

Carbide Drilling Tool

NSB series

Non Step Borer series

WHNSB-TH, WNSB-TH, WHMB-TH, NSBH-ATH
FWHNSB-TH, EMSBS, EMSBH-ATH

*40D ~ 50D type for drilling
ultra-deep hole is added to
Carbide Oil Hole Non Step Borer*



MOLDINO Tool Engineering, Ltd.

New Product News No.2103E-7 2024-3

Selection standard table for Carbide NSB & Carbide Drills

Product	Oil hole ○ With oil hole - Without oil hole	Tool dia DC (mm)	Item Code	Drilling depth														
				~2D	~3D	~4D	~5D	~8D	~10D	~15D	~20D	~25D	~30D	~40D	~50D	~100D		
Carbide Oil Hole Non Step Borer	○	2.0~13.0	03WHNSB-TH	3D														
		2.0~13.0	05WHNSB-TH	5D														
		2.0~13.0	08WHNSB-TH	8D														
		2.0~13.0	10WHNSB-TH	10D														
		2.0~13.0	15WHNSB-TH	15D														
		2.0~13.0	20WHNSB-TH	20D														
		2.0~13.0	25WHNSB-TH	25D														
		2.0~12.0	30WHNSB-TH	30D														
		2.5~10.0	40WHNSB-TH	40D														
		2.5~8.0	50WHNSB-TH	50D														
Carbide Non Step Borer	-	3.0~13.0	02WNSB-TH	2D														
		1.0~13.0	04WNSB-TH	4D														
MINIATURE DRILL WHMB	○	1.0~2.03	WHMB-TH	30D														
Carbide Oil Hole Non Step Borer H for High Hardness Material	○	2.0~12.0	NSBH-ATH	25D														
Carbide Oil Hole Non Step Borer for Cast Iron	○	3.0~13.0	03FWHNSB-TH	3D														
		3.0~13.0	05FWHNSB-TH	5D														
		3.0~13.0	10FWHNSB-TH	10D														
		3.0~13.0	15FWHNSB-TH	15D														
		3.0~12.0	20FWHNSB-TH	20D														
		3.0~10.0	30FWHNSB-TH	30D														
Epoch Micro Step Borer S	-	0.04~1.00	EMSBS-TH	100D														
Epoch Micro Step Borer S for Aluminium	-	0.04~1.00	EMSBS-SD	100D														
Epoch Micro Starter	-	0.04~1.01	EMST-TH	0.6D Starter for EMSBS														
Epoch Micro Step Borer H	-	0.1~2.02	EMSBH-ATH	30D														
Epoch Deep Ball Evolution Hard	-	0.1~2.02	EPDBEH-ATH	0.6D Starter for EMSBH														

WHNSB-TH

WNSB-TH


























WHMB-TH

NSBH-ATH

FWHNSB-TH

EMSBS

EMSBH-ATH

	Work material												Shape	Coating	Page		
	P				H			M	S	K		N			Size List	Cutting Conditions	
	Mild steels	Carbon steels	Alloy steels	Hardened steels	Tool steels	Hardened steels		Stainless steels	Ti Alloy, Heat resistant alloy	Cast iron	Ductile cast iron	Aluminum alloy					Copper alloy
SS	S00C	SCM SCr	SKD SKS	~40 HRC	~45 HRC	45 HRC~	SUS	Inconel Ti Alloy	FC	FCD	Al	Cu					
	○	○	○	○	○		○	○	○	○				TH	6	18	
	○	○	○	○	○		○	○	○	○				TH	7	18	
	○	○	○	○	○		○	○	○	○				TH	8	19	
	○	○	○	○	○		○	○	○	○				TH	9	20	
	○	○	○	○	○		○	○	○	○				TH	10	20	
	○	○	○	○	○		○	○	○	○				TH	11	20	
	○	○	○	○	○		○	○	○	○				TH	12	20	
	○	○	○	○	○		○	○	○	○				TH	13	20	
	○	○	○	○	○		○	○	○	○				TH	14	21	
	○	○	○	○	○		○	○	○	○				TH	15	21	
	○	○	○	○	○		○		○	○				TH	16	22	
	○	○	○	○	○		○		○	○				TH	17	22	
	○	○	○	○	○		○				○	○		TH	26	31	
					○	○								ATH	34	40	
									○	○				TH	45	51	
									○	○				TH	46	51	
									○	○				TH	47	51	
									○	○				TH	48	51	
									○	○				TH	49	51	
									○	○				TH	50	51	
	○	○	○	○	○	○	○	○	○	○	○	○		Micro TH	54	57	
											○	○		SD	54	57	
	○	○	○	○	○	○	○	○	○	○	○	○		Micro TH	58	58	
					○	○								ATH	60	63	
					○	○								ATH	65	65	

Carbide Non Step Borer

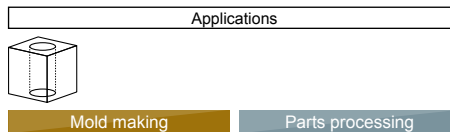
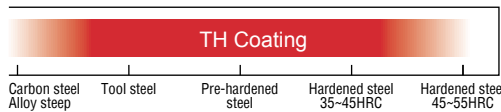
Completely non-step to ultra-deep (L/D=50) holes!!

NSB specially shaped grooves enable quick chip discharge!

Features of WHNSB-TH and WNSB-TH

- 01** Oxidation and abrasion resistant TH Coating.
- 02** NSB specially shaped grooves enable non-step smooth drilling.
- 03** High accuracy shank capable of shrink fitting.
- 04** High-efficiency drilling even for environment friendly MQL machining.

Added manufacturer stock items
Total
1146
items



03~30WHNSB-TH φ2~φ13 [924 Items]
02·04WNSB-TH φ1~φ13 [222 Items]

Features 01 TH Coating improves stability during high-temperature drilling.

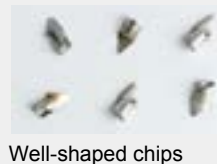
- The new Nano-composite coating material offers extraordinary heat resistance and hardness due to its new composite layer consisting of Nano-crystal material.
- This coating shows extraordinary performance in high speed cutting and high efficient drilling of various work materials from mild steels to hardened steels.

Features 02 Specially shaped grooves removal chips effectively

Torque change on the main spindle

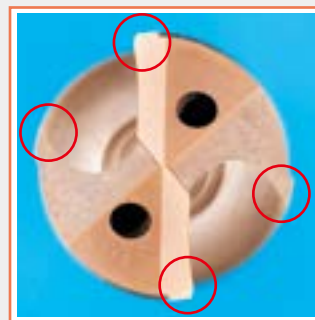
- Tool : 20WHNSB0600-TH
- Cutting conditions : $v_c=100\text{m/min}$
 $f=0.15\text{mm/rev}$ Hole depth=120mm
- Work material : S50C
- Water-soluble coolant, internal oil supply

Carbide Non Step Borer



NSB specially formed groove removal chips effectively.

Features 03 Double margins enable firm guide.



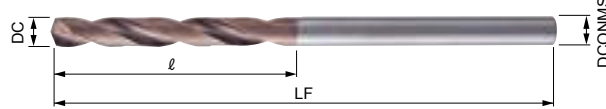
Four guides with double margins

Double margins enable stable drilling even in the last stage of drilling a through hole.

Carbide Oil Hole Non Step Borer (5D)



Plane, S-X thinning



05WHNSB -TH

With oil hole

L/D=5

Cutting condition **18**



0~0.01 (mm)

Item Code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
05WHNSB0200-TH	●	2.0	20	66	3.0
05WHNSB0210-TH	●	2.1	24	74	3.0
05WHNSB0220-TH	●	2.2	24	74	3.0
05WHNSB0230-TH	●	2.3	24	74	3.0
05WHNSB0240-TH	●	2.4	24	74	3.0
05WHNSB0250-TH	●	2.5	24	74	3.0
05WHNSB0260-TH	●	2.6	29	79	3.0
05WHNSB0270-TH	●	2.7	29	79	3.0
05WHNSB0280-TH	●	2.8	29	79	3.0
05WHNSB0290-TH	●	2.9	29	79	3.0
05WHNSB0300-TH	●	3.0	29	79	3.0
05WHNSB0310-TH	●	3.1	37	87	4.0
05WHNSB0320-TH	●	3.2	37	87	4.0
05WHNSB0330-TH	●	3.3	37	87	4.0
05WHNSB0340-TH	●	3.4	37	87	4.0
05WHNSB0350-TH	●	3.5	37	87	4.0
05WHNSB0360-TH	●	3.6	37	87	4.0
05WHNSB0370-TH	●	3.7	37	87	4.0
05WHNSB0380-TH	●	3.8	37	87	4.0
05WHNSB0390-TH	●	3.9	37	87	4.0
05WHNSB0400-TH	●	4.0	37	87	4.0
05WHNSB0410-TH	●	4.1	47	100	5.0
05WHNSB0420-TH	●	4.2	47	100	5.0
05WHNSB0430-TH	●	4.3	47	100	5.0
05WHNSB0440-TH	●	4.4	47	100	5.0
05WHNSB0450-TH	●	4.5	47	100	5.0
05WHNSB0460-TH	●	4.6	47	100	5.0
05WHNSB0470-TH	●	4.7	47	100	5.0
05WHNSB0480-TH	●	4.8	47	100	5.0
05WHNSB0490-TH	●	4.9	47	100	5.0
05WHNSB0500-TH	●	5.0	47	100	5.0
05WHNSB0510-TH	●	5.1	47	100	6.0
05WHNSB0520-TH	●	5.2	47	100	6.0
05WHNSB0530-TH	●	5.3	47	100	6.0
05WHNSB0540-TH	●	5.4	47	100	6.0
05WHNSB0550-TH	●	5.5	47	100	6.0
05WHNSB0560-TH	●	5.6	47	100	6.0
05WHNSB0570-TH	●	5.7	47	100	6.0
05WHNSB0580-TH	●	5.8	47	100	6.0
05WHNSB0590-TH	●	5.9	47	100	6.0
05WHNSB0600-TH	●	6.0	47	100	6.0
05WHNSB0610-TH	●	6.1	55	110	7.0
05WHNSB0620-TH	●	6.2	55	110	7.0

Item Code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
05WHNSB0630-TH	●	6.3	55	110	7.0
05WHNSB0640-TH	●	6.4	55	110	7.0
05WHNSB0650-TH	●	6.5	55	110	7.0
05WHNSB0660-TH	●	6.6	55	110	7.0
05WHNSB0670-TH	●	6.7	55	110	7.0
05WHNSB0680-TH	●	6.8	55	110	7.0
05WHNSB0690-TH	●	6.9	55	110	7.0
05WHNSB0700-TH	●	7.0	55	110	7.0
05WHNSB0710-TH	●	7.1	63	119	8.0
05WHNSB0720-TH	●	7.2	63	119	8.0
05WHNSB0730-TH	●	7.3	63	119	8.0
05WHNSB0740-TH	●	7.4	63	119	8.0
05WHNSB0750-TH	●	7.5	63	119	8.0
05WHNSB0760-TH	●	7.6	63	119	8.0
05WHNSB0770-TH	●	7.7	63	119	8.0
05WHNSB0780-TH	●	7.8	63	119	8.0
05WHNSB0790-TH	●	7.9	63	119	8.0
05WHNSB0800-TH	●	8.0	63	119	8.0
05WHNSB0810-TH	●	8.1	71	128	9.0
05WHNSB0820-TH	●	8.2	71	128	9.0
05WHNSB0830-TH	●	8.3	71	128	9.0
05WHNSB0840-TH	●	8.4	71	128	9.0
05WHNSB0850-TH	●	8.5	71	128	9.0
05WHNSB0860-TH	●	8.6	71	128	9.0
05WHNSB0870-TH	●	8.7	71	128	9.0
05WHNSB0880-TH	●	8.8	71	128	9.0
05WHNSB0890-TH	●	8.9	71	128	9.0
05WHNSB0900-TH	●	9.0	71	128	9.0
05WHNSB0910-TH	□	9.1	79	137	10.0
05WHNSB0920-TH	□	9.2	79	137	10.0
05WHNSB0930-TH	●	9.3	79	137	10.0
05WHNSB0940-TH	●	9.4	79	137	10.0
05WHNSB0950-TH	●	9.5	79	137	10.0
05WHNSB0960-TH	□	9.6	79	137	10.0
05WHNSB0970-TH	□	9.7	79	137	10.0
05WHNSB0980-TH	●	9.8	79	137	10.0
05WHNSB0990-TH	●	9.9	79	137	10.0
05WHNSB1000-TH	●	10.0	79	137	10.0
05WHNSB1010-TH	□	10.1	87	150	11.0
05WHNSB1020-TH	●	10.2	87	150	11.0
05WHNSB1030-TH	●	10.3	87	150	11.0
05WHNSB1040-TH	●	10.4	87	150	11.0
05WHNSB1050-TH	●	10.5	87	150	11.0

Item Code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
05WHNSB1060-TH	□	10.6	87	150	11.0
05WHNSB1070-TH	□	10.7	87	150	11.0
05WHNSB1080-TH	●	10.8	87	150	11.0
05WHNSB1090-TH	●	10.9	87	150	11.0
05WHNSB1100-TH	●	11.0	87	150	11.0
05WHNSB1110-TH	□	11.1	93	156	12.0
05WHNSB1120-TH	□	11.2	93	156	12.0
05WHNSB1130-TH	●	11.3	93	156	12.0
05WHNSB1140-TH	●	11.4	93	156	12.0
05WHNSB1150-TH	●	11.5	93	156	12.0
05WHNSB1160-TH	□	11.6	93	156	12.0
05WHNSB1170-TH	□	11.7	93	156	12.0
05WHNSB1180-TH	●	11.8	93	156	12.0
05WHNSB1190-TH	●	11.9	93	156	12.0
05WHNSB1200-TH	●	12.0	93	156	12.0
05WHNSB1210-TH	□	12.1	104	169	13.0
05WHNSB1220-TH	□	12.2	104	169	13.0
05WHNSB1230-TH	□	12.3	104	169	13.0
05WHNSB1240-TH	□	12.4	104	169	13.0
05WHNSB1250-TH	●	12.5	104	169	13.0
05WHNSB1260-TH	□	12.6	104	169	13.0
05WHNSB1270-TH	□	12.7	104	169	13.0
05WHNSB1280-TH	□	12.8	104	169	13.0
05WHNSB1290-TH	□	12.9	104	169	13.0
05WHNSB1300-TH	●	13.0	104	169	13.0

Applicable work material

Mild steel SS	Carbon steel S○○○	Alloy steel SCM, SCr	Heat-treated steel SKD SKS	Tool steel ~40HRC	Hardened steel ~45HRC 45HRC~	Stainless steel SUS	Heat-resistant steel Ti alloy Inconel	Cast iron FC	Ductile cast iron FCD	Aluminium alloy Al	Copper alloy Cu
○	○	○	○	○	○	○	○	○	○	○	○

Re-grinding compatibility range

Item code	DC (mm)
05WHNSB-TH	2 ~ 13

WHNSB-TH

WNSB-TH

WHMB-TH

NSBH-ATH

FWNSB-TH

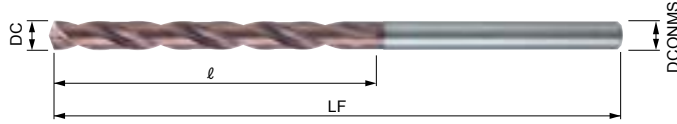
EMSBS

EMSBI-ATH

Carbide Oil Hole Non Step Borer (8D)



Plane, S-X thinning



08WHNSB-TH

With oil hole

L/D=8

Cutting condition 19



0~-0.01 (mm)

Item Code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
08WHNSB0200-TH	●	2.0	25	75	3.0
08WHNSB0210-TH	●	2.1	25	75	3.0
08WHNSB0220-TH	●	2.2	25	75	3.0
08WHNSB0230-TH	●	2.3	28	75	3.0
08WHNSB0240-TH	●	2.4	28	75	3.0
08WHNSB0250-TH	●	2.5	28	75	3.0
08WHNSB0260-TH	●	2.6	33	80	3.0
08WHNSB0270-TH	●	2.7	33	80	3.0
08WHNSB0280-TH	●	2.8	35	83	3.0
08WHNSB0290-TH	●	2.9	35	83	3.0
08WHNSB0300-TH	●	3.0	35	83	3.0
08WHNSB0310-TH	●	3.1	42	94	4.0
08WHNSB0320-TH	●	3.2	42	94	4.0
08WHNSB0330-TH	●	3.3	42	94	4.0
08WHNSB0340-TH	●	3.4	42	94	4.0
08WHNSB0350-TH	●	3.5	42	94	4.0
08WHNSB0360-TH	●	3.6	46	94	4.0
08WHNSB0370-TH	●	3.7	46	94	4.0
08WHNSB0380-TH	●	3.8	46	94	4.0
08WHNSB0390-TH	●	3.9	46	94	4.0
08WHNSB0400-TH	●	4.0	46	94	4.0
08WHNSB0410-TH	●	4.1	55	110	5.0
08WHNSB0420-TH	●	4.2	55	110	5.0
08WHNSB0430-TH	●	4.3	55	110	5.0
08WHNSB0440-TH	●	4.4	55	110	5.0
08WHNSB0450-TH	●	4.5	55	110	5.0
08WHNSB0460-TH	●	4.6	59	110	5.0
08WHNSB0470-TH	●	4.7	59	110	5.0
08WHNSB0480-TH	●	4.8	59	110	5.0
08WHNSB0490-TH	●	4.9	59	110	5.0
08WHNSB0500-TH	●	5.0	59	110	5.0
08WHNSB0510-TH	●	5.1	62	118	6.0
08WHNSB0520-TH	●	5.2	62	118	6.0
08WHNSB0530-TH	●	5.3	62	118	6.0
08WHNSB0540-TH	●	5.4	62	118	6.0
08WHNSB0550-TH	●	5.5	62	118	6.0
08WHNSB0560-TH	●	5.6	67	118	6.0

Item Code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
08WHNSB0570-TH	●	5.7	67	118	6.0
08WHNSB0580-TH	●	5.8	67	118	6.0
08WHNSB0590-TH	●	5.9	67	118	6.0
08WHNSB0600-TH	●	6.0	67	118	6.0
08WHNSB0610-TH	●	6.1	73	132	7.0
08WHNSB0620-TH	●	6.2	73	132	7.0
08WHNSB0630-TH	●	6.3	73	132	7.0
08WHNSB0640-TH	●	6.4	73	132	7.0
08WHNSB0650-TH	●	6.5	73	132	7.0
08WHNSB0660-TH	●	6.6	77	132	7.0
08WHNSB0670-TH	●	6.7	77	132	7.0
08WHNSB0680-TH	●	6.8	77	132	7.0
08WHNSB0690-TH	●	6.9	77	132	7.0
08WHNSB0700-TH	●	7.0	77	132	7.0
08WHNSB0710-TH	●	7.1	84	144	8.0
08WHNSB0720-TH	●	7.2	84	144	8.0
08WHNSB0730-TH	●	7.3	84	144	8.0
08WHNSB0740-TH	●	7.4	84	144	8.0
08WHNSB0750-TH	●	7.5	84	144	8.0
08WHNSB0760-TH	●	7.6	88	144	8.0
08WHNSB0770-TH	●	7.7	88	144	8.0
08WHNSB0780-TH	●	7.8	88	144	8.0
08WHNSB0790-TH	●	7.9	88	144	8.0
08WHNSB0800-TH	●	8.0	88	144	8.0
08WHNSB0810-TH	□	8.1	94	156	9.0
08WHNSB0820-TH	□	8.2	94	156	9.0
08WHNSB0830-TH	●	8.3	94	156	9.0
08WHNSB0840-TH	●	8.4	94	156	9.0
08WHNSB0850-TH	●	8.5	94	156	9.0
08WHNSB0860-TH	□	8.6	99	156	9.0
08WHNSB0870-TH	□	8.7	99	156	9.0
08WHNSB0880-TH	●	8.8	99	156	9.0
08WHNSB0890-TH	●	8.9	99	156	9.0
08WHNSB0900-TH	●	9.0	99	156	9.0
08WHNSB0910-TH	□	9.1	105	168	10.0
08WHNSB0920-TH	□	9.2	105	168	10.0
08WHNSB0930-TH	●	9.3	105	168	10.0

Item Code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
08WHNSB0940-TH	●	9.4	105	168	10.0
08WHNSB0950-TH	●	9.5	105	168	10.0
08WHNSB0960-TH	□	9.6	110	168	10.0
08WHNSB0970-TH	□	9.7	110	168	10.0
08WHNSB0980-TH	●	9.8	110	168	10.0
08WHNSB0990-TH	●	9.9	110	168	10.0
08WHNSB1000-TH	●	10.0	110	168	10.0
08WHNSB1010-TH	□	10.1	116	184	11.0
08WHNSB1020-TH	●	10.2	116	184	11.0
08WHNSB1030-TH	●	10.3	116	184	11.0
08WHNSB1040-TH	●	10.4	116	184	11.0
08WHNSB1050-TH	●	10.5	116	184	11.0
08WHNSB1060-TH	□	10.6	121	184	11.0
08WHNSB1070-TH	●	10.7	121	184	11.0
08WHNSB1080-TH	●	10.8	121	184	11.0
08WHNSB1090-TH	●	10.9	121	184	11.0
08WHNSB1100-TH	●	11.0	121	184	11.0
08WHNSB1110-TH	□	11.1	127	195	12.0
08WHNSB1120-TH	□	11.2	127	195	12.0
08WHNSB1130-TH	●	11.3	127	195	12.0
08WHNSB1140-TH	●	11.4	127	195	12.0
08WHNSB1150-TH	●	11.5	127	195	12.0
08WHNSB1160-TH	●	11.6	132	195	12.0
08WHNSB1170-TH	□	11.7	132	195	12.0
08WHNSB1180-TH	●	11.8	132	195	12.0
08WHNSB1190-TH	●	11.9	132	195	12.0
08WHNSB1200-TH	●	12.0	132	195	12.0
08WHNSB1210-TH	□	12.1	138	208	13.0
08WHNSB1220-TH	□	12.2	138	208	13.0
08WHNSB1230-TH	□	12.3	138	208	13.0
08WHNSB1240-TH	□	12.4	138	208	13.0
08WHNSB1250-TH	●	12.5	138	208	13.0
08WHNSB1260-TH	□	12.6	143	208	13.0
08WHNSB1270-TH	□	12.7	143	208	13.0
08WHNSB1280-TH	□	12.8	143	208	13.0
08WHNSB1290-TH	□	12.9	143	208	13.0
08WHNSB1300-TH	●	13.0	143	208	13.0

Applicable work material

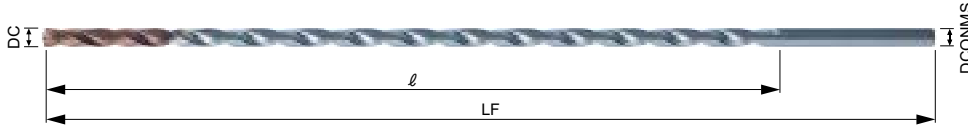
Mild steel SS	Carbon steel S○○○	Alloy steel SCM, SCr	Heat-treated steel SKD SKS	Tool steel ~40HRC	Hardened steel ~45HRC 45HRC~	Stainless steel SUS	Heat-resistant steel, Ti alloy Inconel	Cast iron FC	Ductile cast iron FCD	Aluminium alloy Al	Copper alloy Cu
○	○	○	○	○	○	○	○	○	○	○	○

Re-grinding compatibility range

Item code	DC (mm)
08WHNSB-TH	2 ~ 13

● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

Carbide Oil Hole Non Step Borer (40D)



40WHNSB **-TH** With oil hole L/D=40

Cutting condition **21**

h8

h6

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
40WHNSB0250-TH	◎	2.5	108	159	3.0
40WHNSB0260-TH	□	2.6	117	168	3.0
40WHNSB0270-TH	□	2.7	117	168	3.0
40WHNSB0280-TH	□	2.8	129	180	3.0
40WHNSB0290-TH	□	2.9	129	180	3.0
40WHNSB0300-TH	◎	3.0	129	180	3.0
40WHNSB0310-TH	□	3.1	142	195	4.0
40WHNSB0320-TH	□	3.2	142	195	4.0
40WHNSB0330-TH	□	3.3	142	195	4.0
40WHNSB0340-TH	□	3.4	155	208	4.0
40WHNSB0350-TH	□	3.5	155	208	4.0
40WHNSB0360-TH	□	3.6	155	208	4.0
40WHNSB0370-TH	□	3.7	172	225	4.0
40WHNSB0380-TH	□	3.8	172	225	4.0
40WHNSB0390-TH	□	3.9	172	225	4.0
40WHNSB0400-TH	◎	4.0	172	225	4.0
40WHNSB0410-TH	□	4.1	185	238	5.0
40WHNSB0420-TH	□	4.2	185	238	5.0
40WHNSB0430-TH	□	4.3	185	238	5.0
40WHNSB0440-TH	□	4.4	198	251	5.0
40WHNSB0450-TH	□	4.5	198	251	5.0
40WHNSB0460-TH	□	4.6	198	251	5.0
40WHNSB0470-TH	□	4.7	215	268	5.0
40WHNSB0480-TH	□	4.8	215	268	5.0
40WHNSB0490-TH	□	4.9	215	268	5.0
40WHNSB0500-TH	◎	5.0	215	268	5.0
40WHNSB0510-TH	□	5.1	237	290	6.0
40WHNSB0520-TH	□	5.2	237	290	6.0
40WHNSB0530-TH	□	5.3	237	290	6.0
40WHNSB0540-TH	□	5.4	237	290	6.0
40WHNSB0550-TH	□	5.5	237	290	6.0
40WHNSB0560-TH	□	5.6	258	311	6.0
40WHNSB0570-TH	□	5.7	258	311	6.0
40WHNSB0580-TH	□	5.8	258	311	6.0
40WHNSB0590-TH	□	5.9	258	311	6.0
40WHNSB0600-TH	◎	6.0	258	311	6.0
40WHNSB0610-TH	□	6.1	280	333	7.0
40WHNSB0620-TH	□	6.2	280	333	7.0
40WHNSB0630-TH	□	6.3	280	333	7.0
40WHNSB0640-TH	□	6.4	280	333	7.0
40WHNSB0650-TH	□	6.5	280	333	7.0
40WHNSB0660-TH	□	6.6	301	354	7.0

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
40WHNSB0670-TH	□	6.7	301	354	7.0
40WHNSB0680-TH	□	6.8	301	354	7.0
40WHNSB0690-TH	□	6.9	301	354	7.0
40WHNSB0700-TH	□	7.0	301	354	7.0
40WHNSB0710-TH	□	7.1	323	380	8.0
40WHNSB0720-TH	□	7.2	323	380	8.0
40WHNSB0730-TH	□	7.3	323	380	8.0
40WHNSB0740-TH	□	7.4	323	380	8.0
40WHNSB0750-TH	□	7.5	323	380	8.0
40WHNSB0760-TH	□	7.6	344	401	8.0
40WHNSB0770-TH	□	7.7	344	401	8.0
40WHNSB0780-TH	□	7.8	344	401	8.0
40WHNSB0790-TH	□	7.9	344	401	8.0
40WHNSB0800-TH	◎	8.0	344	401	8.0
40WHNSB0810-TH	□	8.1	366	423	9.0
40WHNSB0820-TH	□	8.2	366	423	9.0
40WHNSB0830-TH	□	8.3	366	423	9.0
40WHNSB0840-TH	□	8.4	366	423	9.0
40WHNSB0850-TH	◎	8.5	366	423	9.0
40WHNSB0860-TH	□	8.6	387	444	9.0
40WHNSB0870-TH	□	8.7	387	444	9.0
40WHNSB0880-TH	□	8.8	387	444	9.0
40WHNSB0890-TH	□	8.9	387	444	9.0
40WHNSB0900-TH	□	9.0	387	444	9.0
40WHNSB0910-TH	□	9.1	409	466	10.0
40WHNSB0920-TH	□	9.2	409	466	10.0
40WHNSB0930-TH	□	9.3	409	466	10.0
40WHNSB0940-TH	□	9.4	409	466	10.0
40WHNSB0950-TH	□	9.5	409	466	10.0
40WHNSB0960-TH	□	9.6	430	487	10.0
40WHNSB0970-TH	□	9.7	430	487	10.0
40WHNSB0980-TH	□	9.8	430	487	10.0
40WHNSB0990-TH	□	9.9	430	487	10.0
40WHNSB1000-TH	◎	10.0	430	487	10.0

40WHNSB Table of Tolerance on tool dia.

h8 for diameters of 2.5 to 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0 and 10.0 For other items, the diameter tolerance will be as in the table below.

	3.0<DC<6.0	6.0<DC<10.0
Max	-0.020	-0.024
Min	-0.036	-0.045

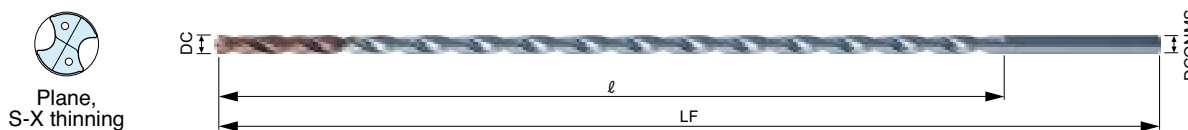
For products with tool dimensions other than listed items, separate consultation is needed. Please contact our sales office.

Applicable work material												
Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	SOOC	SCM, SCr	SKD SKS	~40HRC	~45HRC	45HRC~	SUS	Ti alloy Inconel	FC	FCD	Al	Cu
◎	◎	◎	◎	◎	○	○	◎	○	○	○	○	○

Re-grinding compatibility range	
Item code	DC (mm)
40WHNSB-TH	2.5 ~ 10

◎ : Manufacturer stocked items. □ : Stocked by specified distributor. Contact with our sales department.

