coolant	Water-solble coolant		
	Machine	M/C		

■ Cutting edge condition after drilling 100 holes

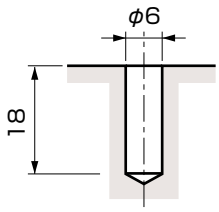
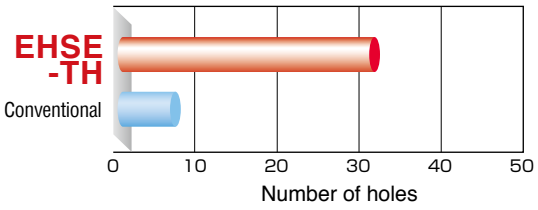
Fine chips

Coarse chips

Drilling for Machine parts（Inducted work material surface hardness）

Work material	Cutting Conditions	Result
Machine parts (Inducted work material surface hardness) 	Item Code：EHSE6.0-TH v_c=60m/min n=3,180min^{-1} f=0.12mm/rev v_f=382mm/min Cutting fluid: Water-soluble coolant Machine : M/C	【Double margine effect】 

Drilling for SKH (65HRC)

Work material	Cutting Conditions	Result
SKH51　65HRC 	Item Code：EHSE6.0-TH v_c=10m/min n=530min^{-1} f=0.04mm/rev v_f=21mm/min Cutting fluid: Water-soluble coolant Machine : M/C	

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

Attentions on Safety

1. Cautions regarding handling

(1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
(2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

2. Cautions regarding mounting

(1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
(2) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Cautions during use

(1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
(2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
(3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
(4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. **Please caution of fire while using oil base coolant, fire prevention is necessary.**
(5) Do not use the tool for any purpose other than that for which it is intended.

4. Cautions regarding regrinding

(1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
(2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
(3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with thelocal laws and regulations regarding prevention of hazards due to specified chemical substances.

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