Carbide Oil Hole Non Step Borer (50D)



50WHNSB-TH

With oil hole

L/D=50

Cutting condition 21

h8

h6

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
50WHNSB0250-TH	☉	2.5	133	184	3.0
50WHNSB0260-TH	□	2.6	144	195	3.0
50WHNSB0270-TH	□	2.7	144	195	3.0
50WHNSB0280-TH	□	2.8	159	210	3.0
50WHNSB0290-TH	□	2.9	159	210	3.0
50WHNSB0300-TH	☉	3.0	159	210	3.0
50WHNSB0310-TH	□	3.1	175	228	4.0
50WHNSB0320-TH	□	3.2	175	228	4.0
50WHNSB0330-TH	□	3.3	175	228	4.0
50WHNSB0340-TH	□	3.4	191	244	4.0
50WHNSB0350-TH	□	3.5	191	244	4.0
50WHNSB0360-TH	□	3.6	191	244	4.0
50WHNSB0370-TH	□	3.7	212	265	4.0
50WHNSB0380-TH	□	3.8	212	265	4.0
50WHNSB0390-TH	□	3.9	212	265	4.0
50WHNSB0400-TH	☉	4.0	212	265	4.0
50WHNSB0410-TH	□	4.1	228	281	5.0
50WHNSB0420-TH	□	4.2	228	281	5.0
50WHNSB0430-TH	□	4.3	228	281	5.0
50WHNSB0440-TH	□	4.4	244	297	5.0
50WHNSB0450-TH	□	4.5	244	297	5.0
50WHNSB0460-TH	□	4.6	244	297	5.0
50WHNSB0470-TH	□	4.7	265	318	5.0
50WHNSB0480-TH	□	4.8	265	318	5.0
50WHNSB0490-TH	□	4.9	265	318	5.0
50WHNSB0500-TH	☉	5.0	265	318	5.0
50WHNSB0510-TH	□	5.1	292	345	6.0
50WHNSB0520-TH	□	5.2	292	345	6.0
50WHNSB0530-TH	□	5.3	292	345	6.0
50WHNSB0540-TH	□	5.4	292	345	6.0
50WHNSB0550-TH	□	5.5	292	345	6.0
50WHNSB0560-TH	□	5.6	318	371	6.0
50WHNSB0570-TH	□	5.7	318	371	6.0
50WHNSB0580-TH	□	5.8	318	371	6.0

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
50WHNSB0590-TH	□	5.9	318	371	6.0
50WHNSB0600-TH	☉	6.0	318	371	6.0
50WHNSB0610-TH	□	6.1	345	398	7.0
50WHNSB0620-TH	□	6.2	345	398	7.0
50WHNSB0630-TH	□	6.3	345	398	7.0
50WHNSB0640-TH	□	6.4	345	398	7.0
50WHNSB0650-TH	□	6.5	345	398	7.0
50WHNSB0660-TH	□	6.6	371	424	7.0
50WHNSB0670-TH	□	6.7	371	424	7.0
50WHNSB0680-TH	□	6.8	371	424	7.0
50WHNSB0690-TH	□	6.9	371	424	7.0
50WHNSB0700-TH	□	7.0	371	424	7.0
50WHNSB0710-TH	□	7.1	398	451	8.0
50WHNSB0720-TH	□	7.2	398	451	8.0
50WHNSB0730-TH	□	7.3	398	451	8.0
50WHNSB0740-TH	□	7.4	398	451	8.0
50WHNSB0750-TH	□	7.5	398	451	8.0
50WHNSB0760-TH	□	7.6	424	481	8.0
50WHNSB0770-TH	□	7.7	424	481	8.0
50WHNSB0780-TH	□	7.8	424	481	8.0
50WHNSB0790-TH	□	7.9	424	481	8.0
50WHNSB0800-TH	☉	8.0	424	481	8.0

50WHNSB Table of Tolerance on tool dia.

h8 for diameters of 2.5 to 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5 and 8.0
For other items, the diameter tolerance will be as in the table below.

	(mm)	
	3.0<DC<6.0	6.0<DC<8.0
Max	-0.020	-0.024
Min	-0.036	-0.045

For products with tool dimensions other than listed items, separate consultation is needed. Please contact our sales office.

Applicable work material

Mild steel SS	Carbon steel S	Alloy steel SCM, SCr	Heat-treated steel SKD, SKS	Tool steel ~40HRC	Hardened steel ~45HRC 45HRC~	Stainless steel SUS	Heat-resistant steel, Ti alloy Inconel	Cast iron FC	Ductile cast iron FCD	Aluminium alloy Al	Copper alloy Cu
☉	☉	☉	☉	☉	☉	☉	☉	☉	☉	☉	☉

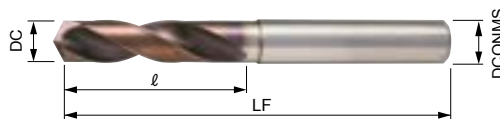
Re-grinding compatibility range

Item code	DC (mm)
50WHNSB-TH	2.5 ~ 8

Carbide Non Step Borer (2D)



Plane, S-X thinning



02WNSB **-TH**

Without oil hole

L/D=2

Cutting condition **22**



0~-0.01 (mm)

Item Code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
02WNSB0300-TH	<input type="checkbox"/>	3.0	15	47	3.0
02WNSB0310-TH	<input type="checkbox"/>	3.1	18	52	4.0
02WNSB0320-TH	<input type="checkbox"/>	3.2	18	52	4.0
02WNSB0330-TH	<input type="checkbox"/>	3.3	18	52	4.0
02WNSB0340-TH	<input type="checkbox"/>	3.4	18	52	4.0
02WNSB0350-TH	<input type="checkbox"/>	3.5	18	52	4.0
02WNSB0360-TH	<input type="checkbox"/>	3.6	20	52	4.0
02WNSB0370-TH	<input type="checkbox"/>	3.7	20	52	4.0
02WNSB0380-TH	<input type="checkbox"/>	3.8	20	52	4.0
02WNSB0390-TH	<input type="checkbox"/>	3.9	20	52	4.0
02WNSB0400-TH	<input type="checkbox"/>	4.0	20	52	4.0
02WNSB0410-TH	<input type="checkbox"/>	4.1	23	59	5.0
02WNSB0420-TH	<input type="checkbox"/>	4.2	23	59	5.0
02WNSB0430-TH	<input type="checkbox"/>	4.3	23	59	5.0
02WNSB0440-TH	<input type="checkbox"/>	4.4	23	59	5.0
02WNSB0450-TH	<input type="checkbox"/>	4.5	23	59	5.0
02WNSB0460-TH	<input type="checkbox"/>	4.6	25	59	5.0
02WNSB0470-TH	<input type="checkbox"/>	4.7	25	59	5.0
02WNSB0480-TH	<input type="checkbox"/>	4.8	25	59	5.0
02WNSB0490-TH	<input type="checkbox"/>	4.9	25	59	5.0
02WNSB0500-TH	<input checked="" type="checkbox"/>	5.0	25	59	5.0
02WNSB0510-TH	<input checked="" type="checkbox"/>	5.1	25	64	6.0
02WNSB0520-TH	<input checked="" type="checkbox"/>	5.2	25	64	6.0
02WNSB0530-TH	<input type="checkbox"/>	5.3	25	64	6.0
02WNSB0540-TH	<input checked="" type="checkbox"/>	5.4	25	64	6.0
02WNSB0550-TH	<input checked="" type="checkbox"/>	5.5	25	64	6.0
02WNSB0560-TH	<input type="checkbox"/>	5.6	25	64	6.0
02WNSB0570-TH	<input type="checkbox"/>	5.7	25	64	6.0
02WNSB0580-TH	<input checked="" type="checkbox"/>	5.8	25	64	6.0
02WNSB0590-TH	<input type="checkbox"/>	5.9	25	64	6.0
02WNSB0600-TH	<input checked="" type="checkbox"/>	6.0	25	64	6.0
02WNSB0610-TH	<input type="checkbox"/>	6.1	29	71	7.0
02WNSB0620-TH	<input checked="" type="checkbox"/>	6.2	29	71	7.0
02WNSB0630-TH	<input type="checkbox"/>	6.3	29	71	7.0
02WNSB0640-TH	<input type="checkbox"/>	6.4	29	71	7.0
02WNSB0650-TH	<input checked="" type="checkbox"/>	6.5	29	71	7.0
02WNSB0660-TH	<input type="checkbox"/>	6.6	31	71	7.0
02WNSB0670-TH	<input type="checkbox"/>	6.7	31	71	7.0
02WNSB0680-TH	<input checked="" type="checkbox"/>	6.8	31	71	7.0
02WNSB0690-TH	<input checked="" type="checkbox"/>	6.9	31	71	7.0
02WNSB0700-TH	<input checked="" type="checkbox"/>	7.0	31	71	7.0
02WNSB0710-TH	<input type="checkbox"/>	7.1	32	76	8.0
02WNSB0720-TH	<input type="checkbox"/>	7.2	32	76	8.0
02WNSB0730-TH	<input checked="" type="checkbox"/>	7.3	32	76	8.0
02WNSB0740-TH	<input type="checkbox"/>	7.4	32	76	8.0
02WNSB0750-TH	<input checked="" type="checkbox"/>	7.5	32	76	8.0
02WNSB0760-TH	<input type="checkbox"/>	7.6	34	76	8.0
02WNSB0770-TH	<input type="checkbox"/>	7.7	34	76	8.0
02WNSB0780-TH	<input checked="" type="checkbox"/>	7.8	34	76	8.0
02WNSB0790-TH	<input checked="" type="checkbox"/>	7.9	34	76	8.0
02WNSB0800-TH	<input checked="" type="checkbox"/>	8.0	34	76	8.0

Item Code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
02WNSB0810-TH	<input type="checkbox"/>	8.1	36	80	9.0
02WNSB0820-TH	<input type="checkbox"/>	8.2	36	80	9.0
02WNSB0830-TH	<input type="checkbox"/>	8.3	36	80	9.0
02WNSB0840-TH	<input checked="" type="checkbox"/>	8.4	36	80	9.0
02WNSB0850-TH	<input checked="" type="checkbox"/>	8.5	36	80	9.0
02WNSB0860-TH	<input checked="" type="checkbox"/>	8.6	38	80	9.0
02WNSB0870-TH	<input type="checkbox"/>	8.7	38	80	9.0
02WNSB0880-TH	<input checked="" type="checkbox"/>	8.8	38	80	9.0
02WNSB0890-TH	<input type="checkbox"/>	8.9	38	80	9.0
02WNSB0900-TH	<input checked="" type="checkbox"/>	9.0	38	80	9.0
02WNSB0910-TH	<input type="checkbox"/>	9.1	40	85	10.0
02WNSB0920-TH	<input type="checkbox"/>	9.2	40	85	10.0
02WNSB0930-TH	<input type="checkbox"/>	9.3	40	85	10.0
02WNSB0940-TH	<input checked="" type="checkbox"/>	9.4	40	85	10.0
02WNSB0950-TH	<input checked="" type="checkbox"/>	9.5	40	85	10.0
02WNSB0960-TH	<input type="checkbox"/>	9.6	41	85	10.0
02WNSB0970-TH	<input type="checkbox"/>	9.7	41	85	10.0
02WNSB0980-TH	<input checked="" type="checkbox"/>	9.8	41	85	10.0
02WNSB0990-TH	<input type="checkbox"/>	9.9	41	85	10.0
02WNSB1000-TH	<input checked="" type="checkbox"/>	10.0	41	85	10.0
02WNSB1010-TH	<input type="checkbox"/>	10.1	42	90	11.0
02WNSB1020-TH	<input checked="" type="checkbox"/>	10.2	42	90	11.0
02WNSB1030-TH	<input checked="" type="checkbox"/>	10.3	42	90	11.0
02WNSB1040-TH	<input type="checkbox"/>	10.4	42	90	11.0
02WNSB1050-TH	<input checked="" type="checkbox"/>	10.5	42	90	11.0
02WNSB1060-TH	<input checked="" type="checkbox"/>	10.6	44	90	11.0
02WNSB1070-TH	<input type="checkbox"/>	10.7	44	90	11.0
02WNSB1080-TH	<input checked="" type="checkbox"/>	10.8	44	90	11.0
02WNSB1090-TH	<input type="checkbox"/>	10.9	44	90	11.0
02WNSB1100-TH	<input checked="" type="checkbox"/>	11.0	44	90	11.0
02WNSB1110-TH	<input type="checkbox"/>	11.1	46	94	12.0
02WNSB1120-TH	<input type="checkbox"/>	11.2	46	94	12.0
02WNSB1130-TH	<input type="checkbox"/>	11.3	46	94	12.0
02WNSB1140-TH	<input checked="" type="checkbox"/>	11.4	46	94	12.0
02WNSB1150-TH	<input checked="" type="checkbox"/>	11.5	46	94	12.0
02WNSB1160-TH	<input checked="" type="checkbox"/>	11.6	46	94	12.0
02WNSB1170-TH	<input type="checkbox"/>	11.7	46	94	12.0
02WNSB1180-TH	<input checked="" type="checkbox"/>	11.8	46	94	12.0
02WNSB1190-TH	<input type="checkbox"/>	11.9	46	94	12.0
02WNSB1200-TH	<input checked="" type="checkbox"/>	12.0	46	94	12.0
02WNSB1210-TH	<input type="checkbox"/>	12.1	49	100	13.0
02WNSB1220-TH	<input checked="" type="checkbox"/>	12.2	49	100	13.0
02WNSB1230-TH	<input type="checkbox"/>	12.3	49	100	13.0
02WNSB1240-TH	<input type="checkbox"/>	12.4	49	100	13.0
02WNSB1250-TH	<input checked="" type="checkbox"/>	12.5	49	100	13.0
02WNSB1260-TH	<input checked="" type="checkbox"/>	12.6	49	100	13.0
02WNSB1270-TH	<input type="checkbox"/>	12.7	49	100	13.0
02WNSB1280-TH	<input type="checkbox"/>	12.8	49	100	13.0
02WNSB1290-TH	<input type="checkbox"/>	12.9	49	100	13.0
02WNSB1300-TH	<input checked="" type="checkbox"/>	13.0	49	100	13.0

Applicable work material

Mild steel SS	Carbon steel S〇〇C	Alloy steel SCM, SCr	Heat-treated steel SKD SKS	Tool steel ~40HRC	Hardened steel ~45HRC 45HRC~		Stainless steel SUS	Heat-resistant steel, Ti alloy Inconel	Cast iron FC	Ductile cast iron FCD	Aluminium alloy Al	Copper alloy Cu
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Re-grinding compatibility range

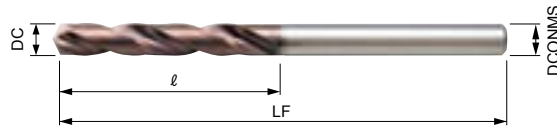
Item code	DC (mm)
02WNSB-TH	3 ~ 13

● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

Carbide Non Step Borer (4D)



Plane, S-X thinning



04WNSB-TH

Without oil hole

L/D=4

Cutting condition 22



0~-0.01 (mm)

Item Code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
04WNSB0100-TH	●	1.0	8	50	3.0
04WNSB0110-TH	●	1.1	9	50	3.0
04WNSB0120-TH	●	1.2	9	50	3.0
04WNSB0130-TH	●	1.3	10	50	3.0
04WNSB0140-TH	●	1.4	10	50	3.0
04WNSB0150-TH	●	1.5	12	50	3.0
04WNSB0160-TH	●	1.6	12	50	3.0
04WNSB0170-TH	●	1.7	14	50	3.0
04WNSB0180-TH	●	1.8	14	50	3.0
04WNSB0190-TH	●	1.9	16	50	3.0
04WNSB0200-TH	●	2.0	16	50	3.0
04WNSB0210-TH	●	2.1	17	50	3.0
04WNSB0220-TH	●	2.2	17	50	3.0
04WNSB0230-TH	●	2.3	17	50	3.0
04WNSB0240-TH	●	2.4	17	50	3.0
04WNSB0250-TH	●	2.5	17	50	3.0
04WNSB0260-TH	●	2.6	19	50	3.0
04WNSB0270-TH	●	2.7	19	50	3.0
04WNSB0280-TH	●	2.8	19	50	3.0
04WNSB0290-TH	●	2.9	19	50	3.0
04WNSB0300-TH	●	3.0	19	50	3.0
04WNSB0310-TH	●	3.1	23	58	4.0
04WNSB0320-TH	●	3.2	23	58	4.0
04WNSB0330-TH	●	3.3	23	58	4.0
04WNSB0340-TH	●	3.4	23	58	4.0
04WNSB0350-TH	●	3.5	23	58	4.0
04WNSB0360-TH	●	3.6	26	58	4.0
04WNSB0370-TH	●	3.7	26	58	4.0
04WNSB0380-TH	●	3.8	26	58	4.0
04WNSB0390-TH	●	3.9	26	58	4.0
04WNSB0400-TH	●	4.0	26	58	4.0
04WNSB0410-TH	●	4.1	29	64	5.0
04WNSB0420-TH	●	4.2	29	64	5.0
04WNSB0430-TH	●	4.3	29	64	5.0
04WNSB0440-TH	●	4.4	29	64	5.0
04WNSB0450-TH	●	4.5	29	64	5.0
04WNSB0460-TH	●	4.6	32	64	5.0
04WNSB0470-TH	●	4.7	32	64	5.0
04WNSB0480-TH	●	4.8	32	64	5.0
04WNSB0490-TH	●	4.9	32	64	5.0
04WNSB0500-TH	●	5.0	32	64	5.0
04WNSB0510-TH	●	5.1	36	78	6.0
04WNSB0520-TH	●	5.2	36	78	6.0

Item Code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
04WNSB0530-TH	●	5.3	36	78	6.0
04WNSB0540-TH	●	5.4	36	78	6.0
04WNSB0550-TH	●	5.5	36	78	6.0
04WNSB0560-TH	●	5.6	39	78	6.0
04WNSB0570-TH	●	5.7	39	78	6.0
04WNSB0580-TH	●	5.8	39	78	6.0
04WNSB0590-TH	●	5.9	39	78	6.0
04WNSB0600-TH	●	6.0	39	78	6.0
04WNSB0610-TH	●	6.1	41	83	7.0
04WNSB0620-TH	●	6.2	41	83	7.0
04WNSB0630-TH	●	6.3	41	83	7.0
04WNSB0640-TH	●	6.4	41	83	7.0
04WNSB0650-TH	●	6.5	41	83	7.0
04WNSB0660-TH	●	6.6	43	83	7.0
04WNSB0670-TH	●	6.7	43	83	7.0
04WNSB0680-TH	●	6.8	43	83	7.0
04WNSB0690-TH	●	6.9	43	83	7.0
04WNSB0700-TH	●	7.0	43	83	7.0
04WNSB0710-TH	●	7.1	45	90	8.0
04WNSB0720-TH	●	7.2	45	90	8.0
04WNSB0730-TH	●	7.3	45	90	8.0
04WNSB0740-TH	●	7.4	45	90	8.0
04WNSB0750-TH	●	7.5	45	90	8.0
04WNSB0760-TH	●	7.6	48	90	8.0
04WNSB0770-TH	●	7.7	48	90	8.0
04WNSB0780-TH	●	7.8	48	90	8.0
04WNSB0790-TH	●	7.9	48	90	8.0
04WNSB0800-TH	●	8.0	48	90	8.0
04WNSB0810-TH	●	8.1	52	96	9.0
04WNSB0820-TH	●	8.2	52	96	9.0
04WNSB0830-TH	●	8.3	52	96	9.0
04WNSB0840-TH	●	8.4	52	96	9.0
04WNSB0850-TH	●	8.5	52	96	9.0
04WNSB0860-TH	●	8.6	54	96	9.0
04WNSB0870-TH	●	8.7	54	96	9.0
04WNSB0880-TH	●	8.8	54	96	9.0
04WNSB0890-TH	●	8.9	54	96	9.0
04WNSB0900-TH	●	9.0	54	96	9.0
04WNSB0910-TH	●	9.1	57	104	10.0
04WNSB0920-TH	●	9.2	57	104	10.0
04WNSB0930-TH	●	9.3	57	104	10.0
04WNSB0940-TH	●	9.4	57	104	10.0
04WNSB0950-TH	●	9.5	57	104	10.0

Item Code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
04WNSB0960-TH	●	9.6	60	104	10.0
04WNSB0970-TH	●	9.7	60	104	10.0
04WNSB0980-TH	●	9.8	60	104	10.0
04WNSB0990-TH	●	9.9	60	104	10.0
04WNSB1000-TH	●	10.0	60	104	10.0
04WNSB1010-TH	●	10.1	63	112	11.0
04WNSB1020-TH	●	10.2	63	112	11.0
04WNSB1030-TH	●	10.3	63	112	11.0
04WNSB1040-TH	●	10.4	63	112	11.0
04WNSB1050-TH	●	10.5	63	112	11.0
04WNSB1060-TH	●	10.6	66	112	11.0
04WNSB1070-TH	●	10.7	66	112	11.0
04WNSB1080-TH	●	10.8	66	112	11.0
04WNSB1090-TH	●	10.9	66	112	11.0
04WNSB1100-TH	●	11.0	66	112	11.0
04WNSB1110-TH	●	11.1	71	121	12.0
04WNSB1120-TH	●	11.2	71	121	12.0
04WNSB1130-TH	●	11.3	71	121	12.0
04WNSB1140-TH	●	11.4	71	121	12.0
04WNSB1150-TH	●	11.5	71	121	12.0
04WNSB1160-TH	●	11.6	73	121	12.0
04WNSB1170-TH	●	11.7	73	121	12.0
04WNSB1180-TH	●	11.8	73	121	12.0
04WNSB1190-TH	●	11.9	73	121	12.0
04WNSB1200-TH	●	12.0	73	121	12.0
04WNSB1210-TH	●	12.1	76	128	13.0
04WNSB1220-TH	●	12.2	76	128	13.0
04WNSB1230-TH	●	12.3	76	128	13.0
04WNSB1240-TH	●	12.4	76	128	13.0
04WNSB1250-TH	●	12.5	76	128	13.0
04WNSB1260-TH	●	12.6	76	128	13.0
04WNSB1270-TH	●	12.7	76	128	13.0
04WNSB1280-TH	●	12.8	76	128	13.0
04WNSB1290-TH	●	12.9	76	128	13.0
04WNSB1300-TH	●	13.0	76	128	13.0

Applicable work material

Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	SOOC	SCM, Scr	SKD, SKS	~40HRC	~45HRC	45HRC~	SUS	Ti alloy, Inconel	FC	FCD	Al	Cu
○	○	○	○	○	○				○	○		

Re-grinding compatibility range

Item code	DC (mm)
04WNSB-TH	2 ~ 13

Recommended Cutting Conditions

O3WHNSB-TH 05WHNSB-TH

Work material	Structural steels (~180HB) SS				Carbon steels (~200HB) S00C				Alloy steels (~30HRC) SCM			
	Internal coolant 50~120~180		MQL (mist) 50~120~180		Internal coolant 50~120~180		MQL (mist) 50~120~180		Internal coolant 50~120~180		MQL (mist) 50~120~180	
Cutting speed v_c (m/min)												
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ2.0	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1
Φ4.0	9,500	0.1~0.16	9,500	0.1~0.16	9,500	0.1~0.16	9,500	0.1~0.16	9,500	0.1~0.16	9,500	0.1~0.16
Φ6.0	6,300	0.15~0.24	6,300	0.15~0.24	6,300	0.15~0.24	6,300	0.15~0.24	6,300	0.15~0.24	6,300	0.15~0.24
Φ8.0	4,800	0.18~0.3	4,800	0.18~0.3	4,800	0.18~0.3	4,800	0.18~0.3	4,800	0.18~0.3	4,800	0.18~0.3
Φ10.0	3,800	0.2~0.35	3,800	0.2~0.35	3,800	0.2~0.35	3,800	0.2~0.35	3,800	0.2~0.35	3,800	0.2~0.35
Φ12.0	3,200	0.22~0.4	3,200	0.22~0.4	3,200	0.22~0.4	3,200	0.22~0.4	3,200	0.22~0.4	3,200	0.22~0.4

Work material	Stainless steels SUS300 SUS400		Titanium alloys Ti-6Al-4V		Pre-hardened steels (~40HRC)				Pre-hardened steels (~50HRC) SKD			
	Internal coolant 50~100~150		Internal coolant 50~80~100		Internal coolant 40~60~100		MQL (mist) 40~60~100		Internal coolant 30~40~50		MQL (mist) 20~30~40	
Cutting speed v_c (m/min)												
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ2.0	11,000	0.03~0.06	9,500	0.02~0.04	9,500	0.04~0.06	8,000	0.04~0.06	6,500	0.03~0.05	4,500	0.03~0.05
Φ4.0	8,000	0.06~0.1	6,400	0.06~0.08	4,800	0.08~0.13	4,800	0.08~0.13	3,200	0.05~0.1	2,400	0.05~0.1
Φ6.0	5,300	0.12~0.19	4,200	0.09~0.12	3,200	0.12~0.19	3,200	0.12~0.19	2,100	0.08~0.14	1,600	0.08~0.14
Φ8.0	4,000	0.14~0.24	3,200	0.12~0.16	2,400	0.14~0.24	2,400	0.14~0.24	1,600	0.12~0.18	1,200	0.12~0.18
Φ10.0	3,200	0.16~0.28	2,550	0.13~0.2	1,900	0.16~0.28	1,900	0.16~0.28	1,300	0.15~0.2	1,000	0.05~0.2
Φ12.0	2,650	0.17~0.31	2,100	0.14~0.24	1,600	0.18~0.32	1,600	0.18~0.32	1,050	0.17~0.24	800	0.17~0.24

Work material	Ductile irons FCD500				Casting FC250				INCONEL718 Heatproof steels	
	Internal coolant 50~100~150		MQL (mist) 50~100~150		Internal coolant 50~120~180		MQL (mist) 50~120~180		Internal coolant 20~30~40	
Cutting speed v_c (m/min)										
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ2.0	13,000	0.05~0.1	13,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1	4,000	0.02~0.03
Φ4.0	8,000	0.1~0.16	8,000	0.1~0.16	9,500	0.1~0.16	9,500	0.1~0.16	2,400	0.06~0.08
Φ6.0	5,300	0.15~0.24	5,300	0.15~0.24	6,300	0.15~0.24	6,300	0.15~0.24	1,600	0.09~0.12
Φ8.0	4,000	0.18~0.3	4,000	0.18~0.3	4,800	0.18~0.3	4,800	0.18~0.3	1,200	0.12~0.16
Φ10.0	3,200	0.2~0.35	3,200	0.2~0.35	3,800	0.2~0.35	3,800	0.2~0.35	950	0.13~0.2
Φ12.0	2,650	0.22~0.4	2,650	0.22~0.4	3,200	0.22~0.4	3,200	0.22~0.4	800	0.14~0.24

[Setting of Cutting Conditions]

- ※ Use the appropriate coolant for the work material and machining shape.
- ※ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- ※ The above cutting conditions are based on the use of a water-soluble coolant diluted to a maximum of 20 times. When coolant dilution exceeds 20 times, decrease the cutting speed to the lowest in the specified range. When the tool diameter is $\phi 5.0$ or less, the coolant pressure should be 2.0 MPa or higher, and when the diameter is over $\phi 5.0$, the pressure should be 1.5 MPa or higher.
- ※ When performing MQL (mist) machining, depending on the amount or status of spray from the tool, it may be necessary to reduce the cutting speed in order to perform machining.
- ※ When changing the tool, use collet free from flaws and stains and attach the tool firmly so that its runout is 0.02mm or less.
- ※ The above conditions apply to a hole-depth of 5 times the diameter or less.
- ※ When cutting fluid is used, reduce the cutting speed to a speed lower than the lowest speed in the specified range. Take the greatest care to avoid smoke or ignition due to heating of chips and the tool.
- ※ Works should be gripped firmly to prevent deformation, deflection and vibration.
- ※ You can use borers at a revolution speed lower than the above values.

08WHNSB-TH

Work material	Structural steels (~180HB) SS				Carbon steels (~200HB) S〇〇C				Alloy steels (~30HRC) SCM			
	Internal coolant 70~120~150		MQL (mist) 50~90~120		Internal coolant 70~120~150		MQL (mist) 50~90~120		Internal coolant 70~120~150		MQL (mist) 50~90~120	
Tool dia.	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)
Φ2.0	16,000	0.05~0.1	13,000	0.05~0.1	16,000	0.05~0.1	13,000	0.05~0.1	16,000	0.05~0.1	13,000	0.05~0.1
Φ4.0	9,500	0.1~0.16	7,200	0.1~0.16	9,500	0.1~0.16	7,200	0.1~0.16	9,500	0.1~0.16	7,200	0.1~0.16
Φ6.0	6,300	0.15~0.24	4,800	0.15~0.24	6,300	0.15~0.24	4,800	0.15~0.24	6,300	0.15~0.24	4,800	0.15~0.24
Φ8.0	4,800	0.18~0.3	3,600	0.18~0.3	4,800	0.18~0.3	3,600	0.18~0.3	4,800	0.18~0.3	3,600	0.18~0.3
Φ10.0	3,800	0.2~0.35	2,900	0.2~0.35	3,800	0.2~0.35	2,900	0.2~0.35	3,800	0.2~0.35	2,900	0.2~0.35
Φ12.0	3,200	0.22~0.4	2,400	0.22~0.4	3,200	0.22~0.4	2,400	0.22~0.4	3,200	0.22~0.4	2,400	0.22~0.4

Work material	Stainless steels SUS300 SUS400		Titanium alloys Ti-6Al-4V		Pre-hardened steels (~40HRC)				Pre-hardened steels (~50HRC) SKD			
	Internal coolant 50~90~120		Internal coolant 40~60~80		Internal coolant 40~60~80		MQL (mist) 30~50~70		Internal coolant 30~40~50		MQL (mist) 10~20~30	
Tool dia.	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)
Φ2.0	11,000	0.03~0.06	9,500	0.02~0.04	9,500	0.04~0.06	8,000	0.04~0.06	6,500	0.03~0.05	4,500	0.03~0.05
Φ4.0	7,200	0.08~0.13	4,800	0.06~0.08	4,800	0.08~0.13	4,000	0.08~0.13	3,200	0.05~0.1	1,600	0.05~0.1
Φ6.0	4,800	0.12~0.19	3,200	0.09~0.12	3,200	0.12~0.19	2,650	0.12~0.19	2,100	0.08~0.14	1,050	0.08~0.14
Φ8.0	3,600	0.14~0.24	2,400	0.12~0.16	2,400	0.14~0.24	2,000	0.14~0.24	1,600	0.12~0.18	800	0.12~0.18
Φ10.0	2,900	0.16~0.28	1,900	0.13~0.2	1,900	0.16~0.28	1,600	0.16~0.28	1,300	0.15~0.2	650	0.15~0.2
Φ12.0	2,400	0.17~0.31	1,600	0.14~0.24	1,600	0.18~0.32	1,350	0.18~0.32	1,050	0.17~0.22	550	0.17~0.22

Work material	Ductile irons FCD500				Casting FC250				INCONEL 718 Heatproof steels	
	Internal coolant 70~100~120		MQL (mist) 50~90~120		Internal coolant 70~120~150		MQL (mist) 50~90~120		Internal coolant 20~30~40	
Tool dia.	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)	Revolution <i>n</i> (min ⁻¹)	Feed per Rev <i>f</i> (mm/rev)
Φ2.0	16,000	0.05~0.1	13,000	0.05~0.1	16,000	0.05~0.1	13,000	0.05~0.1	4,000	0.02~0.03
Φ4.0	8,000	0.1~0.16	7,200	0.1~0.16	9,500	0.1~0.16	7,200	0.1~0.16	2,400	0.04~0.08
Φ6.0	5,300	0.15~0.24	4,800	0.15~0.24	6,300	0.15~0.24	4,800	0.15~0.24	1,600	0.06~0.12
Φ8.0	4,000	0.18~0.3	3,600	0.18~0.3	4,800	0.18~0.3	3,600	0.18~0.3	1,200	0.08~0.16
Φ10.0	3,200	0.2~0.35	2,900	0.2~0.35	3,800	0.2~0.35	2,900	0.2~0.35	950	0.1~0.2
Φ12.0	2,600	0.22~0.4	2,400	0.22~0.4	3,200	0.22~0.4	2,400	0.22~0.4	800	0.12~0.2

[Setting of Cutting Conditions] ※Be sure to refer to the boring procedure (next page) when selecting a tool.

- ※Use the appropriate coolant for the work material and machining shape.
- ※These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- ※The above cutting conditions are based on the use of a water-soluble coolant diluted to a maximum of 20 times. When coolant dilution exceeds 20 times, decrease the cutting speed to the lowest in the specified range. When the tool diameter is φ 5.0 or less, the coolant pressure should be 2.0 MPa or higher, and when the diameter is over φ 5.0, the pressure should be 1.5 MPa or higher.
- ※When performing MQL (mist) machining, depending on the amount or status of spray from the tool, it may be necessary to reduce the cutting speed in order to perform machining.
- ※When changing the tool, use collet free from flaws and stains and attach the tool firmly so that its runout is 0.02mm or less.
- ※The above conditions apply to a hole-depth of 8 times the diameter or less.
- ※When cutting fluid is used, reduce the cutting speed to a speed lower than the lowest speed in the specified range. Take the greatest care to avoid smoke or ignition due to heating of chips and the tool.
- ※Works should be gripped firmly to prevent deformation, deflection and vibration.
- ※You can use borers at a revolution speed lower than the above values.

WHNSB-TH

WNSB-TH

WHMB-TH

NSBH-ATH

FWHNSB-TH

EMSB

EMSBH-ATH

Recommended Cutting Conditions

10WHNSB-TH | 15WHNSB-TH | 20WHNSB-TH | 25WHNSB-TH | 30WHNSB-TH

Work material	Structural steels (~180HB) SS				Carbon steels (~200HB) S00C				Alloy steels (~30HRC) SCM, SKD			
	Internal coolant 40~120		MQL (mist) 40~110		Internal coolant 40~120		MQL (mist) 40~110		Internal coolant 40~100		MQL (mist) 40~90	
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ2.0	8,000	0.05~0.08	8,000	0.05~0.08	8,000	0.05~0.1	8,000	0.05~0.1	8,000	0.05~0.08	8,000	0.05~0.08
Φ4.0	7,000	0.1~0.16	5,500	0.1~0.16	7,000	0.1~0.16	5,500	0.1~0.16	6,300	0.08~0.12	5,000	0.08~0.12
Φ6.0	4,800	0.15~0.24	4,300	0.15~0.24	4,800	0.15~0.24	4,700	0.15~0.24	4,500	0.12~0.20	3,700	0.12~0.20
Φ8.0	3,600	0.18~0.3	3,200	0.18~0.3	3,600	0.18~0.3	3,600	0.18~0.3	3,400	0.16~0.24	2,900	0.16~0.24
Φ10.0	2,900	0.2~0.3	2,600	0.2~0.30	2,900	0.2~0.3	2,900	0.2~0.30	2,700	0.20~0.30	2,400	0.20~0.30
Φ12.0	2,400	0.22~0.35	2,200	0.22~0.35	2,400	0.22~0.35	2,400	0.22~0.35	2,400	0.22~0.32	2,100	0.22~0.32

Work material	Stainless steels SUS300 SUS400		Pre-hardened steels		Ductile irons FCD500				Casting FC250			
	Internal coolant 30~100		Internal coolant 20~50		Internal coolant 40~120		MQL (mist) 40~100		Internal coolant 40~150		MQL (mist) 40~120	
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ2.0	6,000	0.03~0.05	4,500	0.03~0.04	8,000	0.05~0.08	8,000	0.05~0.08	8,000	0.05~0.1	8,000	0.05~0.1
Φ4.0	4,800	0.08~0.12	2,400	0.04~0.08	7,000	0.1~0.16	6,300	0.1~0.16	8,000	0.1~0.16	7,000	0.1~0.16
Φ6.0	3,700	0.12~0.20	1,600	0.06~0.09	4,800	0.15~0.24	4,500	0.15~0.24	5,300	0.15~0.24	4,800	0.15~0.24
Φ8.0	2,700	0.16~0.24	1,200	0.08~0.12	3,600	0.18~0.3	3,400	0.18~0.3	4,000	0.18~0.3	3,600	0.18~0.3
Φ10.0	2,200	0.20~0.30	950	0.1~0.15	2,900	0.2~0.35	2,700	0.2~0.35	3,200	0.2~0.35	2,900	0.2~0.35
Φ12.0	1,800	0.22~0.32	800	0.1~0.15	2,400	0.22~0.35	2,400	0.22~0.35	2,650	0.22~0.35	2,400	0.22~0.35

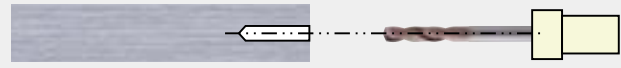
[Setting of Cutting Conditions] ※Be sure to refer to the boring procedure (under) when selecting a tool.

- ※Use the appropriate coolant for the work material and machining shape.
- ※These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- ※The above cutting conditions are based on the use of a water-soluble coolant diluted to a maximum of 20 times. When coolant dilution exceeds 20 times, decrease the cutting speed to the lowest in the specified range. When the tool diameter is $\phi 5.0$ or less, the coolant pressure should be 2.0 MPa or higher, and when the diameter is over $\phi 5.0$, the pressure should be 1.5 MPa or higher.
- ※When performing MQL (mist) machining, depending on the amount or status of spray from the tool, it may be necessary to reduce the cutting speed in order to perform machining.
- ※When changing the tool, use collet free from flaws and stains and attach the tool firmly so that its runout is 0.02mm or less.
- ※When cutting fluid is used, reduce the cutting speed to a speed lower than the lowest speed in the specified range. Take the greatest care to avoid smoke or ignition due to heating of chips and the tool.
- ※Works should be gripped firmly to prevent deformation, deflection and vibration.

Drilling Method

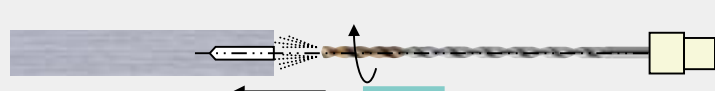
1 Drilling of pilot hole (guide hole) (03WHNSB-TH, 05WHNSB-TH)

- Hole depth : Tool diameter $\times 2\sim 5$ times
- Machining diameter : 08~30WHNSB diameter + 0.03~0.10mm
- Recommended tools : 0.3WHNSB-TH, Carbide stub type, MTO by customized allowance



2 Supplying coolant during low-speed revolution (08~30WHNSB-TH)

- Leading to the guide hole at low speed ($n=0\sim 500$ min⁻¹)
- Stop 2.0~5.0 mm before the end of the guide hole.
- ※When a long tool (200mm or longer) is used, position the tool to the guide hole at low revolution speed ($n=200$ min⁻¹ or less).



3 High-speed revolution for drilling feed (08~30WHNSB-TH)

- After confirming that the revolution speed is increasing at the specified rate, start feeding.



4 Machining completion

- Withdraw the tool at low speed. ($n=0\sim 500$ min⁻¹)
- ※When a long tool (200mm or longer) is used, withdraw the tool at low revolution speed ($n=200$ min⁻¹ or less).



Refer P.6~P.7 about 03WHNSB-TH and 05WHNSB-TH

40WHNSB-TH 50WHNSB-TH

Work material	Structural steels (~200HB) SS, S00C			Alloy steels (~30HRC) SCM			Tool steels (~35HRC) SKD		
	40~65~80			40~65~80			25~45~55		
Cutting speed v_c (m/min)	Revolution n (min ⁻¹)	Feed rate v_f (mm/min)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed rate v_f (mm/min)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed rate v_f (mm/min)	Feed per Rev f (mm/rev)
Tool dia. $\phi 2.5$	8,300	520	0.05~0.08	8,300	520	0.05~0.08	5,700	185	0.025~0.04
$\phi 3$	6,900	520	0.06~0.09	6,900	520	0.06~0.09	4,800	185	0.03~0.05
$\phi 4$	5,200	520	0.08~0.12	5,200	520	0.08~0.12	3,600	185	0.04~0.07
$\phi 5$	4,100	520	0.10~0.15	4,100	520	0.10~0.15	2,900	185	0.05~0.08
$\phi 6$	3,500	520	0.12~0.18	3,500	520	0.12~0.18	2,400	185	0.06~0.10
$\phi 8$	2,600	520	0.16~0.24	2,600	520	0.16~0.24	1,800	185	0.08~0.13
$\phi 8.5$	2,400	520	0.17~0.26	2,400	520	0.17~0.26	1,700	185	0.09~0.14
$\phi 10$	2,100	520	0.20~0.30	2,100	520	0.20~0.30	1,400	185	0.10~0.16

Work material	Tool steels Pre-hardened steels (35~45HRC)			Stainless steels SUS			Cast irons Ductile cast irons FC, FCD		
	25~40~50			30~50~60			40~65~80		
Cutting speed v_c (m/min)	Revolution n (min ⁻¹)	Feed rate v_f (mm/min)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed rate v_f (mm/min)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed rate v_f (mm/min)	Feed per Rev f (mm/rev)
Tool dia. $\phi 2.5$	5,100	165	0.025~0.04	6,400	320	0.04~0.06	8,300	630	0.06~0.09
$\phi 3$	4,200	165	0.03~0.05	5,300	320	0.05~0.07	6,900	630	0.07~0.11
$\phi 4$	3,200	165	0.04~0.07	4,000	320	0.06~0.09	5,200	630	0.10~0.14
$\phi 5$	2,500	165	0.05~0.08	3,200	320	0.08~0.12	4,100	630	0.12~0.18
$\phi 6$	2,100	165	0.06~0.10	2,700	320	0.10~0.14	3,500	630	0.15~0.21
$\phi 8$	1,600	165	0.08~0.13	2,000	320	0.13~0.18	2,600	520	0.16~0.24
$\phi 8.5$	1,500	165	0.09~0.14	1,900	320	0.14~0.20	2,400	520	0.17~0.26
$\phi 10$	1,300	165	0.10~0.16	1,600	320	0.16~0.23	2,100	520	0.20~0.30

[Setting of Cutting Conditions]

- The cutting conditions provided in the Recommended Cutting Conditions table are guidelines. For actual machining, adjust conditions based on machining shape, purpose, and machine type.
- When changing the tool, use a collet free of flaws and stains. Attach the tool securely so that the runout is 0.02 mm or less.
- Make sure the workpiece is gripped firmly to prevent deformation, deflection, and vibration.
- We recommend using coolant when machining stainless steels, aluminum alloys, or hardened steels of 40HRC or greater.
- The cutting conditions assume use of water-soluble cutting fluid diluted not more than 20-fold (5%). If the cutting fluid is diluted more than 20-fold, reduce the cutting speed to the lowest in the specified range. If the tool diameter is $\phi 5.0$ or less, coolant pressure should be at least 2.0 MPa. If the tool diameter exceeds $\phi 5.0$, coolant pressure should be at least 1.5 MPa.
- For mist machining, depending on tool spray rate and actual conditions, you may need to reduce cutting speed.
- If you are using oil-based cutting fluid, set the cutting speed below the lowest value of the specified range. Watch for and take adequate steps to avoid fire or smoke generation due to overheating of the tool and chips.

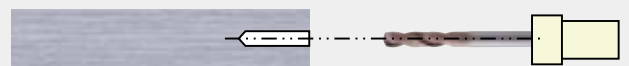
[Machining Precautions]

- To improve guiding characteristics, we recommend using 05WHNSB (as a guide, hole depth = diameter \times 5) for the guide hole.
Example: For 05WHNSB0500-TH, hole depth = $\phi 5.0 \times 5 = 25$ mm.
Tools used: ① guide: 05WHNSB0500-TH, ② long: 50WHNSB0500-TH
- Intermediate machining with the 10-20WHNSB (as a guide, hole depth = diameter \times 10 - 20) before machining with the 40-50WHNSB will minimize hole bending and other problems.
Example: Tools used: ① Guide: 05WHNSB0500-TH,
② Intermediate machining: 10WHNSB0500-TH,
③ Long: 50WHNSB0500-TH
- We recommend starting with step machining (starting with a step amount equal to diameter) to confirm there are no issues with coolant spray rate, cutting noise, chip evacuation, chip shape, or the load meter.
- As a general rule, adjust the feed rate to the minimum value for intersecting holes and through holes.

○ Drilling Method

1 Drilling of pilot hole (guide hole) (05WHNSB-TH)

- Hole depth : Tool diameter \times 5 times
- Machining diameter : 40~50WHNSB-TH diameter 0~+0.03mm



2 Supplying coolant during low-speed revolution (40~50WHNSB-TH)

- Leading to the guide hole at low speed ($n=0\sim 500$ min⁻¹)
- Stop feed 2.0~5.0 mm before the end of the guide hole.



3 High-speed revolution for drilling feed (40~50WHNSB-TH)

- After confirming that the revolution speed is increasing at the specified rate, start feeding.



4 Machining completion

- Withdraw the tool at low speed. ($n=0\sim 500$ min⁻¹)



Refer P.7 about 05WHNSB-TH

Recommended Cutting Conditions

O2WNSB-TH
O4WNSB-TH

Work material	Structural steels (~180HB) SS				Carbon steels (~200HB) S00C				Alloy steels (~30HRC) SCM			
	Coolant 70~100~150		MQL (mist) 70~100~150		Coolant 70~100~150		MQL (mist) 70~100~150		Coolant 70~100~150		MQL (mist) 50~80~130	
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ1.0	22,000	0.03~0.06	22,000	0.03~0.06	22,000	0.03~0.06	22,000	0.03~0.06	22,000	0.03~0.05	16,000	0.03~0.05
Φ2.0	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.08	12,800	0.05~0.08
Φ4.0	8,000	0.1~0.16	8,000	0.1~0.16	8,000	0.1~0.16	8,000	0.1~0.16	8,000	0.1~0.16	6,400	0.1~0.16
Φ6.0	5,300	0.15~0.24	5,300	0.15~0.24	5,300	0.15~0.24	5,300	0.15~0.24	5,300	0.15~0.24	4,300	0.15~0.24
Φ8.0	4,000	0.18~0.3	4,000	0.18~0.3	4,000	0.18~0.3	4,000	0.18~0.3	4,000	0.18~0.3	3,200	0.18~0.3
Φ10.0	3,200	0.2~0.35	3,200	0.2~0.35	3,200	0.2~0.35	3,200	0.2~0.35	3,200	0.2~0.35	2,550	0.2~0.35
Φ12.0	2,650	0.22~0.4	2,650	0.22~0.4	2,650	0.22~0.4	2,650	0.22~0.4	2,650	0.22~0.4	2,100	0.22~0.4

Work material	Alloy steels (~30HRC) Pre-hardened steels (~40HRC)				Pre-hardened steels (~50HRC) SKD	
	Coolant 30~50~80		MQL (mist) 20~40~60		Coolant 20~30~40	
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ1.0	9,500	0.02~0.04	6,300	0.02~0.04	6,300	0.01~0.03
Φ2.0	8,000	0.04~0.07	6,400	0.04~0.07	4,800	0.03~0.05
Φ4.0	4,000	0.08~0.13	3,200	0.08~0.13	2,400	0.05~0.1
Φ6.0	2,650	0.12~0.19	2,100	0.12~0.19	1,600	0.08~0.14
Φ8.0	2,000	0.14~0.24	1,600	0.14~0.24	1,200	0.12~0.18
Φ10.0	1,600	0.16~0.28	1,250	0.16~0.28	1,000	0.15~0.2
Φ12.0	1,300	0.18~0.32	1,050	0.18~0.32	800	0.17~0.24

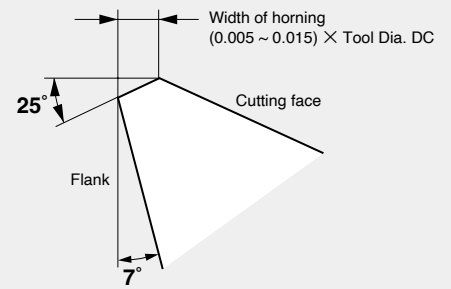
Work material	Ductile irons FCD500				Casting FC250			
	Coolant 50~80~130		MQL (mist) 50~80~130		Coolant 70~100~150		MQL (mist) 70~100~150	
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ1.0	16,000	0.03~0.06	16,000	0.03~0.06	22,000	0.03~0.06	22,000	0.03~0.06
Φ2.0	12,800	0.05~0.1	12,800	0.05~0.1	16,000	0.05~0.1	16,000	0.05~0.1
Φ4.0	6,400	0.1~0.16	6,400	0.1~0.16	8,000	0.1~0.16	8,000	0.1~0.16
Φ6.0	4,300	0.15~0.24	4,300	0.15~0.24	5,300	0.15~0.24	5,300	0.15~0.24
Φ8.0	3,200	0.18~0.3	3,200	0.18~0.3	4,000	0.18~0.3	4,000	0.18~0.3
Φ10.0	2,550	0.2~0.35	2,550	0.2~0.35	3,200	0.2~0.35	3,200	0.2~0.35
Φ12.0	2,100	0.22~0.4	2,100	0.22~0.4	2,650	0.22~0.4	2,650	0.22~0.4

[Setting of Cutting Conditions]

- ※ Use the appropriate coolant for the work material and machining shape.
- ※ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- ※ The above cutting conditions are based on the use of a water-soluble coolant.
- ※ When performing MQL (mist) machining, depending on the amount or status of spray from the tool, the piping route, etc., it may be necessary to reduce the cutting speed in order to perform machining.
- ※ When changing the tool, use a collet free from flaws and stains, and attach the tool firmly so that its runout is 0.02mm or less.
- ※ The above conditions apply to a hole-depth of 4 times the diameter or less.
- ※ When cutting fluid is used, reduce the cutting speed to 70% of the lowest speed.
- ※ Adjust the cutting conditions according to work gripping conditions and rigidity of the machine.
- ※ You can use borers at a revolution speed lower than the above values.

○ Re-grinding for Carbide Non Step Borer

- 1 Performance may deteriorate to 20%~40% of the initial performance due to the method of regrinding and re-coating. Without coating after regrinding, performance may be further reduced and cause chipping or breakage of the drill. It is recommended that you ask us to regrind and recoat your drill to maintain its performance.
- 2 When regrinding yourself, finish the cutting edge surface so that its roughness is 1.6S or less and the lip height difference is 0.02mm or less.



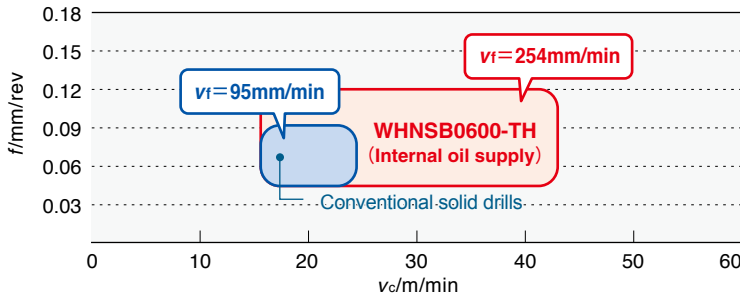
Drill regrinding/recoating orders accepted. Please contact our sales department.



INCONEL718/ Solution treatment + Age-hardening treatment

03WHNSB-TH

- [Cutting conditions]**
- Work : INCONEL718 (Solution treatment + Age-hardening treatment)
 - Tool : 03WHNSB0600-TH • Hole depth : 18mm
 - Coolant : Water-soluble coolant, Internal oil supply



2.7 times greater drilling efficiency

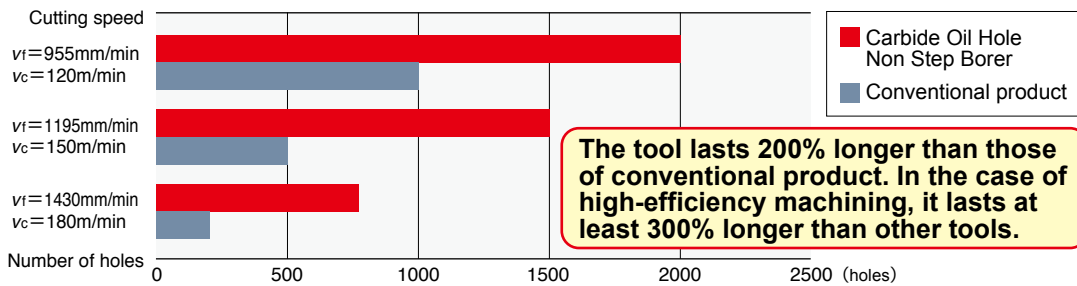
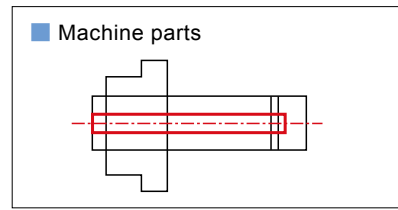


Long-life operation possible with high-efficiency machining that uses an internal oil supply

05WHNSB-TH

TH Coating ensures longevity even for high-speed machining that causes high temperatures.

- [Cutting conditions]**
- Work : SCM440(30HRC) • Tool : 05WHNSB0600-TH
 - Hole depth: 30mm(Blind hole)
 - Coolant : Water-soluble coolant, Internal oil supply



The tool lasts 200% longer than those of conventional product. In the case of high-efficiency machining, it lasts at least 300% longer than other tools.

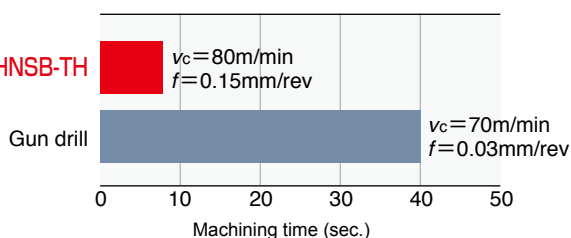


High-efficiency machining and long tool life by MQL.

15WHNSB-TH

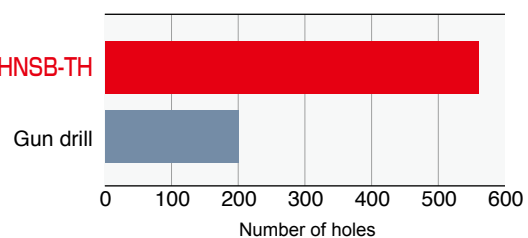
- [Cutting conditions]**
- Work : Equivalent to S48C • Tool : 15WHNSB0550-TH • Hole depth : 80mm (L/D=15)
 - Coolant : MQL(mist), Internal oil supply • Revolutions (n) : 4630min⁻¹
 - Cutting speed (vc) : 80m/min • Feed rate(vf) : 695mm/min • Feed rate(f) : 0.15mm/rev
 - Gun drill cutting conditions : • Revolutions (n) : 4050min⁻¹ • Cutting speed (vc) : 70m/min
 - Feed rate (vf) : 121mm/min • Feed rate(f) : 0.03mm/rev (Oil base coolant)

• Comparison of machining time



Machines at least four times more efficiently!

• Comparison of machining cost



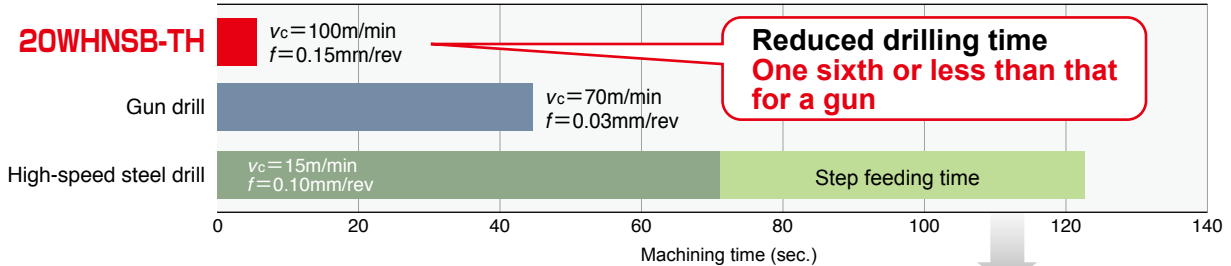
Makes tool life at least two times longer!



Drastic reduction of machining time.

20WHNSB-TH

- [Cutting conditions]**
- Work : S50C(HB220)
 - Tool : 20WHNSB0500-TH
 - Hole depth : 100mm (L/D=20)
 - Coolant : Water-soluble coolant, Internal oil supply



Problems with gun-drill machining

- 1 High-speed feeding is not possible.
- 2 Requires high-pressure coolant.
- 3 Drilling conditions are difficult to select.
- 4 Frequent tool breakage.

WHNSB-TH solves these problems - it greatly increases machining efficiency and drastically reduces machining costs!



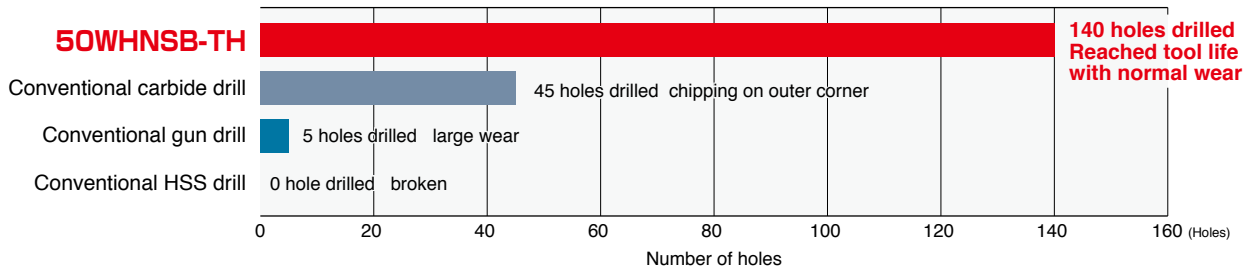
Non-step boring of 50D hole depth

50WHNSB-TH

	MOLDINO 50WHNSB0600-TH	Conventional carbide drill	Conventional gun drill	Conventional HSS drill
n : min ⁻¹	2,500	2,500	3,185	400
V_c : m/min	47	47	60	7.5
V_f : mm/min	200	200	64	24
f : mm/rev	0.08	0.08	0.02	0.06

Compared to conventional gun drills, WHNSB having the highly chipping-resistant cutting edge offers three times the cutting efficiency and ten times the service life. Compared to conventional carbide drills, it offers three times the service life.

- [Cutting conditions]**
- Work material : SKD61annealed material
 - Tool : 50WHNSB0600-TH
 - Hole depth : 265(L/D=44)mm
 - Coolant : Water-soluble coolant, Internal oil supply 2.2MPa

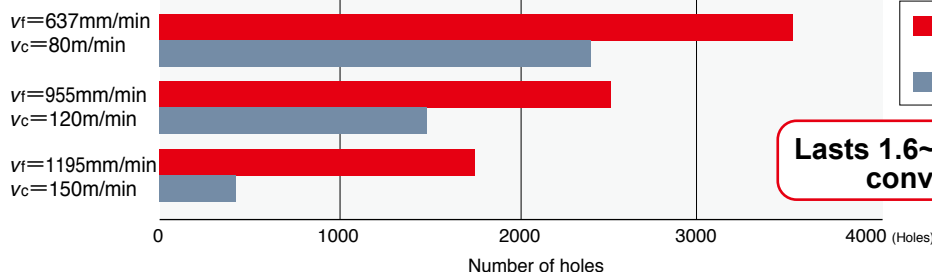
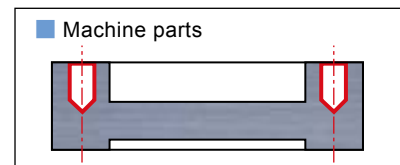


Long-life even if coolant is supplied externally

04WNSB-TH

TH Coating enables efficient machining during high-speed machining causing high temperature. It also reduces machining cost.

- [Cutting conditions]**
- Work material : SCM440(25~30HRC)
 - Tool : 04WNSB0680-TH
 - Hole depth : 22mm(Blind hole)
 - Coolant : External supply of water-soluble coolant



Lasts 1.6~3 times longer than conventional tools.

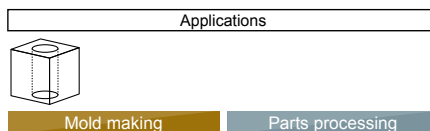
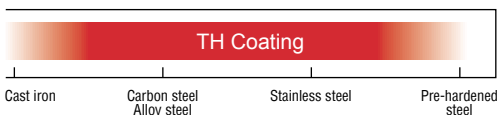
MINIATURE DRILL WHMB

MINIATURE DRILL WHMB drills small-diameter holes with high efficiency and high accuracy.

Features of WHMB-TH

- 01** **New** flute shape form specifically for small-diameter drills
 High-accuracy flute shape form enables high-accuracy hole drilling.
- 02** Large oil hole
 Achieves high coolant output.
- 03** Advanced double-margin shape
 Improves guide characteristics to improve hole accuracy.
- 04** Uses **New** coating technology.
 High-hardness coating for small-diameter tools is formed using new technology.

Add 165 items with 0.01mm increments
Total 312 items



WHMB-TH
$\phi 1.0 \sim \phi 2.03$ L/D=3~30 [312 Items]

Features

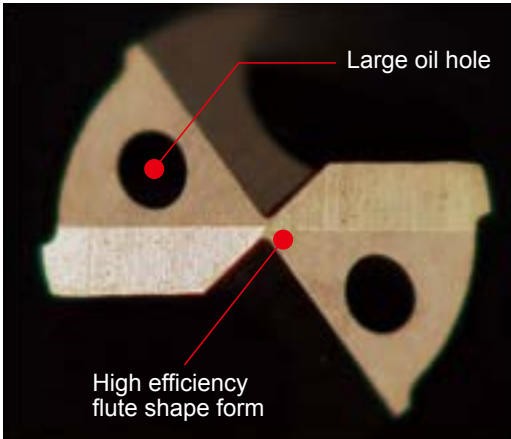
01

New flute shape form specifically for small-diameter drills

Features

02

Large oil hole

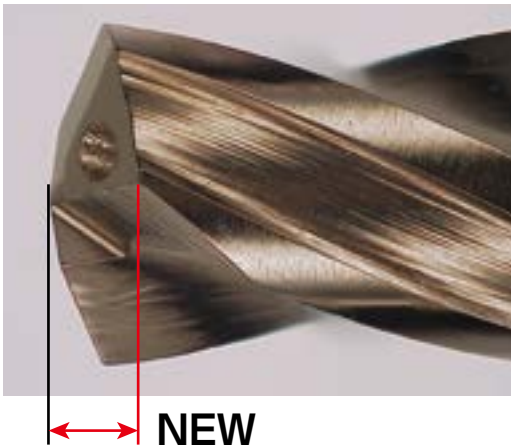


- **New flute shape form** (High-accuracy flute shape form)
Suppresses tool wandering by improving biting characteristics.
- **Large oil hole**
Suppresses chip clogging through high-output coolant discharge.

Features

03

Advanced double-margin shape



Double margin position is put on flute tip side to improve guide characteristics.

WHMB-TH

High-accuracy flute shape form + Large oil hole + Advanced double-margin form



Conventional



Comparison of hole waviness

Features

04

TH Coating improves stability during high-temperature drilling.

- The new Nano-composite coating material offers extraordinary heat resistance and hardness due to its new composite layer consisting of Nano-crystal material.
- This coating shows extraordinary performance in high speed cutting and high efficient drilling of various work materials from mild steels to hardened steels.

WHNSB-TH

WNSB-TH

WHMB-TH

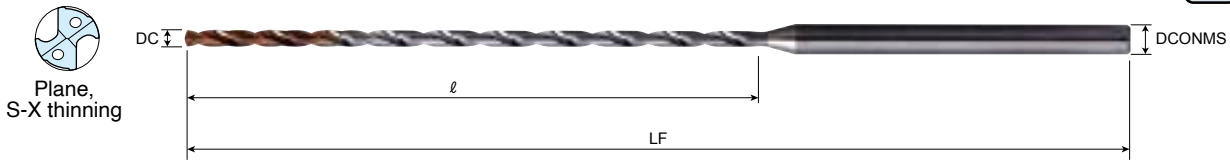
NSBH-ATH

FWHNSB-TH

EMSBS

EMSBH-ATH

MINIATURE DRILL WHMB



WHMB-TH

With oil hole

Cutting condition 31



Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0100-TH	●	6	55	3	
05WHMB0100-TH	●	10	55	3	
10WHMB0100-TH	●	15	55	3	
15WHMB0100-TH	●	20	60	3	
20WHMB0100-TH	●	24	65	3	
25WHMB0100-TH	●	28	65	3	
30WHMB0100-TH	●	33	70	3	
03WHMB0101-TH	□	6	55	3	
05WHMB0101-TH	□	10	55	3	
10WHMB0101-TH	□	16	55	3	
20WHMB0101-TH	□	25	65	3	
30WHMB0101-TH	□	35	75	3	
03WHMB0102-TH	□	6	55	3	
05WHMB0102-TH	□	10	55	3	
10WHMB0102-TH	□	16	55	3	
20WHMB0102-TH	□	25	65	3	
30WHMB0102-TH	□	35	75	3	
03WHMB0103-TH	□	6	55	3	
05WHMB0103-TH	□	10	55	3	
10WHMB0103-TH	□	16	55	3	
20WHMB0103-TH	□	25	65	3	
30WHMB0103-TH	□	35	75	3	
03WHMB0105-TH	●	6	55	3	
05WHMB0105-TH	●	10	55	3	
10WHMB0105-TH	●	16	55	3	
15WHMB0105-TH	●	20	60	3	
20WHMB0105-TH	●	25	65	3	
25WHMB0105-TH	●	30	70	3	
30WHMB0105-TH	●	35	75	3	
03WHMB0110-TH	●	6	55	3	
05WHMB0110-TH	●	11	55	3	
10WHMB0110-TH	●	17	55	3	
15WHMB0110-TH	●	22	60	3	
20WHMB0110-TH	●	26	65	3	
25WHMB0110-TH	●	32	70	3	
30WHMB0110-TH	●	37	75	3	
03WHMB0111-TH	□	6	55	3	
05WHMB0111-TH	□	11	55	3	
10WHMB0111-TH	□	18	60	3	
20WHMB0111-TH	□	28	70	3	
30WHMB0111-TH	□	38	75	3	

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0112-TH	□	6	55	3	
05WHMB0112-TH	□	11	55	3	
10WHMB0112-TH	□	18	60	3	
20WHMB0112-TH	□	28	70	3	
30WHMB0112-TH	□	38	75	3	
03WHMB0113-TH	□	6	55	3	
05WHMB0113-TH	□	11	55	3	
10WHMB0113-TH	□	18	60	3	
20WHMB0113-TH	□	28	70	3	
30WHMB0113-TH	□	38	75	3	
03WHMB0115-TH	●	6	55	3	
05WHMB0115-TH	●	11	55	3	
10WHMB0115-TH	●	18	60	3	
15WHMB0115-TH	●	23	60	3	
20WHMB0115-TH	●	28	70	3	
25WHMB0115-TH	●	33	70	3	
30WHMB0115-TH	●	38	75	3	
03WHMB0120-TH	●	6	55	3	
05WHMB0120-TH	●	12	55	3	
10WHMB0120-TH	●	18	60	3	
15WHMB0120-TH	●	23	60	3	
20WHMB0120-TH	●	29	70	3	
25WHMB0120-TH	●	35	75	3	
30WHMB0120-TH	●	40	80	3	
03WHMB0121-TH	□	7	55	3	
05WHMB0121-TH	□	13	55	3	
10WHMB0121-TH	□	20	60	3	
20WHMB0121-TH	□	31	70	3	
30WHMB0121-TH	□	42	80	3	
03WHMB0122-TH	□	7	55	3	
05WHMB0122-TH	□	13	55	3	
10WHMB0122-TH	□	20	60	3	
20WHMB0122-TH	□	31	70	3	
30WHMB0122-TH	□	42	80	3	
03WHMB0123-TH	□	7	55	3	
05WHMB0123-TH	□	13	55	3	
10WHMB0123-TH	□	20	60	3	
20WHMB0123-TH	□	31	70	3	
30WHMB0123-TH	□	42	80	3	

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0125-TH	●	7	55	3	
05WHMB0125-TH	●	13	55	3	
10WHMB0125-TH	●	20	60	3	
15WHMB0125-TH	●	24	60	3	
20WHMB0125-TH	●	31	70	3	
25WHMB0125-TH	●	36	75	3	
30WHMB0125-TH	●	42	80	3	
03WHMB0130-TH	●	7	55	3	
05WHMB0130-TH	●	14	55	3	
10WHMB0130-TH	●	21	60	3	
15WHMB0130-TH	●	25	70	3	
20WHMB0130-TH	●	32	70	3	
25WHMB0130-TH	●	37	75	3	
30WHMB0130-TH	●	43	80	3	
03WHMB0131-TH	□	7	55	3	
05WHMB0131-TH	□	14	55	3	
10WHMB0131-TH	□	21	60	3	
20WHMB0131-TH	□	33	70	3	
30WHMB0131-TH	□	45	85	3	
03WHMB0132-TH	□	7	55	3	
05WHMB0132-TH	□	14	55	3	
10WHMB0132-TH	□	21	60	3	
20WHMB0132-TH	□	33	70	3	
30WHMB0132-TH	□	45	85	3	
03WHMB0133-TH	□	7	55	3	
05WHMB0133-TH	□	14	55	3	
10WHMB0133-TH	□	21	60	3	
20WHMB0133-TH	□	33	70	3	
30WHMB0133-TH	□	45	85	3	
03WHMB0135-TH	●	7	55	3	
05WHMB0135-TH	●	14	55	3	
10WHMB0135-TH	●	21	60	3	
15WHMB0135-TH	●	26	70	3	
20WHMB0135-TH	●	33	70	3	
25WHMB0135-TH	●	37	75	3	
30WHMB0135-TH	●	45	85	3	

WHMB-TH

With oil hole

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0140-TH	●	7	55	3	
05WHMB0140-TH	●	15	55	3	
10WHMB0140-TH	●	22	60	3	
15WHMB0140-TH	●	27	70	3	
20WHMB0140-TH	●	33	70	3	
25WHMB0140-TH	●	38	75	3	
30WHMB0140-TH	●	47	85	3	
03WHMB0141-TH	□	7	55	3	
05WHMB0141-TH	□	15	55	3	
10WHMB0141-TH	□	23	60	3	
20WHMB0141-TH	□	35	75	3	
30WHMB0141-TH	□	49	85	3	
03WHMB0142-TH	□	7	55	3	
05WHMB0142-TH	□	15	55	3	
10WHMB0142-TH	□	23	60	3	
20WHMB0142-TH	□	35	75	3	
30WHMB0142-TH	□	49	85	3	
03WHMB0143-TH	□	7	55	3	
05WHMB0143-TH	□	15	55	3	
10WHMB0143-TH	□	23	60	3	
20WHMB0143-TH	□	35	75	3	
30WHMB0143-TH	□	49	85	3	
03WHMB0145-TH	●	7	55	3	
05WHMB0145-TH	●	15	55	3	
10WHMB0145-TH	●	23	60	3	
15WHMB0145-TH	●	30	70	3	
20WHMB0145-TH	●	35	75	3	
25WHMB0145-TH	●	42	80	3	
30WHMB0145-TH	●	49	85	3	
03WHMB0150-TH	●	8	55	3	
05WHMB0150-TH	●	16	55	3	
10WHMB0150-TH	●	24	60	3	
15WHMB0150-TH	●	30	70	3	
20WHMB0150-TH	●	37	75	3	
25WHMB0150-TH	●	42	80	3	
30WHMB0150-TH	●	50	90	3	
03WHMB0151-TH	□	8	55	3	
05WHMB0151-TH	□	16	55	3	
10WHMB0151-TH	□	22	60	3	
20WHMB0151-TH	□	37	75	3	
30WHMB0151-TH	□	52	90	3	

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0152-TH	□	8	55	3	
05WHMB0152-TH	□	16	55	3	
10WHMB0152-TH	□	22	60	3	
20WHMB0152-TH	□	37	75	3	
30WHMB0152-TH	□	52	90	3	
03WHMB0153-TH	□	8	55	3	
05WHMB0153-TH	□	16	55	3	
10WHMB0153-TH	□	22	60	3	
20WHMB0153-TH	□	37	75	3	
30WHMB0153-TH	□	52	90	3	
03WHMB0155-TH	●	8	55	3	
05WHMB0155-TH	●	16	55	3	
10WHMB0155-TH	●	22	60	3	
15WHMB0155-TH	●	32	70	3	
20WHMB0155-TH	●	37	75	3	
25WHMB0155-TH	●	44	85	3	
30WHMB0155-TH	●	52	90	3	
03WHMB0160-TH	●	8	55	3	
05WHMB0160-TH	●	17	55	3	
10WHMB0160-TH	●	26	65	3	
15WHMB0160-TH	●	33	70	3	
20WHMB0160-TH	●	37	75	3	
25WHMB0160-TH	●	45	85	3	
30WHMB0160-TH	●	53	90	3	
03WHMB0161-TH	□	8	55	3	
05WHMB0161-TH	□	17	55	3	
10WHMB0161-TH	□	26	65	3	
20WHMB0161-TH	□	38	75	3	
30WHMB0161-TH	□	55	95	3	
03WHMB0162-TH	□	8	55	3	
05WHMB0162-TH	□	17	55	3	
10WHMB0162-TH	□	26	65	3	
20WHMB0162-TH	□	38	75	3	
30WHMB0162-TH	□	55	95	3	
03WHMB0163-TH	□	8	55	3	
05WHMB0163-TH	□	17	55	3	
10WHMB0163-TH	□	26	65	3	
20WHMB0163-TH	□	38	75	3	
30WHMB0163-TH	□	55	95	3	

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0165-TH	●	8	55	3	
05WHMB0165-TH	●	17	55	3	
10WHMB0165-TH	●	26	65	3	
15WHMB0165-TH	●	33	70	3	
20WHMB0165-TH	●	38	75	3	
25WHMB0165-TH	●	46	90	3	
30WHMB0165-TH	●	55	95	3	
03WHMB0170-TH	●	8	55	3	
05WHMB0170-TH	●	18	55	3	
10WHMB0170-TH	●	27	65	3	
15WHMB0170-TH	●	34	70	3	
20WHMB0170-TH	●	40	80	3	
25WHMB0170-TH	●	48	85	3	
30WHMB0170-TH	●	57	95	3	
03WHMB0171-TH	□	8	55	3	
05WHMB0171-TH	□	19	60	3	
10WHMB0171-TH	□	27	65	3	
20WHMB0171-TH	□	41	80	3	
30WHMB0171-TH	□	58	95	3	
03WHMB0172-TH	□	8	55	3	
05WHMB0172-TH	□	19	60	3	
10WHMB0172-TH	□	27	65	3	
20WHMB0172-TH	□	41	80	3	
30WHMB0172-TH	□	58	95	3	
03WHMB0173-TH	□	8	55	3	
05WHMB0173-TH	□	19	60	3	
10WHMB0173-TH	□	27	65	3	
20WHMB0173-TH	□	41	80	3	
30WHMB0173-TH	□	58	95	3	
03WHMB0175-TH	●	8	55	3	
05WHMB0175-TH	●	19	60	3	
10WHMB0175-TH	●	27	65	3	
15WHMB0175-TH	●	34	75	3	
20WHMB0175-TH	●	41	80	3	
25WHMB0175-TH	●	50	90	3	
30WHMB0175-TH	●	58	95	3	

WHNSB-TH

WNSB-TH

WHMB-TH

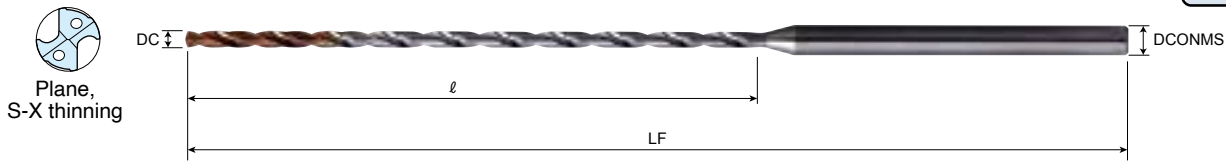
NSBH-ATH

FWHNSB-TH

EMSBS

EMSBI-ATH

MINIATURE DRILL WHMB



WHMB-TH With oil hole

Cutting condition 31



Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0180-TH	●	10	55	3	
05WHMB0180-TH	●	19	60	3	
10WHMB0180-TH	●	28	65	3	
15WHMB0180-TH	●	36	75	3	
20WHMB0180-TH	●	43	80	3	
25WHMB0180-TH	●	51	90	3	
30WHMB0180-TH	●	60	100	3	
03WHMB0181-TH	□	10	55	3	
05WHMB0181-TH	□	20	60	3	
10WHMB0181-TH	□	29	70	3	
20WHMB0181-TH	□	45	85	3	
30WHMB0181-TH	□	61	100	3	
03WHMB0182-TH	□	10	55	3	
05WHMB0182-TH	□	20	60	3	
10WHMB0182-TH	□	29	70	3	
20WHMB0182-TH	□	45	85	3	
30WHMB0182-TH	□	61	100	3	
03WHMB0183-TH	□	10	55	3	
05WHMB0183-TH	□	20	60	3	
10WHMB0183-TH	□	29	70	3	
20WHMB0183-TH	□	45	85	3	
30WHMB0183-TH	□	61	100	3	
03WHMB0185-TH	●	10	55	3	
05WHMB0185-TH	●	20	60	3	
10WHMB0185-TH	●	29	70	3	
15WHMB0185-TH	●	38	75	3	
20WHMB0185-TH	●	45	85	3	
25WHMB0185-TH	●	53	90	3	
30WHMB0185-TH	●	61	100	3	
03WHMB0190-TH	●	10	55	3	
05WHMB0190-TH	●	20	60	3	
10WHMB0190-TH	●	29	70	3	
15WHMB0190-TH	●	39	75	3	
20WHMB0190-TH	●	45	85	3	
25WHMB0190-TH	●	55	95	3	
30WHMB0190-TH	●	63	100	3	

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0191-TH	□	10	55	3	
05WHMB0191-TH	□	20	60	3	
10WHMB0191-TH	□	30	70	3	
20WHMB0191-TH	□	47	85	3	
30WHMB0191-TH	□	65	105	3	
03WHMB0192-TH	□	10	55	3	
05WHMB0192-TH	□	20	60	3	
10WHMB0192-TH	□	30	70	3	
20WHMB0192-TH	□	47	85	3	
30WHMB0192-TH	□	65	105	3	
03WHMB0193-TH	□	10	55	3	
05WHMB0193-TH	□	20	60	3	
10WHMB0193-TH	□	30	70	3	
20WHMB0193-TH	□	47	85	3	
30WHMB0193-TH	□	65	105	3	
03WHMB0195-TH	●	10	55	3	
05WHMB0195-TH	●	20	60	3	
10WHMB0195-TH	●	30	70	3	
15WHMB0195-TH	●	41	80	3	
20WHMB0195-TH	●	47	85	3	
25WHMB0195-TH	●	56	95	3	
30WHMB0195-TH	●	65	105	3	
03WHMB0200-TH	●	10	55	3	
05WHMB0200-TH	●	20	60	3	
10WHMB0200-TH	●	30	70	3	
15WHMB0200-TH	●	41	80	3	
20WHMB0200-TH	●	47	85	3	
25WHMB0200-TH	●	57	95	3	
30WHMB0200-TH	●	67	105	3	
03WHMB0201-TH	□	10	55	3	
05WHMB0201-TH	□	21	60	3	
10WHMB0201-TH	□	31	70	3	
20WHMB0201-TH	□	49	90	3	
30WHMB0201-TH	□	69	110	3	

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
03WHMB0202-TH	□	10	55	3	
05WHMB0202-TH	□	21	60	3	
10WHMB0202-TH	□	31	70	3	
20WHMB0202-TH	□	49	90	3	
30WHMB0202-TH	□	69	110	3	
03WHMB0203-TH	□	10	55	3	
05WHMB0203-TH	□	21	60	3	
10WHMB0203-TH	□	31	70	3	
20WHMB0203-TH	□	49	90	3	
30WHMB0203-TH	□	69	110	3	

Applicable work material

Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel	Stainless steel	Heat-resistant steel	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	S00C	SCM, SCr	SKD SKS	~40HRC	~45HRC 45HRC~	SUS	Ti alloy Inconel	FC	FCD	Al	Cu
○	○	○	○	○		○				○	○

Re-grinding compatibility range

Item code	DC (mm)
WHMB-TH	(N/A)

Manufacturer regrinding/recoating is not possible. ● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

Recommended Cutting Conditions

Up to 5D

03WHMB-TH

05WHMB-TH

Tool dia. (mm)	Cutting condition	Carbon steel SC	Alloy steels SCM	Stainless steels SUS304	Stainless steels SUS630	Aluminium alloys
1	Cutting speed (v_c) m/min	30~40~50	30~40~50	20~30~40	20~30~40	40~60~80
	Revolution (n) min ⁻¹	12,732	12,732	9,549	9,549	19,099
	Feed per rev (f) mm/rev	0.01~0.04	0.01~0.04	0.01~0.04	0.01~0.03	0.01~0.05
1.5	Cutting speed (v_c) m/min	30~40~50	30~40~50	20~30~40	20~30~40	40~60~80
	Revolution (n) min ⁻¹	8,488	8,488	6,366	6,366	12,732
	Feed per rev (f) mm/rev	0.015~0.06	0.015~0.06	0.015~0.06	0.015~0.045	0.015~0.075
2	Cutting speed (v_c) m/min	30~40~50	30~40~50	20~30~40	20~30~40	40~60~80
	Revolution (n) min ⁻¹	6,366	6,366	4,775	4,775	9,549
	Feed per rev (f) mm/rev	0.02~0.08	0.02~0.08	0.02~0.08	0.02~0.06	0.02~0.1

10D or more

10WHMB-TH

15WHMB-TH

20WHMB-TH

25WHMB-TH

30WHMB-TH

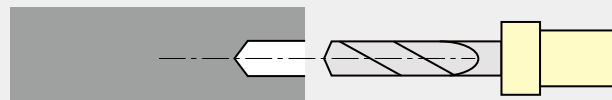
Tool dia. (mm)	Cutting condition	Carbon steel SC	Alloy steels SCM	Stainless steels SUS304	Stainless steels SUS630	Aluminium alloys
1	Cutting speed (v_c) m/min	30~40~50	30~40~50	20~30~40	20~30~40	30~40~60
	Revolution (n) min ⁻¹	12,732	12,732	9,549	9,549	12,732
	Feed per rev (f) mm/rev	0.01~0.03	0.01~0.03	0.01~0.03	0.01~0.015	0.01~0.04
1.5	Cutting speed (v_c) m/min	30~40~50	30~40~50	20~30~40	20~30~40	30~40~60
	Revolution (n) min ⁻¹	8,488	8,488	6,366	6,366	8,488
	Feed per rev (f) mm/rev	0.015~0.045	0.015~0.045	0.015~0.045	0.015~0.023	0.015~0.06
2	Cutting speed (v_c) m/min	30~40~50	30~40~50	20~30~40	20~30~40	30~40~60
	Revolution (n) min ⁻¹	6,366	6,366	4,775	4,775	6,366
	Feed per rev (f) mm/rev	0.02~0.06	0.02~0.06	0.02~0.06	0.02~0.03	0.02~0.08

[Setting of Cutting Conditions]

- This standard cutting condition table is for general guidance regarding cutting conditions. The conditions should be adjusted according to the machining shape, application, machine used, etc. for the actual machining.
- For the cutting fluid, water-based cutting fluids are recommended.
- Internal coolant pressure of 1.5MPa or higher is recommended. (When pressure is less than 1.5MPa, performing step machining is recommended.)
- Use a mesh filter (3 μ m to 5 μ m) to prevent clogging of coolant hole.
- G81 is recommended as the machining cycle.
- When removal of chips is difficult, perform step machining of about the tool diameter. (G73, G83 cycle)
- When mounting the tool, use of a collet without scratches or dirt and tool deflection of 0.02 mm or less is recommended.
- When using 10D type or larger tools, it is recommended that a 3D type tool is used to create a pilot hole.
- When performing machining using a long drill (10D or more), perform machining at $v_c=80$ m/min. or less. If the tool is rotated at high speed, it may be broken by centrifugal force.
- Please consult us regarding machining of materials other than those listed above.

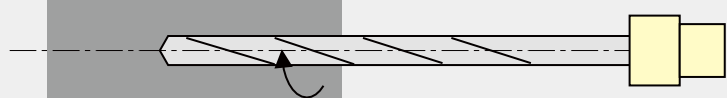
Machining method when using a long drill (10D type or longer)

- 1 Use 03WHMB-TH to machine a hole with a depth of 3 times the tool diameter.

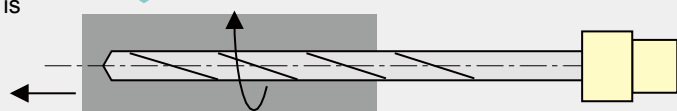


- 2 Machine using a long drill.

※When using a horizontal machine, low-speed rotation ($n=0$ to 500 min⁻¹) while advancing is recommended.



- 3 Dwelling at the bottom of the hole for 0.3 s is recommended.



WHNSB-TH

WNSB-TH

WHMB-TH

NSBH-ATH

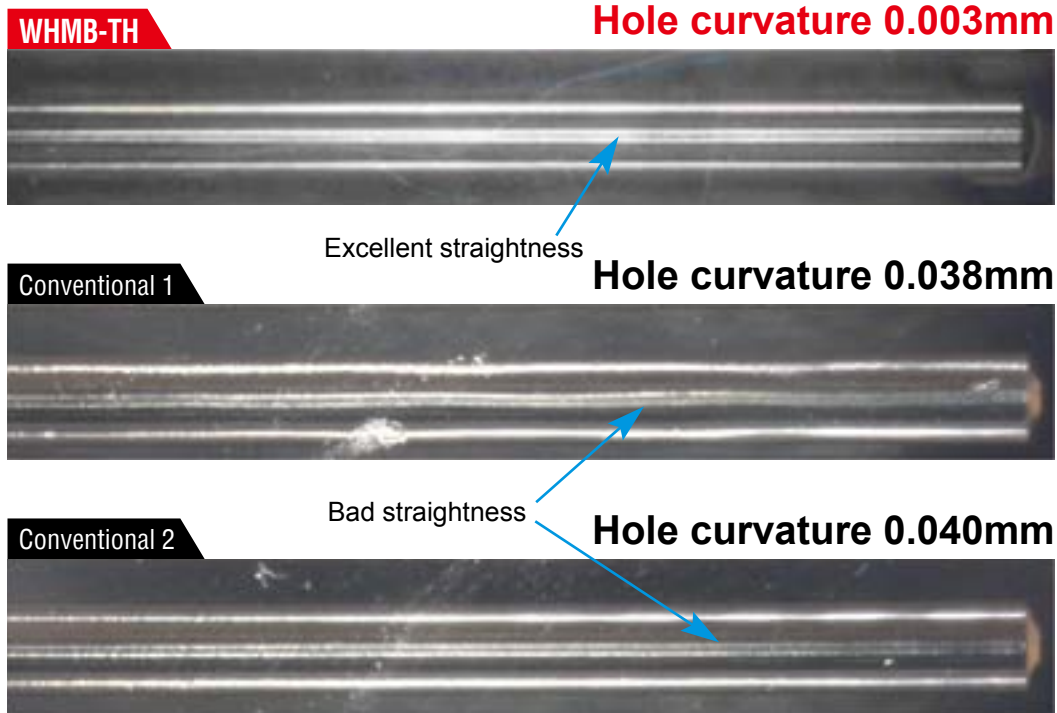
FWHNSB-TH

EMSBS

EMSBI-ATH

Example of hole curvature in acrylic [$\phi 1.0\text{mm}$, 20D type]

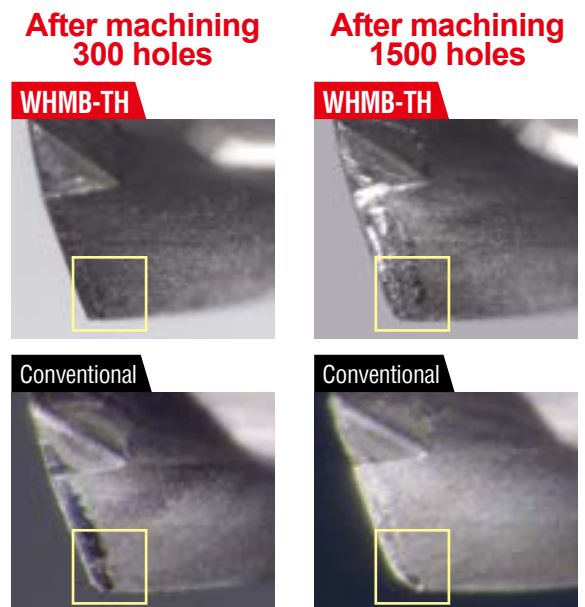
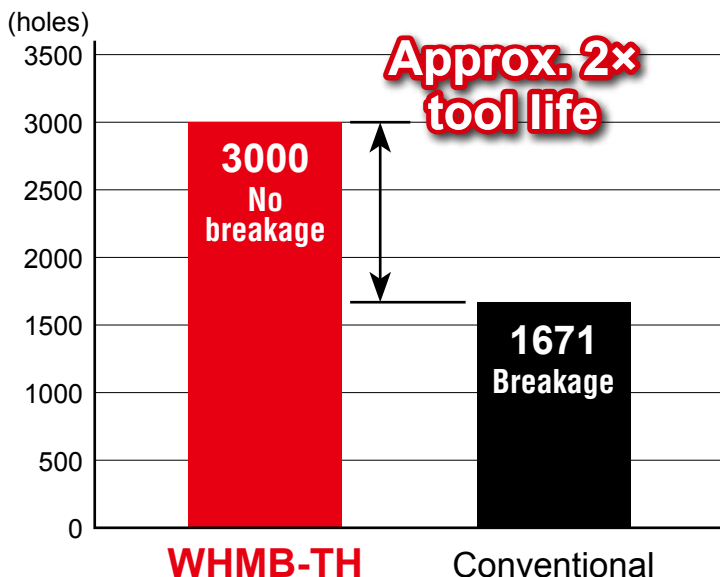
Cutting condition $v_c=30\text{m/min}$, $n=9,549\text{min}^{-1}$, $f=0.02\text{mm/rev}$, $v_f=190\text{mm/min}$, Hole depth=18mm, Pilot hole depth=1mm, Non step machining, Water base coolant, Internal coolant pressure 3MPa



High-accuracy flute shape form achieves higher hole accuracy than conventional products.

Stainless steel (SUS304) machining example [$\phi 1.0\text{mm}$, 20D type]

Cutting condition $v_c=30\text{m/min}$, $n=9,549\text{min}^{-1}$, $f=0.02\text{mm/rev}$, $v_f=190\text{mm/min}$, Hole depth=18mm, Pilot hole depth=1mm, Non step machining, Water base coolant, Internal coolant pressure 3MPa



WHMB maintains the flute edge condition even after machining 1,500 holes.

Stainless steel (SUS630) machining example

03WHMB0170-TH ϕ 1.7mm 3D type

Cutting condition

$v_c=30\text{m/min}$, $n=5,617\text{min}^{-1}$, $f=0.0425\text{mm/rev}$,
 $v_f=239\text{mm/min}$, Hole depth=5mm,
 Non step machining, Water base coolant,
 Internal coolant pressure 3MPa

**After machining 800 holes,
 continued machining is possible**



30WHMB0170-TH ϕ 1.7mm 3D type

Cutting condition

$v_c=30\text{m/min}$, $n=5,617\text{min}^{-1}$, $f=0.025\text{mm/rev}$,
 $v_f=143\text{mm/min}$, Hole depth=48mm,
 Non step machining, Water base coolant,
 Internal coolant pressure 3MPa

**After machining 200 holes,
 continued machining is possible**



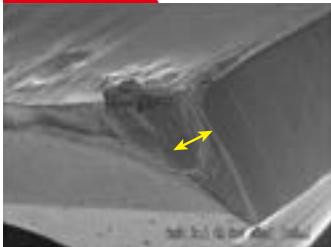
Chrome molybdenum steel (SCM420) machining example [ϕ 1.0mm 30D type]

Cutting condition (G73 cycle)

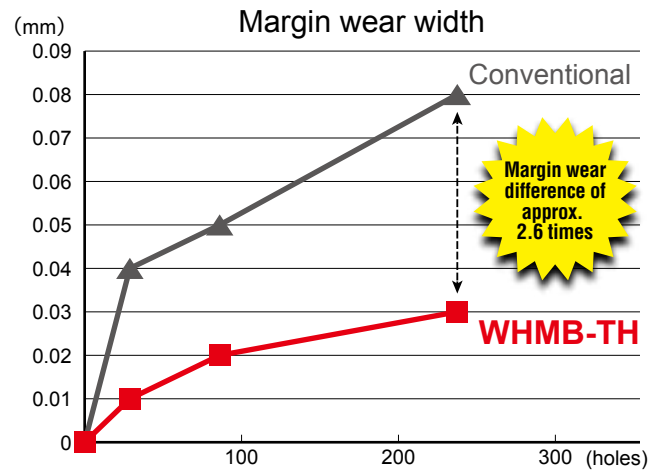
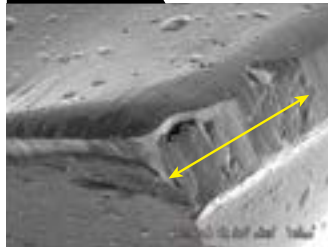
$v_c=30\text{m/min}$, $n=9,549\text{min}^{-1}$, $f=0.03\text{mm/rev}$, $v_f=286\text{mm/min}$,
 Step=1mm, Hole depth=28mm, Pilot hole depth=1mm,
 Water base coolant, Internal coolant pressure 3MPa

After machining 240 holes

WHMB-TH



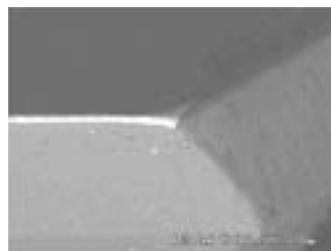
Conventional



Chrome steel machining example [ϕ 1.0mm 30D type]

Cutting condition (G73 cycle)

$v_c=50.2\text{m/min}$, $n=16,000\text{min}^{-1}$, $f=0.03\text{mm/rev}$, $v_f=480\text{mm/min}$, Hole depth=25mm,
 Step=1mm, Water base coolant, Internal coolant pressure 3MPa



Tool wear after machining 1000 holes (25m)

Machined workpiece

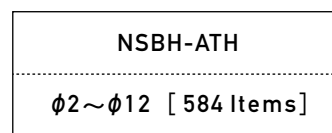
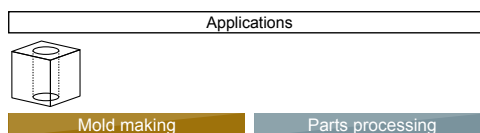
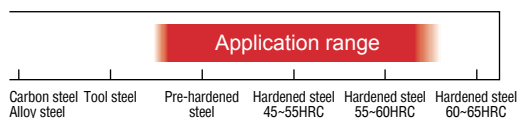
Achieves deep hole machining of L/D=25 Machining time is 6sec/hole!

Carbide Oil Hole Non Step Borer H for High Hardness Material

Achieves high-performance drilling of high-hardened steels.

Features of NSBH-ATH

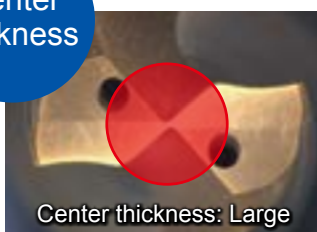
- High toughness and cutting edge strength for high-hardened steels.
- Smooth removal of chips by special flute shape.



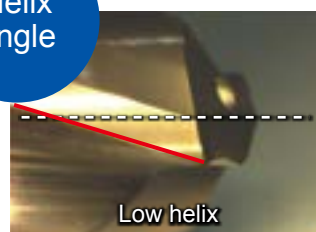
Design

Increased tool toughness and cutting edge strength

Center thickness

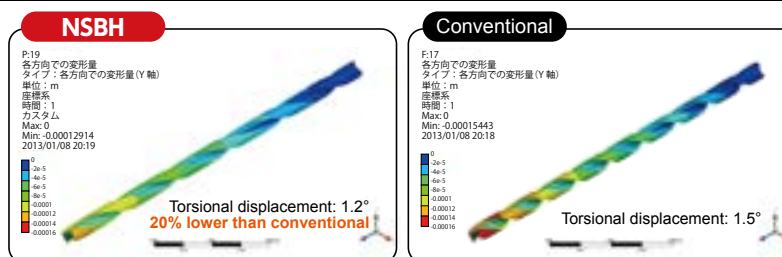


Helix angle



Deformation simulation by quasi model

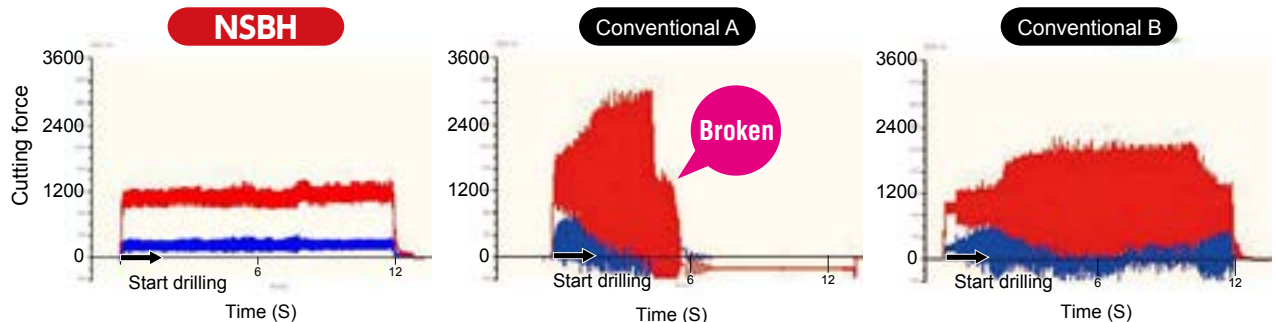
Torsional displacement for simulation using the thrust and torque values generated when boring steel material with a hardness of 50HRC for a tool model with a tool diameter of φ6.0 and a groove length of 140mm.
Thrust load: 1150N; Torque load: 240Ncm



Tool deformation and deflection due to large cutting force while drilling high-hardened steel were suppressed.

Cutting force

Work material : DAC(50HRC) Item code & size : NSBH0600-150-ATH (φ6.0×150×205) $n=3,183\text{min}^{-1}$
 $v_c=60\text{m/min}$ $v_f=191\text{mm/min}$ $f=0.06\text{mm/rev}$ Hole depth =56mm Internal water base coolant



Compared to conventional, cutting force variation on drilling is less and smooth drilling is achieved.

Improved heat-resistant coating

Please refer to 60 page for ATH coating.

ATH coating

NSBH-ATH

Hole depth should be set to "under flute length-2xDC" as a general rule.

Item code	Stocks	Size (mm)					Point angle α
		Tool dia.	Flute length	Overall length	Under neck length	Shank dia.	
		DC	ℓ	LF	ℓ ₂	DCONMS	
NSBH1050-200-ATH	□	10.5	200	260	203	12	135
NSBH1050-250-ATH	□		250	310	253		
NSBH1050-300-ATH	□		300	360	303		
NSBH1060-50-ATH	●	10.6	50	110	53	12	140
NSBH1060-90-ATH	□		90	150	93		
NSBH1060-120-ATH	□		120	180	123		
NSBH1060-150-ATH	□		150	210	153		
NSBH1060-200-ATH	□		200	260	203		
NSBH1060-250-ATH	□		250	310	253		
NSBH1060-300-ATH	□		300	360	303		
NSBH1070-50-ATH	□	10.7	50	110	53	12	135
NSBH1070-90-ATH	□		90	150	93		
NSBH1070-120-ATH	□		120	180	123		
NSBH1070-150-ATH	□		150	210	153		
NSBH1070-200-ATH	□		200	260	203		
NSBH1070-250-ATH	□		250	310	253		
NSBH1070-300-ATH	□		300	360	303		
NSBH1080-50-ATH	●	10.8	50	110	53	12	140
NSBH1080-90-ATH	□		90	150	93		
NSBH1080-120-ATH	□		120	180	123		
NSBH1080-150-ATH	□		150	210	153		
NSBH1080-200-ATH	□		200	260	203		
NSBH1080-250-ATH	□		250	310	253		
NSBH1080-300-ATH	□		300	360	303		
NSBH1090-50-ATH	●	10.9	50	110	53	12	135
NSBH1090-90-ATH	□		90	150	93		
NSBH1090-120-ATH	□		120	180	123		
NSBH1090-150-ATH	□		150	210	153		
NSBH1090-200-ATH	□		200	260	203		
NSBH1090-250-ATH	□		250	310	253		
NSBH1090-300-ATH	□		300	360	303		
NSBH1100-55-ATH	●	11.0	55	120	58	12	140
NSBH1100-90-ATH	●		90	155	93		
NSBH1100-120-ATH	●		120	185	123		
NSBH1100-150-ATH	●		150	215	153		
NSBH1100-200-ATH	●		200	265	203		
NSBH1100-250-ATH	●		250	315	253		
NSBH1100-300-ATH	●		300	365	303		
NSBH1110-55-ATH	□	11.1	55	120	58	12	135
NSBH1110-90-ATH	□		90	155	93		
NSBH1110-120-ATH	□		120	185	123		
NSBH1110-150-ATH	□		150	215	153		
NSBH1110-200-ATH	□		200	265	203		
NSBH1110-250-ATH	□		250	315	253		
NSBH1110-300-ATH	□		300	365	303		
NSBH1120-55-ATH	□	11.2	55	120	58	12	140
NSBH1120-90-ATH	□		90	155	93		
NSBH1120-120-ATH	□		120	185	123		
NSBH1120-150-ATH	□		150	215	153		
NSBH1120-200-ATH	□		200	265	203		
NSBH1120-250-ATH	□		250	315	253		
NSBH1120-300-ATH	□		300	365	303		
NSBH1130-55-ATH	□	11.3	55	120	58	12	135
NSBH1130-90-ATH	□		90	155	93		
NSBH1130-120-ATH	□		120	185	123		
NSBH1130-150-ATH	□		150	215	153		
NSBH1130-200-ATH	□		200	265	203		
NSBH1130-250-ATH	□	250	315	253			
NSBH1130-300-ATH	□	300	365	303			

Item code	Stocks	Size (mm)					Point angle α
		Tool dia.	Flute length	Overall length	Under neck length	Shank dia.	
		DC	ℓ	LF	ℓ ₂	DCONMS	
NSBH1140-55-ATH	□	11.4	55	120	58	12	140
NSBH1140-90-ATH	□		90	155	93		
NSBH1140-120-ATH	□		120	185	123		
NSBH1140-150-ATH	□		150	215	153		
NSBH1140-200-ATH	□		200	265	203		
NSBH1140-250-ATH	□	250	315	253			
NSBH1140-300-ATH	□	300	365	303			
NSBH1150-60-ATH	●	11.5	60	125	63	12	135
NSBH1150-90-ATH	●		90	155	93		
NSBH1150-120-ATH	●		120	185	123		
NSBH1150-150-ATH	●		150	215	153		
NSBH1150-200-ATH	●		200	265	203		
NSBH1150-250-ATH	●	250	315	253			
NSBH1150-300-ATH	●	300	365	303			
NSBH1160-60-ATH	□	11.6	60	125	63	12	140
NSBH1160-90-ATH	□		90	155	93		
NSBH1160-120-ATH	□		120	185	123		
NSBH1160-150-ATH	□		150	215	153		
NSBH1160-200-ATH	□		200	265	203		
NSBH1160-250-ATH	□	250	315	253			
NSBH1160-300-ATH	□	300	365	303			
NSBH1170-60-ATH	□	11.7	60	125	63	12	135
NSBH1170-90-ATH	□		90	155	93		
NSBH1170-120-ATH	□		120	185	123		
NSBH1170-150-ATH	□		150	215	153		
NSBH1170-200-ATH	□		200	265	203		
NSBH1170-250-ATH	□	250	315	253			
NSBH1170-300-ATH	□	300	365	303			
NSBH1180-60-ATH	□	11.8	60	125	63	12	140
NSBH1180-90-ATH	□		90	155	93		
NSBH1180-120-ATH	□		120	185	123		
NSBH1180-150-ATH	□		150	215	153		
NSBH1180-200-ATH	□		200	265	203		
NSBH1180-250-ATH	□	250	315	253			
NSBH1180-300-ATH	□	300	365	303			
NSBH1190-60-ATH	□	11.9	60	125	63	12	135
NSBH1190-90-ATH	□		90	155	93		
NSBH1190-120-ATH	□		120	185	123		
NSBH1190-150-ATH	□		150	215	153		
NSBH1190-200-ATH	□		200	265	203		
NSBH1190-250-ATH	□	250	315	253			
NSBH1190-300-ATH	□	300	365	303			
NSBH1200-60-ATH	●	12.0	60	125	63	12	140
NSBH1200-90-ATH	●		90	155	93		
NSBH1200-120-ATH	●		120	185	123		
NSBH1200-150-ATH	●		150	215	153		
NSBH1200-200-ATH	●		200	265	203		
NSBH1200-250-ATH	●	250	315	253			
NSBH1200-300-ATH	●	300	365	303			

Applicable work material

Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel	Stainless steel	Heat-resistant steel, Ti alloy	Cast iron	Ductile cast iron	Aluminum alloy	Copper alloy
SS	SOOC	SCM, Scr	SKD SKS	~40HRC	~45HRC 45HRC~	SUS	Inconel	FC	FCD	Al	Cu
					○ ◎						

Re-grinding compatibility range

Item code	DC (mm)
NSBH-ATH	2 ~ 12

WHNSB-TH

WNBSB-TH

WHMB-TH

NSBH-ATH

FWNSB-TH

EMSB

EMSB-ATH

Recommended Cutting Conditions

NSBH-ATH

Cutting Conditions (Water base internal coolant)

Work material	Pre-hardened steels (40~45HRC)		Hardened steels (45~55HRC)		Hardened steels (55~60HRC)	
	Cutting speed v_c (m/min)	Feed rate f (mm/rev)	Cutting speed v_c (m/min)	Feed rate f (mm/rev)	Cutting speed v_c (m/min)	Feed rate f (mm/rev)
$\phi 2$	20~60~80	0.01~0.05	20~40~60	0.01~0.03	10~20	0.01~0.02
$\phi 4$		0.02~0.08		0.01~0.06		0.01~0.04
$\phi 6$		0.08~0.15		0.05~0.09		0.03~0.06
$\phi 8$		0.1~0.2		0.06~0.12		0.04~0.08
$\phi 10$		0.12~0.25		0.08~0.15		0.06~0.1
$\phi 12$		0.13~0.25		0.1~0.15		0.06~0.1

[Setting of Cutting Conditions] Be sure to refer to the drilling process as follows when selecting a tool.

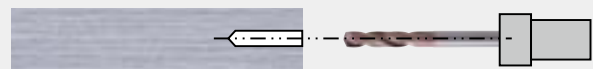
- These standard cutting conditions are intended as approximate values for cutting conditions. For actual drilling, cutting conditions should be adjusted according to the drilling shape, purpose, machine used, etc.
- NSBH-ATH series have positive tolerance on the diameter. Please select guide and long-hole drills out of NSBH-ATH series. Mixed use of conventional WHNSB-TH series harms drilling stability due to negative tolerance of WHNSB-TH series.
- When changing the tool, use collet free from flaws and stains and attach the tool firmly so that its runout is 0.02mm or less.
- Works should be gripped firmly to prevent deformation, deflection and vibration.
- Upon drilling hole, dwell time at the final depth helps chip removal.
- If cutting chips are not smoothly removed, perform step drilling at depth around the tool diameter.
- Upon matters in chip removal during drilling, please refer to following countermeasures;
 - ① Keep v_c and lower feed. (The thinner chip for better removal)
 - ② Keep f and higher v_c . (Higher rotation for better removal)
- At the time of through-hole reduce feed rate f to one-half or less.
- Internal supply of water based coolant is recommended.
- The above cutting conditions are based on the use of a water base coolant diluted to a maximum of 20 times. When coolant dilution exceeds 20 times, decrease the cutting speed to the lowest in the specified range. When the tool diameter is $\phi 5.0$ or less, the coolant pressure should be 2.0 MPa or higher, and when the diameter is over $\phi 5.0$, the pressure should be 1.5 MPa or higher.
- When performing MQL (mist) machining, depending on the amount or conditions of spray from the tool, it may be necessary to reduce the cutting speed in order to drilling.
- When oil base coolant is used, reduce the cutting speed to a speed lower than the lowest speed in the specified range. Take the greatest care to avoid smoke or ignition due to heating of chips and the tool.
- Perform sufficient maintenance of coolant systems to prevent clogging of the oil hole.

Drilling process

1 Drilling of pilot hole (guide hole)

- Recommended tools :
Use the product with the shortest flute length for each size of product. (Point angle 140-degree NSBH-ATH)
- Hole depth : Tool diameter $\times 3.0$ times
※When using a product for which the flute length is more than $L/D=8$, drilling a pilot hole first.

※Please refer to next page for attention for use



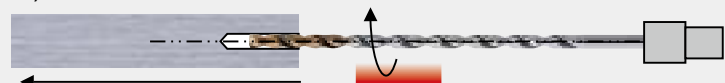
2 Supplying coolant during low-speed revolution

- Leading to the pilot hole at low speed ($n=0\sim 500 \text{ min}^{-1}$)
- Stop feed 2.0~5.0 mm before the end of the pilot hole.
※When a long tool (200mm or longer) is used, position the tool to the pilot hole at low revolution speed ($n=200 \text{ min}^{-1}$ or less).



3 High-speed revolution for drilling feed (NSBH-ATH)

- After confirming that the revolution speed is increasing at the specified rate, start cutting.



4 Finish drilling

- Withdraw the tool at low speed. ($n=0\sim 500 \text{ min}^{-1}$)
※When a long tool (200mm or longer) is used, withdraw the tool at low revolution speed ($n=200 \text{ min}^{-1}$ or less).

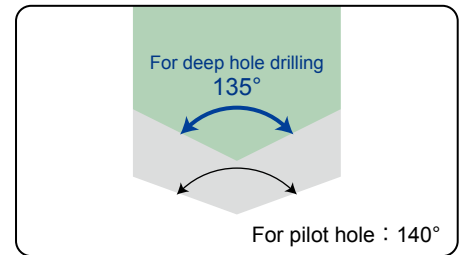


○ Regarding pilot hole drilling for NSBH-ATH

The shortest NSBH-ATH among each diameter length series has point angle of 140°, though others have that of 135°. It is recommended first to drill a guide hole with NSBH-ATH of point angle 140° before deep boring.
+5° gives better tool edge allocation onto work material.

Example Hole size : $\phi 6 \times 100\text{mm}$

- ① Pilot hole → NSBH0600-30-ATH
- ② Deep hole drilling → NSBH0600-120-ATH



○ Regarding tolerance of diameter for NSBH-ATH

Diameter of NSBH-ATH has a positive tolerance in order to (1) compensate hole shrink after boring, and (2) keep clearance for ejector pin of die mold. WHNSB and WNSB have negative tolerance of diameter.

Use of WHNSB or WNSB for pilot hole may cause diameter interference with NSBH-ATH.

[Diameter tolerance]

DC ≤ 6	0	~+0.012
6 < DC ≤ 10	0	~+0.015
10 < DC	-0.003	~+0.015

○ NSBH-ATH used for pilot hole before threading

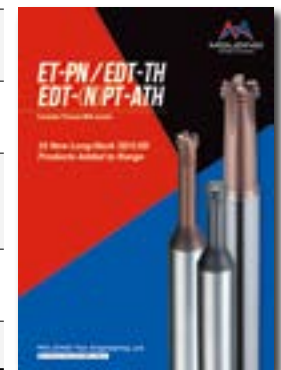
Expanded lineup! For pilot hole of tapping products added. Tapping is possible by NSBH-ATH and carbide threading cutters combination easily.

Screw size		Item code	Stocks	Tool dia.	Flute length	Overall length	Under neck length	Adapted carbide threading cutters
Nominal dia.	Pitch							
M3	0.5	NSBH0240-10-ATH	●	2.4	10	60	14	ET-0.5-6-PN, ET0.5-7.5-PN
		NSBH0250-10-ATH	●	2.5				
		NSBH0260-10-ATH	●	2.6				
M4	0.7	NSBH0320-20-ATH	●	3.2	20	70	23	ET-0.7-8-PN, ET-0.7-10-PN
		NSBH0330-20-ATH	●	3.3				
		NSBH0340-20-ATH	●	3.4				
M5	0.8	NSBH0410-20-ATH	●	4.1	20	70	23	ET-0.8-10-PN, ET-0.8-12.5-PN
		NSBH0420-20-ATH	●	4.2				
		NSBH0430-20-ATH	●	4.3				
M6	1	NSBH0490-20-ATH	□	4.9	20	70	23	ET-1.0-12-PN, ET-1.0-15-PN
		NSBH0500-25-ATH	●	5.0	25	80	28	
		NSBH0510-30-ATH	●	5.1	30	85	33	
M8	1.25	NSBH0670-30-ATH	□	6.7	30	85	33	ET-1.25-16-PN, ET-1.25-20-PN
		NSBH0680-30-ATH	●	6.8				
		NSBH0690-30-ATH	●	6.9				
M10	1.5	NSBH0850-45-ATH	●	8.5	45	105	48	ET-1.5-20-PN, ET-1.5-25-PN
		NSBH0860-45-ATH	●	8.6				
		NSBH0870-45-ATH	●	8.7				
		NSBH0880-45-ATH	●	8.8				
M12	1.75	NSBH1030-50-ATH	●	10.3	50	110	53	ET-1.75-24-PN, ET-1.75-30-PN
		NSBH1040-50-ATH	●	10.4				
		NSBH1050-50-ATH	●	10.5				
M14	2	NSBH1190-60-ATH	□	11.9	60	125	63	Not applicable
		NSBH1200-60-ATH	●	12.0				

● : Stocked items. □ : Stocked by specified distributor. Contact to sales office.



▲ Check here for details on Epoch Thread Mill "ET-PN"



○ Trouble shooting

Phenomenons	Factors	Actions
Not stable tool life.	Performance fell because the drill for pilot holes was not used.	Please use drill of wide point angle one for pilot hole drilling.
	Hit to pilot hole, because WHNSB or WNSB was used pilot hole drilling.	Please use same series drills for pilot hole drilling and normal drilling.
	Drill has runout.	Please set drill runout less than 0.02mm. Please change to collet of free from dent or dirt for increase accuracy.
It will break.	Less chip removal.	Please use step drilling. Please use dwell process about a second on step drilling.
	Less coolant clogged chip in the hole.	Please check coolant system. Please use coolant steadily.

WHNSB-TH

WNSB-TH

WHMB-TH

NSBH-ATH

FWNSB-TH

EMSBS

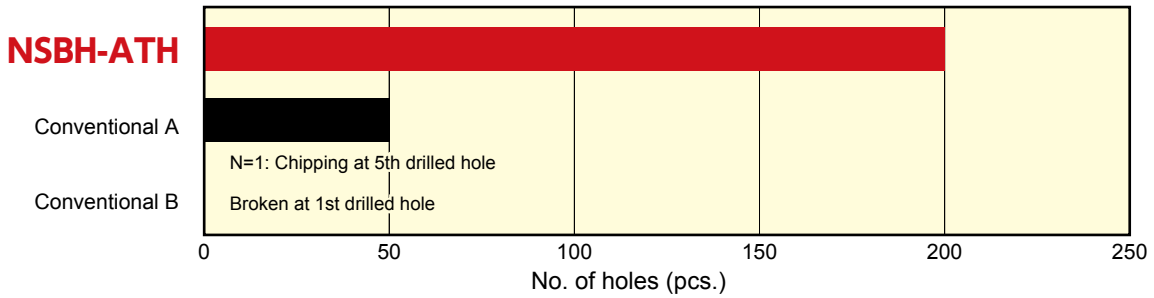
EMSBI-ATH



Achieved long tool life with high-performance drilling of high-hardened steels.

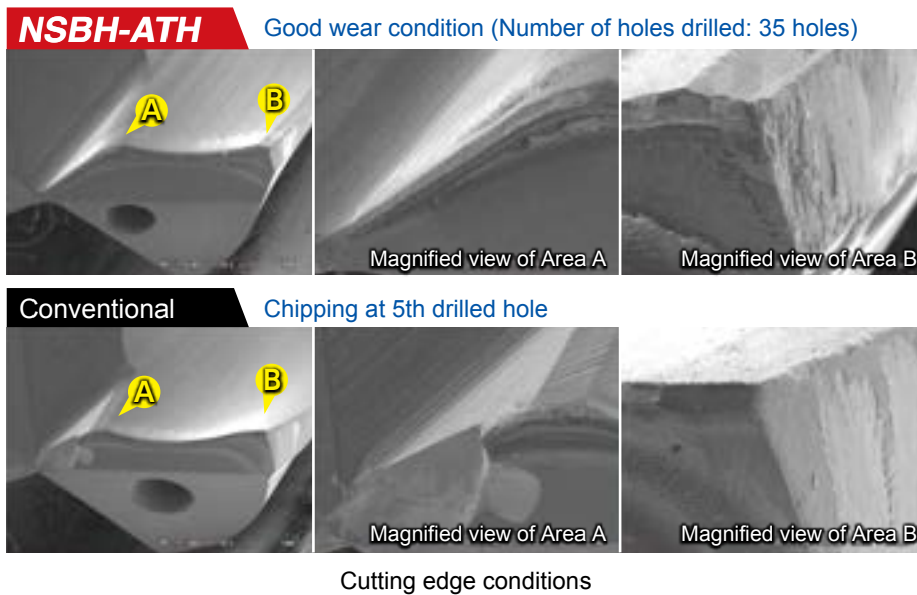
01 Drilling for DAC (50HRC), ($\phi 6 \times 120\text{mm}$)

Work material : DAC(50HRC) Item code & size : NSBH0600-150-ATH ($\phi 6.0 \times 150 \times 205$) Hole depth =120mm (Pilot hole 12mm)
Coolant : Internal water base coolant $n=3,183\text{min}^{-1}$ $v_c=60\text{m/min}$ $v_f=191\text{mm/min}$ $f=0.06\text{mm/rev}$



02 Drilling for equivalent to SUS420J2 (52HRC), ($\phi 6 \times 120\text{mm}$)

Work material : Equivalent to SUS420J2 (52HRC) Item code & size : NSBH0600-150-ATH ($\phi 6.0 \times 150 \times 205$)
Hole depth =120mm (Pilot hole 18mm) Coolant : Internal water base coolant
 $n=3,183\text{min}^{-1}$ $v_c=60\text{m/min}$ $v_f=191\text{mm/min}$ $f=0.06\text{mm/rev}$



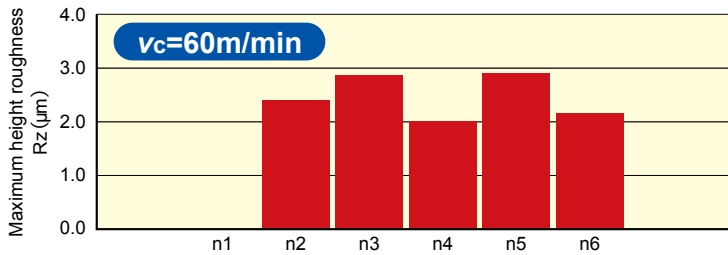


Achieved high-grade holes and good chip removal.

01 Wall surface conditions ($\phi 6 \times 125\text{mm}$)

※Surface roughness measured at 6 locations per hole.

Work material : DAC-MAGIC(48HRC) Item code & size : NSBH0600-150-ATH ($\phi 6.0 \times 150 \times 205$)
Hole depth =125mm Coolant : Internal water base coolant $f=0.06\text{mm/rev}$



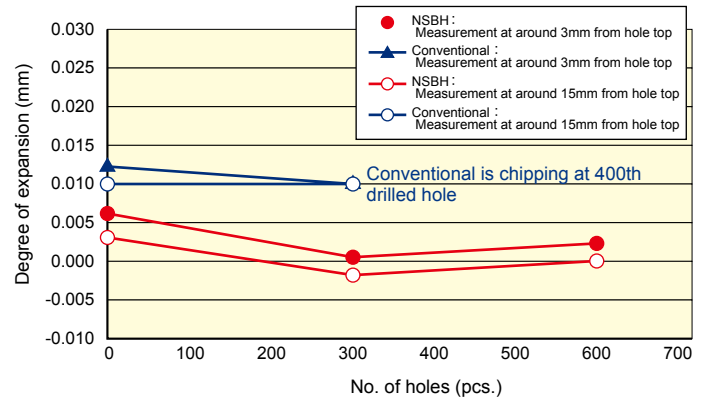
Condition at depth of around 100mm



Possible long tool life drilling with good accuracy

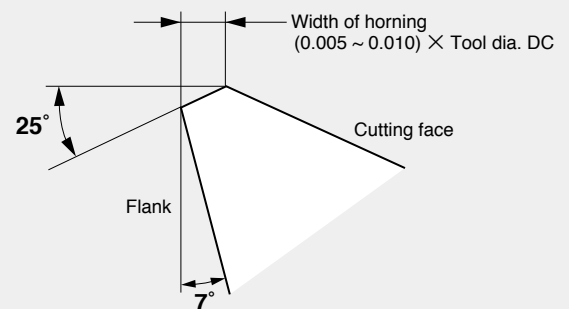
01 Inside diameter ($\phi 6 \times 25\text{mm}$)

Work material : DAC-MAGIC(48HRC)
Item code & size : NSBH0600-60-ATH ($\phi 6.0 \times 60 \times 115$)
Hole depth =25mm
Coolant : Internal water base coolant
 $n=3,183\text{min}^{-1}$ $v_c=60\text{m/min}$
 $v_f=191\text{mm/min}$ $f=0.06\text{mm/rev}$



Re-grinding for Carbide Oil Hole Non Step Borer H

- Performance may deteriorate of the initial performance due to the method of re-grinding and re-coating. Without coating after re-grinding, performance may be further reduced and cause chipping or breakage of the drill. It is recommended that you ask us to re-grind and re-coat your drill.
- Finish the cutting edge surface so that its roughness is 1.6S or less and the lip height difference is 0.02mm or less.



Please inquire drill re-grinding/re-coating to sales office.

WHNSB-TH

WNBSB-TH

WHMB-TH

NSBH-ATH

FWHNSB-TH

EMSBS

EMSBI-ATH

Carbide Oil Hole Non Step Borer for Cast iron

Remarkably high performance for drilling in cast iron.

Machining with high efficiency and long tool life reduces machining costs.

Ideal for environmentally friendly MQL (mist) machining!

Features of FWHNSB-TH

01 Employs new flute shape.

- Effect of indented flute shape and special perimeter corner shape suppresses wear.
- Also effective for anti-chipping for through holes.

02 Special groove shape smoothly ejects chips.

03 Double margin provides firm guide.

- Stabilizes tool movement during machining to provide stable machining.

04 Uses TH Coating which is durable against wear and oxidation.

05 High-precision shank; Shrink fitting also OK.



Applications



Mold making

Parts processing

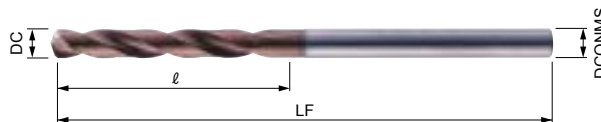
FWHNSB-TH

$\phi 3 \sim \phi 13$ L/D=3~30 [566 Items]

Carbide Oil Hole Non Step Borer for Cast Iron (5D)



Plane, S-X thinning



05FWHNSB ○○○○-TH

L/D=5

With oil hole

Cutting condition **51**



0~-0.01 (mm)

Item code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
05FWHNSB0300-TH	△	3.0	29	79	3.0
05FWHNSB0310-TH	△	3.1	37	87	4.0
05FWHNSB0320-TH	△	3.2	37	87	4.0
05FWHNSB0330-TH	△	3.3	37	87	4.0
05FWHNSB0340-TH	△	3.4	37	87	4.0
05FWHNSB0350-TH	△	3.5	37	87	4.0
05FWHNSB0360-TH	△	3.6	37	87	4.0
05FWHNSB0370-TH	△	3.7	37	87	4.0
05FWHNSB0380-TH	△	3.8	37	87	4.0
05FWHNSB0390-TH	△	3.9	37	87	4.0
05FWHNSB0400-TH	△	4.0	37	87	4.0
05FWHNSB0410-TH	△	4.1	47	100	5.0
05FWHNSB0420-TH	△	4.2	47	100	5.0
05FWHNSB0430-TH	△	4.3	47	100	5.0
05FWHNSB0440-TH	△	4.4	47	100	5.0
05FWHNSB0450-TH	△	4.5	47	100	5.0
05FWHNSB0460-TH	△	4.6	47	100	5.0
05FWHNSB0470-TH	△	4.7	47	100	5.0
05FWHNSB0480-TH	△	4.8	47	100	5.0
05FWHNSB0490-TH	△	4.9	47	100	5.0
05FWHNSB0500-TH	△	5.0	47	100	5.0
05FWHNSB0510-TH	△	5.1	47	100	6.0
05FWHNSB0520-TH	△	5.2	47	100	6.0
05FWHNSB0530-TH	△	5.3	47	100	6.0
05FWHNSB0540-TH	△	5.4	47	100	6.0
05FWHNSB0550-TH	△	5.5	47	100	6.0
05FWHNSB0560-TH	△	5.6	47	100	6.0
05FWHNSB0570-TH	△	5.7	47	100	6.0
05FWHNSB0580-TH	△	5.8	47	100	6.0
05FWHNSB0590-TH	△	5.9	47	100	6.0
05FWHNSB0600-TH	△	6.0	47	100	6.0
05FWHNSB0610-TH	△	6.1	55	110	7.0
05FWHNSB0620-TH	△	6.2	55	110	7.0
05FWHNSB0630-TH	△	6.3	55	110	7.0
05FWHNSB0640-TH	△	6.4	55	110	7.0
05FWHNSB0650-TH	△	6.5	55	110	7.0
05FWHNSB0660-TH	△	6.6	55	110	7.0
05FWHNSB0670-TH	△	6.7	55	110	7.0
05FWHNSB0680-TH	△	6.8	55	110	7.0
05FWHNSB0690-TH	△	6.9	55	110	7.0
05FWHNSB0700-TH	△	7.0	55	110	7.0
05FWHNSB0710-TH	△	7.1	63	119	8.0
05FWHNSB0720-TH	△	7.2	63	119	8.0
05FWHNSB0730-TH	△	7.3	63	119	8.0
05FWHNSB0740-TH	△	7.4	63	119	8.0
05FWHNSB0750-TH	△	7.5	63	119	8.0
05FWHNSB0760-TH	△	7.6	63	119	8.0
05FWHNSB0770-TH	△	7.7	63	119	8.0
05FWHNSB0780-TH	△	7.8	63	119	8.0
05FWHNSB0790-TH	△	7.9	63	119	8.0
05FWHNSB0800-TH	△	8.0	63	119	8.0

Item code	Stock	Size (mm)			
		Tool dia. DC	Flute length ℓ	Overall length LF	Shank dia. DCONMS
05FWHNSB0810-TH	△	8.1	71	128	9.0
05FWHNSB0820-TH	△	8.2	71	128	9.0
05FWHNSB0830-TH	△	8.3	71	128	9.0
05FWHNSB0840-TH	△	8.4	71	128	9.0
05FWHNSB0850-TH	△	8.5	71	128	9.0
05FWHNSB0860-TH	△	8.6	71	128	9.0
05FWHNSB0870-TH	△	8.7	71	128	9.0
05FWHNSB0880-TH	△	8.8	71	128	9.0
05FWHNSB0890-TH	△	8.9	71	128	9.0
05FWHNSB0900-TH	△	9.0	71	128	9.0
05FWHNSB0910-TH	△	9.1	79	137	10.0
05FWHNSB0920-TH	△	9.2	79	137	10.0
05FWHNSB0930-TH	△	9.3	79	137	10.0
05FWHNSB0940-TH	△	9.4	79	137	10.0
05FWHNSB0950-TH	△	9.5	79	137	10.0
05FWHNSB0960-TH	△	9.6	79	137	10.0
05FWHNSB0970-TH	△	9.7	79	137	10.0
05FWHNSB0980-TH	△	9.8	79	137	10.0
05FWHNSB0990-TH	△	9.9	79	137	10.0
05FWHNSB1000-TH	△	10.0	79	137	10.0
05FWHNSB1010-TH	□	10.1	87	150	11.0
05FWHNSB1020-TH	△	10.2	87	150	11.0
05FWHNSB1030-TH	△	10.3	87	150	11.0
05FWHNSB1040-TH	□	10.4	87	150	11.0
05FWHNSB1050-TH	△	10.5	87	150	11.0
05FWHNSB1060-TH	□	10.6	87	150	11.0
05FWHNSB1070-TH	□	10.7	87	150	11.0
05FWHNSB1080-TH	△	10.8	87	150	11.0
05FWHNSB1090-TH	□	10.9	87	150	11.0
05FWHNSB1100-TH	△	11.0	87	150	11.0
05FWHNSB1110-TH	□	11.1	93	156	12.0
05FWHNSB1120-TH	□	11.2	93	156	12.0
05FWHNSB1130-TH	□	11.3	93	156	12.0
05FWHNSB1140-TH	□	11.4	93	156	12.0
05FWHNSB1150-TH	△	11.5	93	156	12.0
05FWHNSB1160-TH	□	11.6	93	156	12.0
05FWHNSB1170-TH	□	11.7	93	156	12.0
05FWHNSB1180-TH	△	11.8	93	156	12.0
05FWHNSB1190-TH	□	11.9	93	156	12.0
05FWHNSB1200-TH	△	12.0	93	156	12.0
05FWHNSB1210-TH	□	12.1	104	169	13.0
05FWHNSB1220-TH	△	12.2	104	169	13.0
05FWHNSB1230-TH	□	12.3	104	169	13.0
05FWHNSB1240-TH	□	12.4	104	169	13.0
05FWHNSB1250-TH	△	12.5	104	169	13.0
05FWHNSB1260-TH	□	12.6	104	169	13.0
05FWHNSB1270-TH	□	12.7	104	169	13.0
05FWHNSB1280-TH	□	12.8	104	169	13.0
05FWHNSB1290-TH	□	12.9	104	169	13.0
05FWHNSB1300-TH	△	13.0	104	169	13.0

Applicable work material

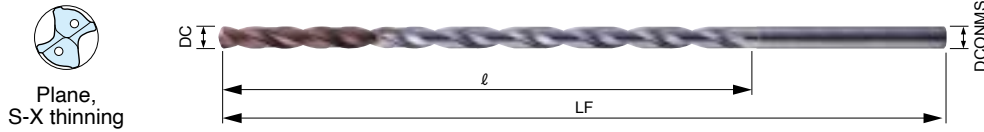
Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	SOOC	SCM, SCr	SKD SKS	~40HRC	~45HRC	45HRC~	SUS	Ti alloy Inconel	FC	FCD	Al	Cu

Re-grinding compatibility range

Item code	DC (mm)
05FWHNSB-TH	3 ~ 13

△ : When the stock is out, will become to produce on request. □ : Stocked by specified distributor. Contact with our sales department.

Carbide Oil Hole Non Step Borer for Cast Iron (20D)



20FWHNSB-TH

L/D=20

With oil hole

Cutting condition 51



Refer to previous page



Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
20FWHNSB0300-TH	△	3.0	69	117	3.0
20FWHNSB0310-TH	□	3.1	81	129	4.0
20FWHNSB0320-TH	□	3.2	81	129	4.0
20FWHNSB0330-TH	□	3.3	81	129	4.0
20FWHNSB0340-TH	□	3.4	81	129	4.0
20FWHNSB0350-TH	□	3.5	81	129	4.0
20FWHNSB0360-TH	□	3.6	92	141	4.0
20FWHNSB0370-TH	□	3.7	92	141	4.0
20FWHNSB0380-TH	□	3.8	92	141	4.0
20FWHNSB0390-TH	□	3.9	92	141	4.0
20FWHNSB0400-TH	△	4.0	92	141	4.0
20FWHNSB0410-TH	□	4.1	104	155	5.0
20FWHNSB0420-TH	□	4.2	104	155	5.0
20FWHNSB0430-TH	□	4.3	104	155	5.0
20FWHNSB0440-TH	□	4.4	104	155	5.0
20FWHNSB0450-TH	□	4.5	104	155	5.0
20FWHNSB0460-TH	□	4.6	116	167	5.0
20FWHNSB0470-TH	□	4.7	116	167	5.0
20FWHNSB0480-TH	□	4.8	116	167	5.0
20FWHNSB0490-TH	□	4.9	116	167	5.0
20FWHNSB0500-TH	△	5.0	116	167	5.0
20FWHNSB0510-TH	□	5.1	127	178	6.0
20FWHNSB0520-TH	□	5.2	127	178	6.0
20FWHNSB0530-TH	□	5.3	127	178	6.0
20FWHNSB0540-TH	□	5.4	127	178	6.0
20FWHNSB0550-TH	△	5.5	127	178	6.0
20FWHNSB0560-TH	□	5.6	139	190	6.0
20FWHNSB0570-TH	□	5.7	139	190	6.0
20FWHNSB0580-TH	□	5.8	139	190	6.0
20FWHNSB0590-TH	□	5.9	139	190	6.0
20FWHNSB0600-TH	△	6.0	139	190	6.0
20FWHNSB0610-TH	□	6.1	150	203	7.0
20FWHNSB0620-TH	□	6.2	150	203	7.0
20FWHNSB0630-TH	□	6.3	150	203	7.0
20FWHNSB0640-TH	□	6.4	150	203	7.0
20FWHNSB0650-TH	△	6.5	150	203	7.0
20FWHNSB0660-TH	□	6.6	162	215	7.0
20FWHNSB0670-TH	□	6.7	162	215	7.0
20FWHNSB0680-TH	□	6.8	162	215	7.0
20FWHNSB0690-TH	□	6.9	162	215	7.0
20FWHNSB0700-TH	△	7.0	162	215	7.0
20FWHNSB0710-TH	□	7.1	173	228	8.0
20FWHNSB0720-TH	□	7.2	173	228	8.0
20FWHNSB0730-TH	□	7.3	173	228	8.0
20FWHNSB0740-TH	□	7.4	173	228	8.0
20FWHNSB0750-TH	□	7.5	173	228	8.0

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
20FWHNSB0760-TH	□	7.6	185	240	8.0
20FWHNSB0770-TH	□	7.7	185	240	8.0
20FWHNSB0780-TH	□	7.8	185	240	8.0
20FWHNSB0790-TH	□	7.9	185	240	8.0
20FWHNSB0800-TH	△	8.0	185	240	8.0
20FWHNSB0810-TH	□	8.1	196	251	9.0
20FWHNSB0820-TH	□	8.2	196	251	9.0
20FWHNSB0830-TH	□	8.3	196	251	9.0
20FWHNSB0840-TH	□	8.4	196	251	9.0
20FWHNSB0850-TH	□	8.5	196	251	9.0
20FWHNSB0860-TH	□	8.6	208	263	9.0
20FWHNSB0870-TH	□	8.7	208	263	9.0
20FWHNSB0880-TH	□	8.8	208	263	9.0
20FWHNSB0890-TH	□	8.9	208	263	9.0
20FWHNSB0900-TH	△	9.0	208	263	9.0
20FWHNSB0910-TH	□	9.1	219	274	10.0
20FWHNSB0920-TH	□	9.2	219	274	10.0
20FWHNSB0930-TH	□	9.3	219	274	10.0
20FWHNSB0940-TH	□	9.4	219	274	10.0
20FWHNSB0950-TH	□	9.5	219	274	10.0
20FWHNSB0960-TH	□	9.6	231	286	10.0
20FWHNSB0970-TH	□	9.7	231	286	10.0
20FWHNSB0980-TH	□	9.8	231	286	10.0
20FWHNSB0990-TH	□	9.9	231	286	10.0
20FWHNSB1000-TH	△	10.0	231	286	10.0
20FWHNSB1010-TH	□	10.1	243	298	11.0
20FWHNSB1020-TH	□	10.2	243	298	11.0
20FWHNSB1030-TH	□	10.3	243	298	11.0
20FWHNSB1040-TH	□	10.4	243	298	11.0
20FWHNSB1050-TH	□	10.5	243	298	11.0
20FWHNSB1060-TH	□	10.6	254	315	11.0
20FWHNSB1070-TH	□	10.7	254	315	11.0
20FWHNSB1080-TH	□	10.8	254	315	11.0
20FWHNSB1090-TH	□	10.9	254	315	11.0
20FWHNSB1100-TH	△	11.0	254	315	11.0
20FWHNSB1110-TH	□	11.1	266	327	12.0
20FWHNSB1120-TH	□	11.2	266	327	12.0
20FWHNSB1130-TH	□	11.3	266	327	12.0
20FWHNSB1140-TH	□	11.4	266	327	12.0
20FWHNSB1150-TH	□	11.5	266	327	12.0
20FWHNSB1160-TH	□	11.6	277	338	12.0
20FWHNSB1170-TH	□	11.7	277	338	12.0
20FWHNSB1180-TH	□	11.8	277	338	12.0
20FWHNSB1190-TH	□	11.9	277	338	12.0
20FWHNSB1200-TH	△	12.0	277	338	12.0

Applicable work material

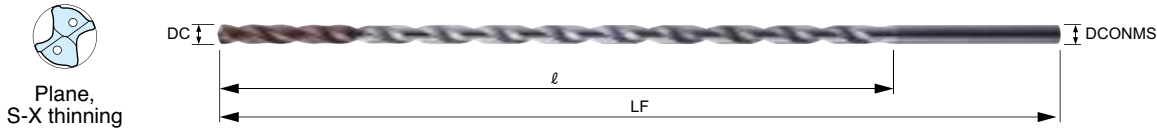
Mild steel SS	Carbon steel S	Alloy steel SCM, SCr	Heat-treated steel SKD, SKS	Tool steel ~40HRC	Hardened steel ~45HRC 45HRC~	Stainless steel SUS	Heat-resistant steel, Ti alloy Inconel	Cast iron FC	Ductile cast iron FCD	Aluminium alloy Al	Copper alloy Cu
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Re-grinding compatibility range

Item code	DC (mm)
20FWHNSB-TH	3 ~ 12

WHNSB-TH
WNSB-TH
WHMB-TH
NSBH-ATH
FWHNSB-TH
EMSBS
EMSBH-ATH

Carbide Oil Hole Non Step Borer for Cast Iron (30D)



30FWHNSB-TH

L/D=30

With oil hole

Cutting condition 51



Refer to under table



Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
30FWHNSB0300-TH	△	3.0	99	147	3.0
30FWHNSB0310-TH	□	3.1	116	164	4.0
30FWHNSB0320-TH	□	3.2	116	164	4.0
30FWHNSB0330-TH	□	3.3	116	164	4.0
30FWHNSB0340-TH	□	3.4	116	164	4.0
30FWHNSB0350-TH	□	3.5	116	164	4.0
30FWHNSB0360-TH	□	3.6	132	181	4.0
30FWHNSB0370-TH	□	3.7	132	181	4.0
30FWHNSB0380-TH	□	3.8	132	181	4.0
30FWHNSB0390-TH	□	3.9	132	181	4.0
30FWHNSB0400-TH	△	4.0	132	181	4.0
30FWHNSB0410-TH	□	4.1	149	200	5.0
30FWHNSB0420-TH	□	4.2	149	200	5.0
30FWHNSB0430-TH	□	4.3	149	200	5.0
30FWHNSB0440-TH	□	4.4	149	200	5.0
30FWHNSB0450-TH	□	4.5	149	200	5.0
30FWHNSB0460-TH	□	4.6	166	217	5.0
30FWHNSB0470-TH	□	4.7	166	217	5.0
30FWHNSB0480-TH	□	4.8	166	217	5.0
30FWHNSB0490-TH	□	4.9	166	217	5.0
30FWHNSB0500-TH	△	5.0	166	217	5.0
30FWHNSB0510-TH	□	5.1	182	233	6.0
30FWHNSB0520-TH	□	5.2	182	233	6.0
30FWHNSB0530-TH	□	5.3	182	233	6.0
30FWHNSB0540-TH	□	5.4	182	233	6.0
30FWHNSB0550-TH	△	5.5	182	233	6.0
30FWHNSB0560-TH	□	5.6	199	250	6.0
30FWHNSB0570-TH	□	5.7	199	250	6.0
30FWHNSB0580-TH	□	5.8	199	250	6.0
30FWHNSB0590-TH	□	5.9	199	250	6.0
30FWHNSB0600-TH	△	6.0	199	250	6.0
30FWHNSB0610-TH	□	6.1	215	268	7.0
30FWHNSB0620-TH	□	6.2	215	268	7.0
30FWHNSB0630-TH	□	6.3	215	268	7.0
30FWHNSB0640-TH	□	6.4	215	268	7.0
30FWHNSB0650-TH	△	6.5	215	268	7.0

Item code	Stock	Size (mm)			
		Tool dia.	Flute length	Overall length	Shank dia.
		DC	ℓ	LF	DCONMS
30FWHNSB0660-TH	□	6.6	232	285	7.0
30FWHNSB0670-TH	□	6.7	232	285	7.0
30FWHNSB0680-TH	□	6.8	232	285	7.0
30FWHNSB0690-TH	□	6.9	232	285	7.0
30FWHNSB0700-TH	△	7.0	232	285	7.0
30FWHNSB0710-TH	□	7.1	248	303	8.0
30FWHNSB0720-TH	□	7.2	248	303	8.0
30FWHNSB0730-TH	□	7.3	248	303	8.0
30FWHNSB0740-TH	□	7.4	248	303	8.0
30FWHNSB0750-TH	□	7.5	248	303	8.0
30FWHNSB0760-TH	□	7.6	265	320	8.0
30FWHNSB0770-TH	□	7.7	265	320	8.0
30FWHNSB0780-TH	□	7.8	265	320	8.0
30FWHNSB0790-TH	□	7.9	265	320	8.0
30FWHNSB0800-TH	△	8.0	265	320	8.0
30FWHNSB0810-TH	□	8.1	281	336	9.0
30FWHNSB0820-TH	□	8.2	281	336	9.0
30FWHNSB0830-TH	□	8.3	281	336	9.0
30FWHNSB0840-TH	□	8.4	281	336	9.0
30FWHNSB0850-TH	□	8.5	281	336	9.0
30FWHNSB0860-TH	□	8.6	298	353	9.0
30FWHNSB0870-TH	□	8.7	298	353	9.0
30FWHNSB0880-TH	□	8.8	298	353	9.0
30FWHNSB0890-TH	□	8.9	298	353	9.0
30FWHNSB0900-TH	△	9.0	298	353	9.0
30FWHNSB0910-TH	□	9.1	314	369	10.0
30FWHNSB0920-TH	□	9.2	314	369	10.0
30FWHNSB0930-TH	□	9.3	314	369	10.0
30FWHNSB0940-TH	□	9.4	314	369	10.0
30FWHNSB0950-TH	□	9.5	314	369	10.0
30FWHNSB0960-TH	□	9.6	331	386	10.0
30FWHNSB0970-TH	□	9.7	331	386	10.0
30FWHNSB0980-TH	□	9.8	331	386	10.0
30FWHNSB0990-TH	□	9.9	331	386	10.0
30FWHNSB1000-TH	△	10.0	331	386	10.0

10~30FWHNSB Table of Tolerance on tool dia.

① □ : Tool diameter tolerance of 10 to 30FWHNSB for stock of specified distributors (mm)

10~30FWHNSB				
	DC ≤ 3.0	3.0 < DC ≤ 6.0	6.0 < DC ≤ 10.0	10.0 < DC ≤ 14.0
Max	-0.015	-0.020	-0.024	-0.030
Min	-0.028	-0.036	-0.045	-0.053

② Tool diameter tolerance for 10~30FWHNSB which stock indicates △ is h8.

Applicable work material

Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	SOOC	SCM, SCR	SKD, SKS	~40HRC	~45HRC	45HRC~	SUS	Ti alloy, Inconel	FC	FCD	Al	Cu

Re-grinding compatibility range

Item code	DC (mm)
30FWHNSB-TH	3 ~ 10

△ : When the stock is out, will become to produce on request. □ : Stocked by specified distributor. Contact with our sales department.

Recommended Cutting Conditions

03FWHNSB-TH

05FWHNSB-TH

10FWHNSB-TH

15FWHNSB-TH

20FWHNSB-TH

30FWHNSB-TH

Work material	Ductile irons FCD700				Ductile irons FCD500				Cast irons FC			
	Internal coolant 70~100~150		MQL (mist) 70~100~150		Internal coolant 70~100~150		MQL (mist) 70~100~150		Internal coolant 70~100~180		MQL (mist) 70~100~180	
Tool dia.	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	送り量 f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)	Revolution n (min ⁻¹)	送り量 f (mm/rev)	Revolution n (min ⁻¹)	Feed per Rev f (mm/rev)
Φ4.0	8,000	0.1~0.24	8,000	0.1~0.24	8,000	0.1~0.32	8,000	0.1~0.32	8,000	0.1~0.32	8,000	0.1~0.32
Φ6.0	5,300	0.15~0.36	5,300	0.15~0.36	5,300	0.15~0.48	5,300	0.15~0.48	5,300	0.15~0.48	5,300	0.15~0.48
Φ8.0	4,000	0.18~0.48	4,000	0.18~0.48	4,000	0.18~0.64	4,000	0.18~0.64	4,000	0.18~0.64	4,000	0.18~0.64
Φ10.0	3,200	0.2~0.5	3,200	0.2~0.5	3,200	0.2~0.7	3,200	0.2~0.7	3,200	0.2~0.7	3,200	0.2~0.7
Φ12.0	2,650	0.22~0.54	2,650	0.22~0.54	2,650	0.22~0.78	2,650	0.22~0.78	2,650	0.22~0.78	2,650	0.22~0.78

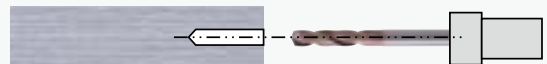
[Setting of Cutting Conditions] ※Be sure to refer to the boring procedure (under) when selecting a tool.

- ① Use the appropriate coolant for the work material and machining shape.
- ② These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- ③ These internal coolant cutting conditions are for when using a water-soluble cutting lubricant. Further, for diameters of ϕ 5.0 or less, a coolant pressure of at least 2.0MPa is required.
- ④ As general criteria, feed rate should be set to 7.0% of tool diameter or less when machining holes of 10 \times to 20 \times tool diameter and to 6.0% of tool diameter or less when machining holes of 20 \times to 30 \times tool diameter.
- ⑤ When performing MQL (mist) machining, depending on the mist equipment or discharge amount from tool, it may be necessary to reduce feed rate to perform cutting.
- ⑥ When mounting tool, use a collet without scratches or stains, and suppress tool vibration to 0.02mm or less.
- ⑦ When using oil-based cutting lubricants, set cutting speed to 70% of cutting speed lower limit as general criteria.
- ⑧ Rotation speeds of slower than those shown in the condition table can also be used.

Drilling Method

1 Drilling of pilot hole (guide hole) (03WHNSB-TH, 05WHNSB-TH)

- Hole depth : Tool diameter \times 2~5 times
- Machining diameter : 10~30FWHNSB diameter + 0.03~0.10mm
- Recommended tools : 03WHNSB-TH, Carbide stub type, MTO by customized allowance



2 Supplying coolant during low-speed revolution (10~30FWHNSB-TH)

- Leading to the guide hole at low speed ($n=0\sim 500$ min⁻¹)
 - Stop feed 2.0~5.0 mm before the end of the guide hole.
- ※When a long tool (200mm or longer) is used, position the tool to the guide hole at low revolution speed ($n=200$ min⁻¹ or less).



3 High-speed revolution for drilling feed (10~30FWHNSB-TH)

- After confirming that the revolution speed is increasing at the specified rate, start feeding.



4 Machining completion

- Withdraw the tool at low speed. ($n=0\sim 500$ min⁻¹)
- ※When a long tool (200mm or longer) is used, withdraw the tool at low revolution speed ($n=200$ min⁻¹ or less).



WHNSB-TH

WNBSB-TH

WHMB-TH

NSBH-ATH

FWHNSB-TH

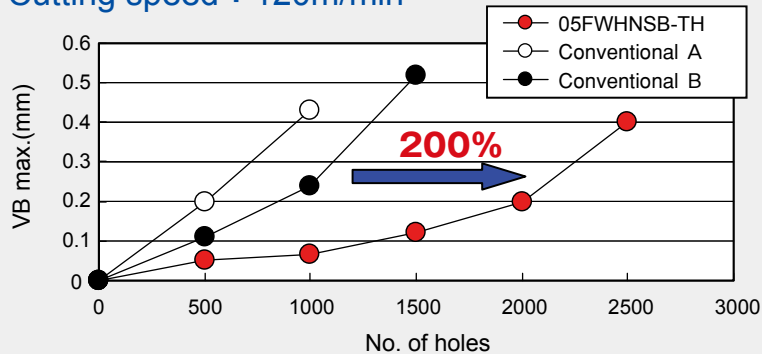
EMSBS

EMSBI-ATH

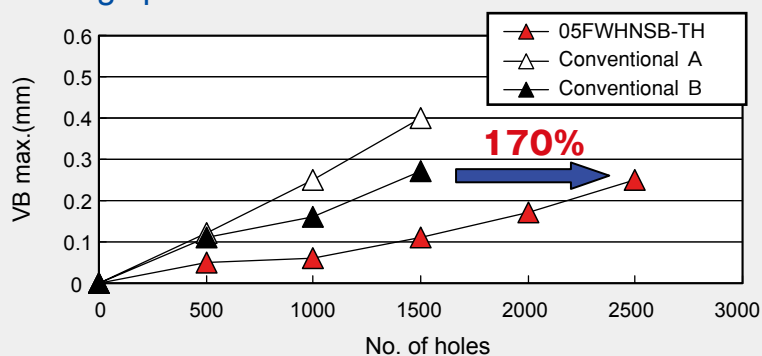
Use of new flute shape enables high-performance MQL machining.

Example: Semi-dry machining of ductile cast iron (FCD700)

Cutting speed : 120m/min

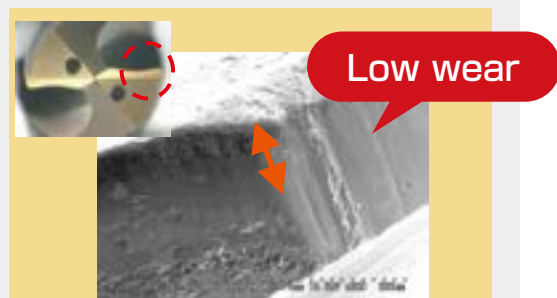


Cutting speed : 80m/min

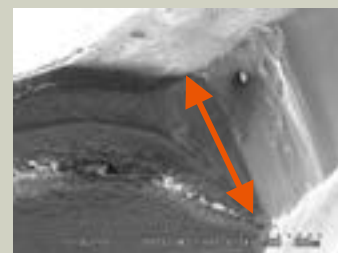


<Cutting condition>

Tool dia.: $\phi 6.0$ Work material : FCD700
 $f=0.24\text{mm/rev}$ Hole depth=24mm
 Mist : Internal coolant



Carbide Oil Hole Non Step Borer for Cast Iron



Conventional (Carbide Oil Hole Drill)

Reduces machining costs

Comparison of machining costs

		Conventional Carbide Drill	05FWHNSB-TH
C	Unit price (¥/piece)	¥13,500	¥15,200
L	Tool life (hole/piece)	1400	2200
N _l	No. of holes per lot (hole/lot)	1000	1000
T _m _l	Processing time (min/lot)	30	22
C _l	Tool cost per lot (¥/lot)	¥9,643	¥6,909
T _t	Tool replacement time (min/piece)	1	1
M _c	Machinery cost (¥/min)	¥100	¥100
X _l	Machining cost per lot (¥/lot)	¥12,714	¥9,155
	Machining cost ratio (%)	100%	72.0%
	Production per month (hole)	300,000	300,000
	Cost per month (¥/month)	¥3,814,286	¥2,746,364
	Cost reduction per month (¥/month)		¥1,067,922

The processing cost is reduced by 28%

Also reduces machining time and environmental load

Comparison of machining efficiency

		Conventional Carbide Drill	05FWHNSB-TH
n	Revolution (min ⁻¹)	4240	6370
f	Feed/revolution (mm/rev)	0.240	0.240
v _f	Feed speed (mm/min)	1018	1529
H	Drilling depth (mm)	24	24
T _m	Effective cutting time for 1 hole (min/hole)	0.024	0.016
T _{m1}	Processing time for 1 hole (min/hole)	0.030	0.022
DC	Tool dia. (mm)	6.0	6.0
Q	Metal removal volume (cm ³ /min)	28.757	43.204
	Efficiency ratio (%)	100%	150%

Comparison of environmental load

		Conventional Carbide Drill	05FWHNSB-TH
P _c	Cutting force (kW)	0.782	1.175
W _c	Electric power by cutting force (kWh)	0.307	0.307
W _o	Electric power by spindle motor (kWh)	0.375	0.275
	CO ₂ emissions for 1 lot (kg-CO ₂ /lot)	0.267	0.228
	CO ₂ emissions for 1 year (kg-CO ₂ /year)	961	820
	CO ₂ reduction for 1 year (kg-CO ₂ /year)		141



High performance is also achieved for wet machining of course!

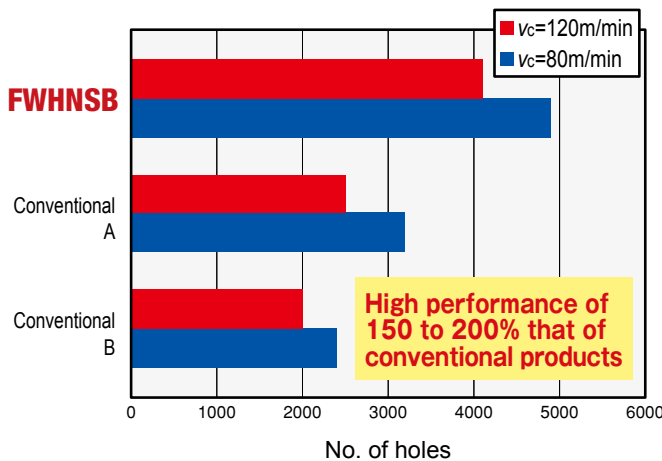
Example: Wet machining of ductile cast iron (FCD700)

<Cutting condition>

Tool dia.: $\phi 6.0$ Work material : FCD700

$v_c=120\text{m/min}$ $f=0.24\text{mm/rev}$ Hole depth=24mm

Waterbase coolant, Internal coolant



		Conventional Carbide Drill	05FWHNSB-TH
C	Unit price (¥/piece)	¥13,500	¥15,200
L	Tool life (hole/piece)	3100	4100
Nl	No. of holes per lot (hole/lot)	1000	1000
Tm ℓ	Processing time (min/lot)	30	22
C ℓ	Tool cost per lot (¥/lot)	¥4,355	¥3,707
Tt	Tool replacement time (min/piece)	1	1
Mc	Machinery cost (¥/min)	¥100	¥100
X ℓ	Machining cost per lot (¥/lot)	¥7,387	¥5,932
	Machining cost ratio (%)	100%	80.3%
	Production per month (hole)	300,000	300,000
	Cost per month (¥/month)	¥2,216,129	¥1,779,512
	Cost reduction per month (¥/month)		¥436,617



Easily machines deep holes!

High-performance machining of deep holes with depths of 30x tool diameter

<Cutting condition>

Tool dia. : $\phi 6.0$

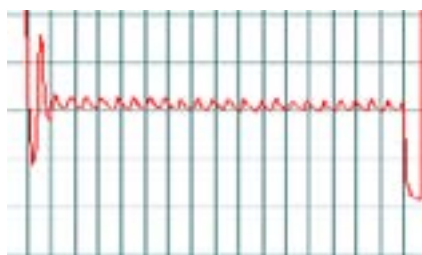
Work material : FCD700

$v_c=100\text{m/min}$ $v_f=1170\text{mm/min}$

$f=0.22\text{mm/rev}$ Hole depth=180mm

Mist, Internal coolant

Cutting time
6.5 second



Variation of load along main axis



Chip shape

Indented flute shape and special groove shape smoothly eject chips.

Ultra-high-performance hole machining at feed rates of 4,000mm/min.

<Cutting condition>

Tool dia.: $\phi 5.0$ Work material : FCD450

$v_c=125\text{m/min}$ $v_f=4000\text{mm/min}$

$f=0.5\text{mm/rev}$ Hole depth=100mm Mist, Internal coolant



Flute tip after machining 1,000 holes

Deep hole with L/D=20 can be machined in just 1.5s. Incredible high feed rate!

WHNSB-TH

WNSB-TH

WHMB-TH

NSBH-ATH

FWHNSB-TH

EMSBS

EMSBI-ATH

Epoch Micro Step Borer S

Enables ultra-deep drilling of minute holes

Features of EMSBS

- 01** New chip-removal stopper technology + high-rigidity neck shape enables high-accuracy drilling of minute holes.
- 02** Thinning flute shape achieves even higher machining accuracy (Thinning: Tool diameter > Ø0.1)
- 03** Combined with a special starter, it enables stable deep drilling of minute holes.
- 04** Two types of coating to match various applications

For product sizes other than standard product sizes, refer to made-to-order products (up to 100D possible).

		Applications Mold making Parts processing	EMSBS-TH/SD Ø0.04~Ø1 [188 Items]
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Features 01 New chip-removal stopper technology

Chip removal flow direction

Chip removal flute

Chip stopper

High-rigidity neck shape

Features 02 Thinning flute shape (Thinning: Tool diameter > Ø0.1)

Tool dia. : Ø0.5

Tool dia. : Ø0.1

Features 03 Special starter

(Ø0.1 or more)

Appearance of Epoch Micro Starter

Features 04 Two types of coating to match various applications

Micro-TH Coating **Various kinds of steel**
(SUS, common steel, high-hardness materials, etc.)

- Micro-TH Coating is super-smooth coating developed for micro-tool required higher accuracy.
- Micro-TH Coating realized higher performance even in micro-tool (under 0.1mm) due to less macro-particle.
- The characteristic is the same of conventional TH Coating.

SD(S-DLC) Coating **Non-ferrous**
(copper, aluminum, machinable ceramics, etc.)

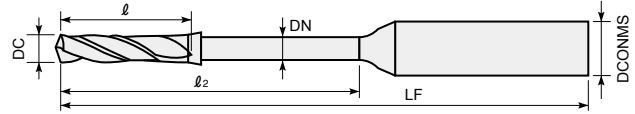
- The hydrogen-free DLC coating infinitely close to that of diamond.
- Impurities are low, providing high heat resistance and enabling high-efficiency machining.
- A new filtering technology is utilized to remove abnormal particles from the coating to provide the extremely smooth DLC coating.

WHNSB-TH
 WNSB-TH
 WHMB-TH
 NSBH-ATH
 FWHNSB-TH
 EMSBS
 EMSBH-ATH

Epoch Micro Step Borer S

Manufactured upon request only.

We can deliver the size to match customer needs.
Manufactured upon request only.



EMSBS ○○○○-○○-□□

l₂: Designation of under neck length;
(B) Designation of coating

Cutting condition 57



0
-0.005



(mm)

Order code	Kind of coating (B)	Size (mm)								
		l ₂ /DC	Tool dia.	Flute length	Neck dia.	Under neck length	Overall length LF			Shank dia. DCONMS
							DC	l	DN	
EMSBS0004-(A)-(B)	TH/SD	Value of 30 or less	0.04	0.2	0.033	Value can be specified freely.	40			3
EMSBS0005-(A)-(B)	TH/SD		0.05	0.25	0.04		40			3
EMSBS0006-(A)-(B)	TH/SD		Value of 50 or less can be specified.	0.06	0.3		0.05	40		
EMSBS0007-(A)-(B)	TH/SD	0.07		0.35	0.06		40			3
EMSBS0008-(A)-(B)	TH/SD	0.08		0.4	0.07		40			3
EMSBS0009-(A)-(B)	TH/SD	0.09		0.45	0.08		40			3
EMSBS0010-(A)-(B)	TH/SD	0.1		0.5	0.09		45			3
EMSBS0015-(A)-(B)	TH/SD	Value of 100 or less can be specified.	0.15	0.75	0.14		45		55	3
EMSBS0020-(A)-(B)	TH/SD		0.2	1	0.19		45	55	3	
EMSBS0030-(A)-(B)	TH/SD		0.3	1.5	0.28		45	55	65	3
EMSBS0040-(A)-(B)	TH/SD		0.4	2	0.38	50	60	75	3	
EMSBS0050-(A)-(B)	TH/SD		0.5	2.5	0.48	50	65	85	3	
EMSBS0060-(A)-(B)	TH/SD		0.6	3	0.57	55	75	95	3	
EMSBS0070-(A)-(B)	TH/SD		0.7	3.5	0.67	60	80	105	4	
EMSBS0080-(A)-(B)	TH/SD		0.8	4	0.76	60	85	115	4	
EMSBS0090-(A)-(B)	TH/SD		0.9	4.5	0.85	65	90	125	4	
EMSBS0100-(A)-(B)	TH/SD		1	5	0.95	70	100	135	4	

Ratio to cutting conditions for different L/D

Adjust cutting conditions according to the following ratios based on the cutting conditions for L/D=10 on next page.

L/D	Revolution	Feed rate	Step	L/D	Revolution	Feed rate	Step
20 times or less	100%	100%	100%	70 times or less	55%	55%	100%
30 times or less	100%	100%	100%	80 times or less	40%	40%	100%
40 times or less	90%	90%	100%	90 times or less	35%	35%	100%
50 times or less	80%	80%	100%	100 times or less	30%	30%	100%
60 times or less	65%	65%	100%				

Ordering method

The under neck length and coating can be freely selected according to the application.

Selecting under neck length

Please specify the under neck length using (drilling depth + tool diameter) as criteria.

Selecting coating

In general, SD should be selected for non-ferrous materials, and TH should be selected for other materials.

[Example 1] For example, when drilling a hole in SUS304 that is ϕ 0.3mm in diameter with a drilling depth of 15mm, specify a tool with a diameter of ϕ 0.3mm and a under neck length of 15.3mm (Drilling depth + tool diameter).

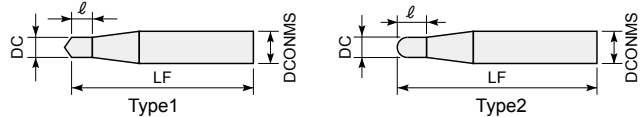
Order code : **EMSBS0030-15.3-TH**

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

Epoch Micro Starter



Tolerance on dia.: DC<0.2: -0.005~-0.01mm
DC≥0.2: -0.005~-0.015mm
Tolerance on shank: φ3: 0~-0.003mm
φ4: 0~-0.005mm



EMST-TH

Cutting condition 58 Carbide Micro TH

Item code	Stock	Size(mm)				Shape
		Tool dia.	Flute length	Overall length	Shank dia.	
		DC	ℓ	LF	DCONMS	
EMST0004-TH	●	0.04	0.04	45	3	Type 1
EMST0005-TH	●	0.05	0.05	45	3	
EMST0006-TH	●	0.06	0.06	45	3	
EMST0007-TH	●	0.07	0.07	45	3	
EMST0008-TH	●	0.08	0.08	45	3	
EMST0009-TH	●	0.09	0.09	45	3	
EMST0010-TH	●	0.1	0.1	45	3	
EMST0011-TH	●	0.11	0.11	45	3	
EMST0012-TH	●	0.12	0.12	45	3	
EMST0013-TH	●	0.13	0.13	45	3	
EMST0014-TH	●	0.14	0.14	45	3	
EMST0015-TH	●	0.15	0.15	45	3	
EMST0016-TH	●	0.16	0.16	45	3	
EMST0017-TH	●	0.17	0.17	45	3	
EMST0018-TH	●	0.18	0.18	45	3	
EMST0019-TH	●	0.19	0.19	45	3	
EMST0020-TH	●	0.2	0.2	45	3	
EMST0021-TH	□	0.21	0.21	45	3	
EMST0029-TH	□	0.29	0.29	45	3	
EMST0030-TH	●	0.3	0.3	45	3	
EMST0031-TH	□	0.31	0.31	45	3	

Item code	Stock	Size(mm)				Shape
		Tool dia.	Flute length	Overall length	Shank dia.	
		DC	ℓ	LF	DCONMS	
EMST0039-TH	□	0.39	0.39	45	3	Type 2
EMST0040-TH	●	0.4	0.4	45	3	
EMST0041-TH	□	0.41	0.41	45	3	
EMST0049-TH	□	0.49	0.49	45	3	
EMST0050-TH	●	0.5	0.5	45	3	
EMST0051-TH	□	0.51	0.51	45	3	
EMST0059-TH	□	0.59	0.59	45	3	
EMST0060-TH	●	0.6	0.6	45	3	
EMST0061-TH	□	0.61	0.61	45	3	
EMST0069-TH	□	0.69	0.69	45	4	
EMST0070-TH	●	0.7	0.7	45	4	
EMST0071-TH	□	0.71	0.71	45	4	
EMST0079-TH	□	0.79	0.79	45	4	
EMST0080-TH	●	0.8	0.8	45	4	
EMST0081-TH	□	0.81	0.81	45	4	
EMST0089-TH	□	0.89	0.89	45	4	
EMST0090-TH	●	0.9	0.9	45	4	
EMST0091-TH	□	0.91	0.91	45	4	
EMST0099-TH	□	0.99	0.99	45	4	
EMST0100-TH	●	1	1	45	4	
EMST0101-TH	□	1.01	1.01	45	4	

Recommended cutting conditions EMST-TH

Item Code	Tool dia. (mm)	Under neck length (mm)	Aluminium, Resin			Carbon steels (180~250HB)			Stainless steels (25~35HRC)			Pre-hardened steels (35~45HRC)			Hardened steels (45~55HRC)		
			Revolution n min ⁻¹	Feed rate V_f mm/min	Step Feed (mm)	Revolution n min ⁻¹	Feed rate V_f mm/min	Step Feed (mm)	Revolution n min ⁻¹	Feed rate V_f mm/min	Step Feed (mm)	Revolution n min ⁻¹	Feed rate V_f mm/min	Step Feed (mm)	Revolution n min ⁻¹	Feed rate V_f mm/min	Step Feed (mm)
EMST0004-TH	0.04	0.024	39,789	20	0.001	35,810	18	0.001	31,831	16	0.001	27,852	14	0.001	23,873	6	0.001
EMST0005-TH	0.05	0.03	38,197	19	0.001	31,831	16	0.001	28,648	14	0.001	25,465	13	0.001	22,282	6	0.001
EMST0006-TH	0.06	0.036	37,136	19	0.002	29,178	15	0.002	26,526	13	0.002	23,873	12	0.001	21,221	5	0.001
EMST0007-TH	0.07	0.042	36,378	18	0.002	27,284	14	0.002	25,010	13	0.002	22,736	11	0.001	20,463	5	0.001
EMST0008-TH	0.08	0.048	35,810	18	0.002	27,852	14	0.002	25,863	13	0.002	23,873	12	0.001	21,884	5	0.001
EMST0009-TH	0.09	0.054	35,368	18	0.002	26,526	13	0.002	24,757	12	0.002	22,989	11	0.002	21,221	5	0.001
EMST0010-TH	0.1	0.06	35,014	26	0.003	25,465	19	0.003	23,873	18	0.003	22,282	17	0.002	20,690	10	0.001
EMST0015-TH	0.15	0.09	25,465	19	0.004	23,343	18	0.004	21,221	16	0.004	20,160	15	0.003	19,099	10	0.002
EMST0020-TH	0.2	0.12	23,873	24	0.005	20,690	21	0.005	19,099	19	0.005	17,507	18	0.004	16,711	13	0.003
EMST0030-TH	0.3	0.18	15,915	16	0.008	14,854	15	0.008	13,793	14	0.008	12,732	13	0.005	12,202	9	0.004
EMST0040-TH	0.4	0.24	13,528	14	0.010	12,335	12	0.010	11,937	12	0.010	11,539	12	0.007	10,743	11	0.005
EMST0050-TH	0.5	0.3	10,823	14	0.013	9,868	12	0.013	9,549	12	0.013	9,231	12	0.009	8,594	11	0.006
EMST0060-TH	0.6	0.36	9,019	14	0.015	8,223	12	0.015	7,958	12	0.015	7,692	12	0.011	7,162	11	0.008
EMST0070-TH	0.7	0.42	7,730	14	0.018	7,048	12	0.018	6,821	12	0.018	6,594	12	0.012	6,139	11	0.009
EMST0080-TH	0.8	0.48	6,764	14	0.020	6,167	12	0.020	5,968	12	0.020	5,769	12	0.014	5,371	11	0.010
EMST0090-TH	0.9	0.54	6,013	14	0.023	5,482	12	0.023	5,305	12	0.023	5,128	12	0.016	4,775	11	0.011
EMST0100-TH	1	0.6	5,411	14	0.025	4,934	12	0.025	4,775	12	0.025	4,615	12	0.018	4,297	11	0.013

*These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.

*In general, water-soluble or oil-based coolant should be used to ensure chip removal.

*Always use with a G83 program (Peck drilling cycle).

*Drilling depth: Be sure to drill to a depth of 60% of the diameter.
(Ex.: For Ø0.1, depth=0.06mm)

Applicable work material

Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel, Ti alloy	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	SOOC	SCM, SCr	SKD, SKS	~40HRC	~45HRC	45HRC~	SUS	Inconel	FC	FCD	Al	Cu
○	○	○	○	○	○	○	○	○	○	○	○	○

Re-grinding compatibility range

Item code	DC (mm)
EMST-TH	(N/A)

● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

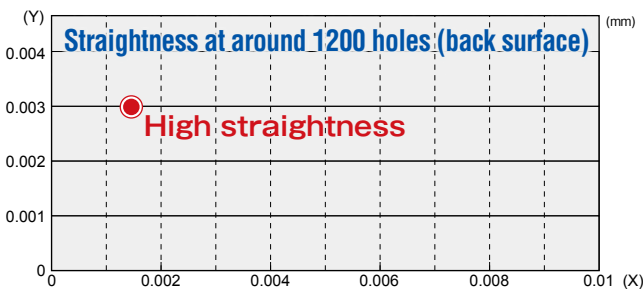
Machining data

01 Example of minute hole drilling of nozzle

Work material : SUS316 Tool : $\phi 0.07 \times 0.7\text{mm}$ (L/D=10)
 Drilling depth = 0.5mm (Through hole)
 Coolant : Water-base $n=20,000\text{min}^{-1}$ $vc=4.4\text{m/min}$ $vf=50\text{mm/min}$
 $f=0.0025\text{mm/rev}$ Step=0.007mm



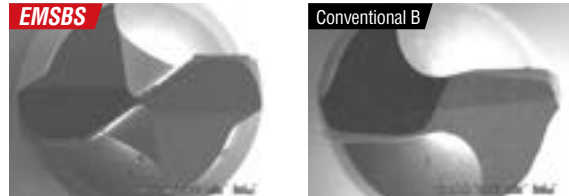
Number of holes drilled:
1200 holes
Drilling time:
30s/hole



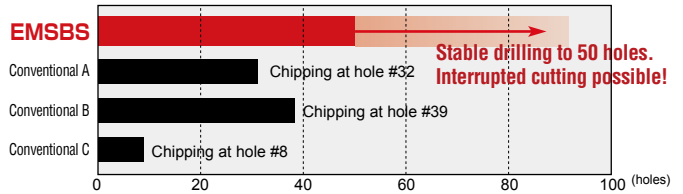
02 Minute die holes

Work material : HAP40[Ⓐ] Tool : $\phi 0.5 \times 5\text{mm}$ (L/D=10)
 Drilling depth = 5mm (Through hole)
 Coolant : Air-blow $n=10,000\text{min}^{-1}$ $vc=15.7\text{m/min}$ $vf=50\text{mm/min}$
 $f=0.005\text{mm/rev}$ Step=0.05mm

Tool condition after drilling 30 holes



Number of holes drilled



Enables stable machining of powder metallurgy HSS which often causes seizing with other tools.

How to use Epoch Micro Step Borer

Caution points when machining

<About pilot holes>

Use of the special starter is recommended.

* Particularly when drilling high-accuracy holes, please use the special starter.

Always perform step drilling using a G83 program. Drilling depth: Be sure to drill to a depth of 60% of the diameter. (Ex.: For $\phi 0.1$, depth=0.06mm)

<About coolants>

In general, oil-based or water-soluble coolants are recommended. When using, set it up so that the coolant hits the flute tips.

<About machining programs>

Always perform drilling using a G83 program (Peck drilling cycle).

Recommended reference position: 0.05 to 0.1mm. However, for aspect ratios of greater than 50D, the position should be set as 30% of the tool diameter below the surface of the work.

(Ex.: For $\phi 1 \times 100\text{mm}$ under neck length, reference position = -0.3mm)

Recommended approach distance: 0.05mm

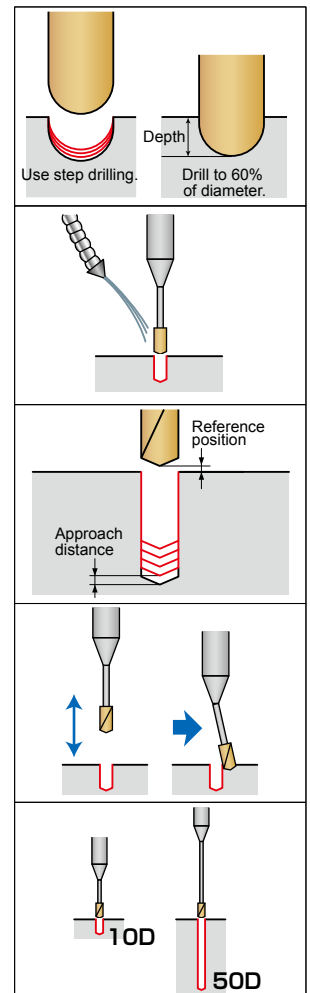
*Change according to the machine parameter setting screen. If these values are large, machining time may become longer.

<About fast feed rates>

When the under neck length is long, if the fast feed rate is too fast, bit may be broken. Recommended: 20m/min. or less (for greater than 30D, 5m/min. or less)

<When focusing on accuracy for hole depths of 30D or greater>

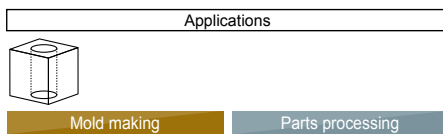
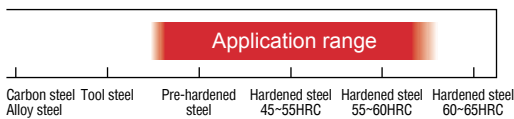
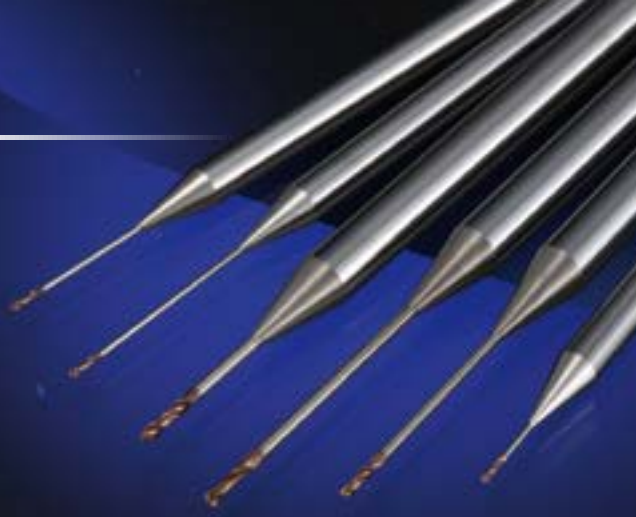
Drilling accuracy can be further improved by inserting 10D before drilling after drilling with a starter. For aspect ratios of greater than 50D, always insert 10D before starting drilling.



Epoch Micro Step Borer H

Features of EMSBH-ATH

Achieved small-diameter deep drilling of high-hardened steels by using special substrate, shape, and coating.



EMSBH-ATH
$\phi 0.1 \sim \phi 2.02$ [111 Items]

Design

Special flute design for high-hardened steels enables smooth drilling. Flow of cutting chips is also smooth.

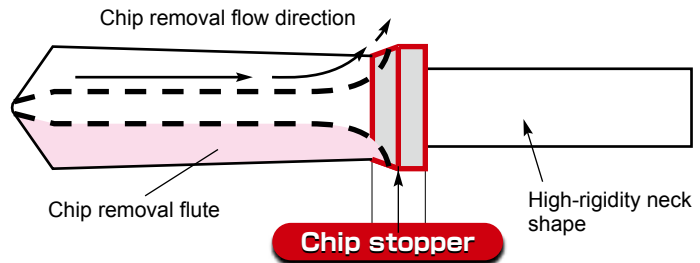


Special edge shape for high-hardened steels ▶

Chip-removal stopper

Chips are reliably removed, improving guide characteristics during drilling.

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



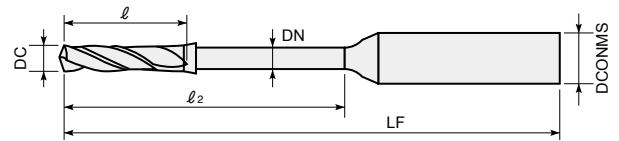
Improved heat-resistant coating



Features

- Hardness and oxidation resistance of TH Coating is further improved. Enables longer life and higher efficient when cutting high-hardness materials. (Si nano composite coating with finer crystal particles)
- Exhibits amazing performance when cutting high-hardness materials (55HRC or higher) Cold-worked die steel, HSS, tool steel.

Epoch Micro Step Borer H



EMSBH○○○○-○○-ATH

Cutting condition 63
Dia. tolerance $\begin{matrix} +0.006 \\ +0.001 \end{matrix}$
h4
(mm)

Item code	Stocks	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ ₂	DN	LF	DCONMS
EMSBH0010-1-ATH	●	0.1	0.50	1.0	0.09	45	3.0
EMSBH0010-2-ATH	●			2.0			
EMSBH0010-3-ATH	●			3.0			
EMSBH0011-1-ATH	□	0.11	0.55	1.0	0.1	45	3.0
EMSBH0011-2-ATH	□			2.0			
EMSBH0011-3-ATH	□			3.0			
EMSBH0012-1-ATH	□	0.12	0.60	1.0	0.11	45	3.0
EMSBH0012-2-ATH	□			2.0			
EMSBH0012-3-ATH	□			3.0			
EMSBH0015-1.5-ATH	□	0.15	0.75	1.5	0.14	45	3.0
EMSBH0015-3-ATH	□			3.0			
EMSBH0015-4.5-ATH	□			4.5			
EMSBH0020-2-ATH	●	0.2	1.00	2.0	0.19	45	3.0
EMSBH0020-4-ATH	●			4.0			
EMSBH0020-6-ATH	●			6.0			
EMSBH0021-2-ATH	□	0.21	1.05	2.0	0.19	45	3.0
EMSBH0021-4-ATH	□			4.0			
EMSBH0021-6-ATH	□			6.0			
EMSBH0022-2-ATH	□	0.22	1.10	2.0	0.2	45	3.0
EMSBH0022-4-ATH	□			4.0			
EMSBH0022-6-ATH	□			6.0			
EMSBH0030-3-ATH	●	0.3	1.5	3.0	0.28	45	3.0
EMSBH0030-6-ATH	●			6.0			
EMSBH0030-9-ATH	●			9.0			
EMSBH0031-3-ATH	□	0.31	1.5	3.0	0.29	45	3.0
EMSBH0031-6-ATH	□			6.0			
EMSBH0031-9-ATH	□			9.0			
EMSBH0032-3-ATH	□	0.32	1.5	3.0	0.3	45	3.0
EMSBH0032-6-ATH	□			6.0			
EMSBH0032-9-ATH	□			9.0			
EMSBH0040-4-ATH	●	0.4	2.0	4.0	0.38	50	3.0
EMSBH0040-8-ATH	●			8.0			
EMSBH0040-12-ATH	●			12.0			

Item code	Stocks	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	ℓ	ℓ ₂	DN	LF	DCONMS
EMSBH0041-4-ATH	□	0.41	2.0	4.0	0.39	50	3.0
EMSBH0041-8-ATH	□			8.0			
EMSBH0041-12-ATH	□			12.0			
EMSBH0042-4-ATH	□	0.42	2.0	4.0	0.4	50	3.0
EMSBH0042-8-ATH	□			8.0			
EMSBH0042-12-ATH	□			12.0			
EMSBH0050-5-ATH	●	0.5	2.5	5.0	0.48	50	3.0
EMSBH0050-10-ATH	●			10.0			
EMSBH0050-15-ATH	●			15.0			
EMSBH0051-5-ATH	□	0.51	2.5	5.0	0.48	50	3.0
EMSBH0051-10-ATH	□			10.0			
EMSBH0051-15-ATH	□			15.0			
EMSBH0052-5-ATH	□	0.52	2.5	5.0	0.49	50	3.0
EMSBH0052-10-ATH	□			10.0			
EMSBH0052-15-ATH	□			15.0			
EMSBH0060-6-ATH	●	0.6	3.0	6.0	0.57	55	3.0
EMSBH0060-12-ATH	●			12.0			
EMSBH0060-18-ATH	●			18.0			
EMSBH0061-6-ATH	□	0.61	3.0	6.0	0.58	55	3.0
EMSBH0061-12-ATH	□			12.0			
EMSBH0061-18-ATH	□			18.0			
EMSBH0062-6-ATH	□	0.62	3.0	6.0	0.59	55	3.0
EMSBH0062-12-ATH	□			12.0			
EMSBH0062-18-ATH	□			18.0			
EMSBH0070-7-ATH	●	0.7	3.5	7.0	0.67	60	4.0
EMSBH0070-14-ATH	●			14.0			
EMSBH0070-21-ATH	●			21.0			
EMSBH0071-7-ATH	□	0.71	3.5	7.0	0.67	60	4.0
EMSBH0071-14-ATH	□			14.0			
EMSBH0071-21-ATH	□			21.0			
EMSBH0072-7-ATH	□	0.72	3.5	7.0	0.68	60	4.0
EMSBH0072-14-ATH	□			14.0			
EMSBH0072-21-ATH	□			21.0			

●: Stocked items. □: Stocked by specified distributor. Contact to sales office.

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

●: Stocked items. □: Stocked by specified distributor. Contact to sales office.

WHNSB-TH

WNSB-TH

WHMB-TH

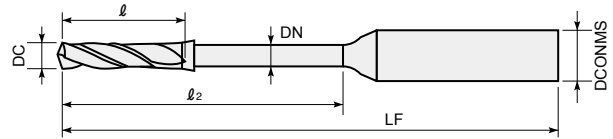
NSBH-ATH

FWNSB-TH

EMSB

EMSBH-ATH

Epoch Micro Step Borer H



EMS BH - -ATH

Cutting condition 63

Dia. tolerance +0.006 +0.001

h4 (mm)

Item code	Stocks	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	l	l ₂	DN	LF	DCONMS
EMS BH0080-8-ATH	●			8.0			
EMS BH0080-16-ATH	●	0.8	4.0	16.0	0.76	60	4.0
EMS BH0080-24-ATH	●			24.0			
EMS BH0081-8-ATH	□			8.0			
EMS BH0081-16-ATH	□	0.81	4.0	16.0	0.76	60	4.0
EMS BH0081-24-ATH	□			24.0			
EMS BH0082-8-ATH	□			8.0			
EMS BH0082-16-ATH	□	0.82	4.0	16.0	0.77	60	4.0
EMS BH0082-24-ATH	□			24.0			
EMS BH0090-9-ATH	●			9.0			
EMS BH0090-18-ATH	●	0.9	4.5	18.0	0.85	65	4.0
EMS BH0090-27-ATH	●			27.0			
EMS BH0091-9-ATH	□			9.0			
EMS BH0091-18-ATH	□	0.91	4.5	18.0	0.86	65	4.0
EMS BH0091-27-ATH	□			27.0			
EMS BH0092-9-ATH	□			9.0			
EMS BH0092-18-ATH	□	0.92	4.5	18.0	0.87	65	4.0
EMS BH0092-27-ATH	□			27.0			
EMS BH0100-10-ATH	●			10.0			
EMS BH0100-20-ATH	●	1.0	5.0	20.0	0.95	70	4.0
EMS BH0100-30-ATH	●			30.0			
EMS BH0101-10-ATH	□			10.0			
EMS BH0101-20-ATH	□	1.01	5.0	20.0	0.97	70	4.0
EMS BH0101-30-ATH	□			30.0			
EMS BH0102-10-ATH	□			10.0			
EMS BH0102-20-ATH	□	1.02	5.0	20.0	0.98	70	4.0
EMS BH0102-30-ATH	□			30.0			

Item code	Stocks	Size(mm)					
		Tool dia.	Flute length	Under neck length	Neck dia.	Overall length	Shank dia.
		DC	l	l ₂	DN	LF	DCONMS
EMS BH0150-15-ATH	●			15.0	-	70	
EMS BH0150-30-ATH	●	1.5	15.0	30.0	1.44	70	4.0
EMS BH0150-45-ATH	●			45.0		100	
EMS BH0151-15-ATH	□			15.0	-	70	
EMS BH0151-30-ATH	□	1.51	15.0	30.0	1.45	70	4.0
EMS BH0151-45-ATH	□			45.0		100	
EMS BH0152-15-ATH	□			15.0	-	70	
EMS BH0152-30-ATH	□	1.52	15.0	30.0	1.46	70	4.0
EMS BH0152-45-ATH	□			45.0		100	
EMS BH0200-20-ATH	●			20.0	-	70	
EMS BH0200-40-ATH	●	2.0	20.0	40.0	1.92	100	4.0
EMS BH0200-60-ATH	●			60.0		100	
EMS BH0201-20-ATH	□			20.0	-	70	
EMS BH0201-40-ATH	□	2.01	20.0	40.0	1.93	100	4.0
EMS BH0201-60-ATH	□			60.0		100	
EMS BH0202-20-ATH	□			20.0	-	70	
EMS BH0202-40-ATH	□	2.02	20.0	40.0	1.94	100	4.0
EMS BH0202-60-ATH	□			60.0		100	

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

Applicable work material												
Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel, Ti alloy	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	S	SCM, SCR	SKD, SKS	~40HRC	~45HRC	45HRC~	SUS	Inconel	FC	FCD	Al	Cu
					○	◎						

Re-grinding compatibility range	
Item code	DC (mm)
EMS BH-ATH	(N/A)

● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

Recommended Cutting Conditions

EMSBH-ATH

Item code	Tool dia.	Under neck length	Step feed (mm)	Pre-hardened steels (35~45HRC)		Hardened steels (45~60HRC)	
				Revolution n min ⁻¹	Feed rate v_f mm/min	Revolution n min ⁻¹	Feed rate v_f mm/min
EMSBH0010-1-ATH	0.1	1.0	0.01	22,300	67	12,420	41
EMSBH0010-2-ATH		2.0					
EMSBH0010-3-ATH		3.0					
EMSBH0011-1-ATH	0.11	1.0	0.011	22,300	67	12,420	41
EMSBH0011-2-ATH		2.0					
EMSBH0011-3-ATH		3.0					
EMSBH0012-1-ATH	0.12	1.0	0.012	22,300	67	12,420	41
EMSBH0012-2-ATH		2.0					
EMSBH0012-3-ATH		3.0					
EMSBH0015-1.5-ATH	0.15	1.5	0.015	22,300	65	12,420	45
EMSBH0015-3-ATH		3.0					
EMSBH0015-4.5-ATH		4.5					
EMSBH0020-2-ATH	0.2	2.0	0.02	15,800	63	11,150	50
EMSBH0020-4-ATH		4.0					
EMSBH0020-6-ATH		6.0					
EMSBH0021-2-ATH	0.21	2.0	0.021	15,800	63	11,150	50
EMSBH0021-4-ATH		4.0					
EMSBH0021-6-ATH		6.0					
EMSBH0022-2-ATH	0.22	2.0	0.022	15,800	63	11,150	50
EMSBH0022-4-ATH		4.0					
EMSBH0022-6-ATH		6.0					
EMSBH0030-3-ATH	0.3	3.0	0.03	13,000	51	11,150	43
EMSBH0030-6-ATH		6.0					
EMSBH0030-9-ATH		9.0					
EMSBH0031-3-ATH	0.31	3.0	0.031	13,000	51	11,150	43
EMSBH0031-6-ATH		6.0					
EMSBH0031-9-ATH		9.0					
EMSBH0032-3-ATH	0.32	3.0	0.032	13,000	51	11,150	43
EMSBH0032-6-ATH		6.0					
EMSBH0032-9-ATH		9.0					
EMSBH0040-4-ATH	0.4	4.0	0.04	11,200	55	10,350	52
EMSBH0040-8-ATH		8.0					
EMSBH0040-12-ATH		12.0					
EMSBH0041-4-ATH	0.41	4.0	0.041	11,200	55	10,350	52
EMSBH0041-8-ATH		8.0					
EMSBH0041-12-ATH		12.0					
EMSBH0042-4-ATH	0.42	4.0	0.042	11,200	55	10,350	52
EMSBH0042-8-ATH		8.0					
EMSBH0042-12-ATH		12.0					
EMSBH0050-5-ATH	0.5	5.0	0.05	10,500	52	10,000	50
EMSBH0050-10-ATH		10.0					
EMSBH0050-15-ATH		15.0					
EMSBH0051-5-ATH	0.51	5.0	0.051	10,500	52	10,000	50
EMSBH0051-10-ATH		10.0					
EMSBH0051-15-ATH		15.0					
EMSBH0052-5-ATH	0.52	5.0	0.052	10,500	52	10,000	50
EMSBH0052-10-ATH		10.0					
EMSBH0052-15-ATH		15.0					
EMSBH0060-6-ATH	0.6	6.0	0.06	10,060	56	9,560	55
EMSBH0060-12-ATH		12.0					
EMSBH0060-18-ATH		18.0					
EMSBH0061-6-ATH	0.61	6.0	0.061	10,060	56	9,560	55
EMSBH0061-12-ATH		12.0					
EMSBH0061-18-ATH		18.0					
EMSBH0062-6-ATH	0.62	6.0	0.062	10,060	56	9,560	55
EMSBH0062-12-ATH		12.0					
EMSBH0062-18-ATH		18.0					

Item code	Tool dia.	Under neck length	Step feed (mm)	Pre-hardened steels (35~45HRC)		Hardened steels (45~60HRC)	
				Revolution n min ⁻¹	Feed rate v_f mm/min	Revolution n min ⁻¹	Feed rate v_f mm/min
EMSBH0070-7-ATH	0.7	7.0	0.07	9,600	59	9,100	54
EMSBH0070-14-ATH		14.0					
EMSBH0070-21-ATH		21.0					
EMSBH0071-7-ATH	0.71	7.0	0.071	9,600	59	9,100	54
EMSBH0071-14-ATH		14.0					
EMSBH0071-21-ATH		21.0					
EMSBH0072-7-ATH	0.72	7.0	0.072	9,600	59	9,100	54
EMSBH0072-14-ATH		14.0					
EMSBH0072-21-ATH		21.0					
EMSBH0080-8-ATH	0.8	8.0	0.08	9,260	57	8,760	55
EMSBH0080-16-ATH		16.0					
EMSBH0080-24-ATH		24.0					
EMSBH0081-8-ATH	0.81	8.0	0.081	9,260	57	8,760	55
EMSBH0081-16-ATH		16.0					
EMSBH0081-24-ATH		24.0					
EMSBH0082-8-ATH	0.82	8.0	0.082	9,260	57	8,760	55
EMSBH0082-16-ATH		16.0					
EMSBH0082-24-ATH		24.0					
EMSBH0090-9-ATH	0.9	9.0	0.09	9,000	60	8,500	56
EMSBH0090-18-ATH		18.0					
EMSBH0090-27-ATH		27.0					
EMSBH0091-9-ATH	0.91	9.0	0.091	9,000	60	8,500	56
EMSBH0091-18-ATH		18.0					
EMSBH0091-27-ATH		27.0					
EMSBH0092-9-ATH	0.92	9.0	0.092	9,000	60	8,500	56
EMSBH0092-18-ATH		18.0					
EMSBH0092-27-ATH		27.0					
EMSBH0100-10-ATH	1.0	10.0	0.1	8,500	63	8,000	56
EMSBH0100-20-ATH		20.0					
EMSBH0100-30-ATH		30.0					
EMSBH0101-10-ATH	1.01	10.0	0.101	8,500	63	8,000	56
EMSBH0101-20-ATH		20.0					
EMSBH0101-30-ATH		30.0					
EMSBH0102-10-ATH	1.02	10.0	0.102	8,500	63	8,000	56
EMSBH0102-20-ATH		20.0					
EMSBH0102-30-ATH		30.0					
EMSBH0150-15-ATH	1.5	15.0	0.15	5,750	60	4,250	43
EMSBH0150-30-ATH		30.0					
EMSBH0150-45-ATH		45.0					
EMSBH0151-15-ATH	1.51	15.0	0.151	5,750	60	4,250	43
EMSBH0151-30-ATH		30.0					
EMSBH0151-45-ATH		45.0					
EMSBH0152-15-ATH	1.52	15.0	0.152	5,750	60	4,250	43
EMSBH0152-30-ATH		30.0					
EMSBH0152-45-ATH		45.0					
EMSBH0200-20-ATH	2.0	20.0	0.2	5,000	60	3,190	43
EMSBH0200-40-ATH		40.0					
EMSBH0200-60-ATH		60.0					
EMSBH0201-20-ATH	2.01	20.0	0.201	5,000	60	3,190	43
EMSBH0201-40-ATH		40.0					
EMSBH0201-60-ATH		60.0					
EMSBH0202-20-ATH	2.02	20.0	0.202	5,000	60	3,190	43
EMSBH0202-40-ATH		40.0					
EMSBH0202-60-ATH		60.0					

[Note]

Please understand "Drilling method and attentions" 16 page, and use EMSBH-ATH.

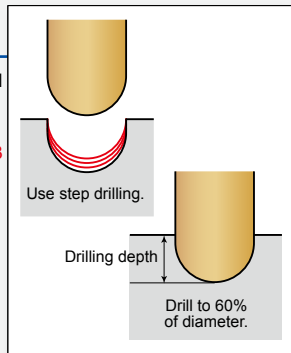
Recommended Cutting Conditions

Setting of cutting conditions

- This standard cutting condition table is intended as reference cutting conditions. The conditions should be adjusted as necessary according to the actual conditions of machined shape, purpose, machine used, etc.
- Please use EPDBEH-ATH as a starter.
- Please always use G83 mode (peck drilling cycle).
- For drilling hardened steel, when drilling holes with an L/D of 30D, it is recommended to use a 10D tool for pre-drilling. In addition, when the diameter is less than $\phi 0.5$, in addition to pre-drilling with a 10D tool, further pre-drilling with a 20D tool is also recommended.
Example: When drilling a $\phi 0.1 \times 30D$ hole in SKD11 (60HRC), etc.
- Under-neck length (ℓ_2) conforms to through-hole drilling depth.
- When drilling through holes, drill the through hole to a depth of between 20% and 30% of the diameter from the tip of the tool.
Ex.: For work thickness T=4mm and tool= $\phi 0.5 \times 5\text{mm}$, drilling depth should be 4.14mm (from tip of tool).
- Water-soluble or oil-based coolant should be used to ensure chip removal.
- Please pay attention on the below "Drilling process and attentions on drilling".

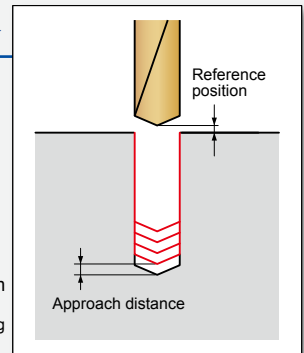
<About starter>

※ Use of a special starter (Epoch Deep Ball Evolution Hard EPDBEH-ATH) is recommended.
Be sure to perform step drilling using a G83 program.
Drilling depth: Be sure to perform drilling to a depth of 60% of the tool diameter.
(For example, 0.06mm deep for a tool diameter of $\phi 0.1\text{mm}$)



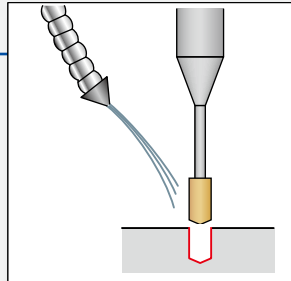
<About machining programs>

Always perform drilling using a G83 program (Peck drilling cycle).
Recommended reference position: 0.05 to 0.1mm
However, for aspect ratios of greater than 50D, the position should be set as 30% of the tool dia. below the surface of the work.
(Ex.: For $\phi 1 \times 100\text{mm}$ below-neck length, reference position = -0.3mm)
Recommended approach distance: 0.05mm
※ Change according to the machine parameter setting screen. If these values are large, machining time may become longer.



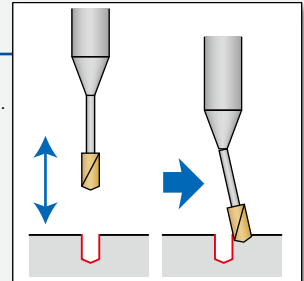
<About coolants>

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



<About fast feed rates>

When the below-neck length is long, if the fast feed rate is too fast, bit may be broken.
Recommended: 20m/min. or less
(for greater than 30D, 5m/min. or less)



Regarding tolerance of diameter for EMSBH-ATH

Diameter of EMSBH-ATH has a positive tolerance in order to
(1) compensate hole shrink after boring, and
(2) keep clearance for ejector pin of die mold.
Conventional EMSBS has negative tolerance of diameter.

【Diameter tolerance】

+0.006mm
+0.001mm

Trouble shooting

Phenomenons	Factors	Actions
It will break.	Less chip removal.	<ul style="list-style-type: none"> ▶ Please hit coolant to the flute steadily. ▶ Please keep feed speed, and increase revolution speed. Improve chip removal.
	Hole is bent.	▶ Please added drilling process by short EMSBH after drilling by starter.
Not stable tool life.	Drill has runout.	▶ Please set drill runout less than 0.005mm. Please change to collet of free from dent or dirt for increase accuracy.

Epoch Deep Ball Evolution Hard

Use of Epoch Deep Ball Evolution Hard (EPDBEH-ATH) is recommended for starter.

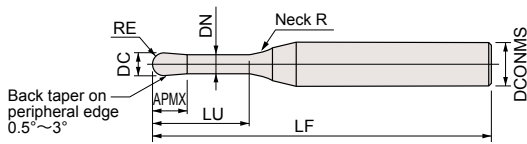


Tolerance on RE : Right table Helix angle : 30°

2 Flutes



Tolerance on shank : h5



(mm)	
Ball radius	Tolerance on RE
RE ≥ 0.25	± 0.003
$0.25 < RE$	± 0.005

EPDBEH2 - -ATH

Cutting condition 65

Item code	Stocks	Size(mm)								
		Tool dia.	Ball radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R	Neck R
		DC	RE	LU	APMX	DN	LF	DCONMS		
EPDBEH2001-0.2-ATH	●	0.1	0.05	0.2	0.08	0.08	45	4	1	
EPDBEH20011-0.2-ATH	□	0.11	0.055	0.2	0.09	0.09	45	4	1	
EPDBEH20012-0.2-ATH	□	0.12	0.06	0.2	0.1	0.1	45	4	1	
EPDBEH20015-0.2-ATH	□	0.15	0.075	0.2	0.13	0.13	45	4	1	
EPDBEH2002-0.5-ATH	●	0.2	0.1	0.5	0.15	0.17	50	4	1	
EPDBEH20021-0.5-ATH	□	0.21	0.105	0.5	0.16	0.18	50	4	1	
EPDBEH20022-0.5-ATH	□	0.22	0.11	0.5	0.17	0.19	50	4	1	
EPDBEH2003-0.5-ATH	●	0.3	0.15	0.5	0.25	0.27	50	4	2	
EPDBEH20031-0.5-ATH	□	0.31	0.155	0.5	0.26	0.28	50	4	2	
EPDBEH20032-0.5-ATH	□	0.32	0.16	0.5	0.27	0.29	50	4	2	
EPDBEH2004-0.75-ATH	●	0.4	0.2	0.75	0.3	0.37	50	4	2	
EPDBEH20041-0.75-ATH	□	0.41	0.205	0.75	0.31	0.38	50	4	2	
EPDBEH20042-0.75-ATH	□	0.42	0.21	0.75	0.32	0.39	50	4	2	
EPDBEH2005-1-ATH	●	0.5	0.25	1	0.35	0.47	50	4	2	
EPDBEH20051-1-ATH	□	0.51	0.255	1	0.36	0.48	50	4	2	
EPDBEH20052-1-ATH	□	0.52	0.26	1	0.37	0.49	50	4	2	
EPDBEH2006-1-ATH	●	0.6	0.3	1	0.4	0.57	50	4	4	
EPDBEH20061-1-ATH	□	0.61	0.305	1	0.41	0.58	50	4	4	
EPDBEH20062-1-ATH	□	0.62	0.31	1	0.42	0.59	50	4	4	

Item code	Stocks	Size(mm)								
		Tool dia.	Ball radius	Under neck length	Flute length	Neck dia.	Overall length	Shank dia.	Neck R	Neck R
		DC	RE	LU	APMX	DN	LF	DCONMS		
EPDBEH2007-2-ATH	●	0.7	0.35	2	0.45	0.67	50	4	4	
EPDBEH20071-2-ATH	□	0.71	0.355	2	0.46	0.68	50	4	4	
EPDBEH20072-2-ATH	□	0.72	0.36	2	0.47	0.69	50	4	4	
EPDBEH2008-2-ATH	●	0.8	0.4	2	0.5	0.77	50	4	4	
EPDBEH20081-2-ATH	□	0.81	0.405	2	0.51	0.78	50	4	4	
EPDBEH20082-2-ATH	□	0.82	0.41	2	0.52	0.79	50	4	4	
EPDBEH2009-2-ATH	●	0.9	0.45	2	0.6	0.87	50	4	4	
EPDBEH20091-2-ATH	□	0.91	0.455	2	0.61	0.88	50	4	4	
EPDBEH20092-2-ATH	□	0.92	0.46	2	0.62	0.89	50	4	4	
EPDBEH2010-2-ATH	●	1	0.5	2	0.8	0.96	50	4	4	
EPDBEH20101-2-ATH	□	1.01	0.505	2	0.81	0.97	50	4	4	
EPDBEH20102-2-ATH	□	1.02	0.51	2	0.82	0.98	50	4	4	
EPDBEH2015-2-ATH	●	1.5	0.75	2	1.35	1.44	50	4	4	
EPDBEH20151-2-ATH	□	1.51	0.755	2	1.36	1.45	50	4	4	
EPDBEH20152-2-ATH	□	1.52	0.76	2	1.37	1.46	50	4	4	
EPDBEH2020-3-ATH	●	2	1	3	1.7	1.92	50	4	4	
EPDBEH20201-3-ATH	□	2.01	1.005	3	1.71	1.93	50	4	4	
EPDBEH20202-3-ATH	□	2.02	1.01	3	1.72	1.94	50	4	4	

● Cutting condition for starter (EPDBEH-ATH)

Tool dia. DC	Under neck length LU	Pre-hardened steels (35~45HRC)			Hardened steels (45~55HRC)			Hardened steels (55~60HRC)		
		Revolution η min ⁻¹	Feed rate V_f mm/min	Step feed mm	Revolution η min ⁻¹	Feed rate V_f mm/min	Step feed mm	Revolution η min ⁻¹	Feed rate V_f mm/min	Step feed mm
0.1	0.2									
0.11	0.2	13,369	33	0.003	12,414	21	0.003	12,414	21	0.003
0.12	0.2									
0.15	0.2	13,369	34	0.0045	12,414	23	0.0045	12,414	23	0.0045
0.2	0.5									
0.21	0.5	10,504	35	0.006	10,027	25	0.006	10,027	25	0.006
0.22	0.5									
0.3	0.5									
0.31	0.5	8,913	25	0.009	8,541	21	0.009	8,541	21	0.009
0.32	0.5									
0.4	0.75									
0.41	0.75	8,077	23	0.012	7,520	21	0.012	7,520	21	0.012
0.42	0.75									
0.5	1									
0.51	1	6,462	23	0.015	6,016	21	0.015	6,016	21	0.015
0.52	1									
0.6	1									
0.61	1	5,385	23	0.018	5,013	21	0.018	5,013	21	0.018
0.62	1									

Tool dia. DC	Under neck length LU	Pre-hardened steels (35~45HRC)			Hardened steels (45~55HRC)			Hardened steels (55~60HRC)		
		Revolution η min ⁻¹	Feed rate V_f mm/min	Step feed mm	Revolution η min ⁻¹	Feed rate V_f mm/min	Step feed mm	Revolution η min ⁻¹	Feed rate V_f mm/min	Step feed mm
0.7	2									
0.71	2	4,615	23	0.021	4,297	21	0.021	4,297	21	0.021
0.72	2									
0.8	2									
0.81	2	4,039	23	0.024	3,760	21	0.024	3,760	21	0.024
0.82	2									
0.9	2									
0.91	2	3,590	23	0.027	3,342	21	0.027	3,342	21	0.027
0.92	2									
1	2									
1.01	2	3,231	23	0.045	3,008	21	0.03	3,008	21	0.03
1.02	2									
1.5	2									
1.51	2	2,154	23	0.045	2,005	21	0.045	2,005	21	0.045
1.52	2									
2	3									
2.01	3	1,615	23	0.06	1,504	21	0.06	1,504	21	0.06
2.02	3									

- These recommended cutting conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- Water-soluble or oil-based coolant should be used to ensure chip removal.
- Always use with a G83 program (Peck drilling cycle).
- Drilling depth: Be sure to drill to a depth of 60% of the diameter. (Ex.: For $\varnothing 0.1$, depth=0.06mm)

● Applicable work material

Mild steel	Carbon steel	Alloy steel	Heat-treated steel	Tool steel	Hardened steel		Stainless steel	Heat-resistant steel	Cast iron	Ductile cast iron	Aluminium alloy	Copper alloy
SS	SOC	SCM, SCr	SKD, SKS	~40HRC	~45HRC	45HRC~	SUS	FC, Inconel	FC	FCD	Al	Cu

● Re-grinding compatibility range

Item code	DC (mm)
EPDBEH-ATH	× (N/A)

● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

WHNSB-TH

WNSB-TH

WHMB-TH

NSBH-ATH

FWNSB-TH

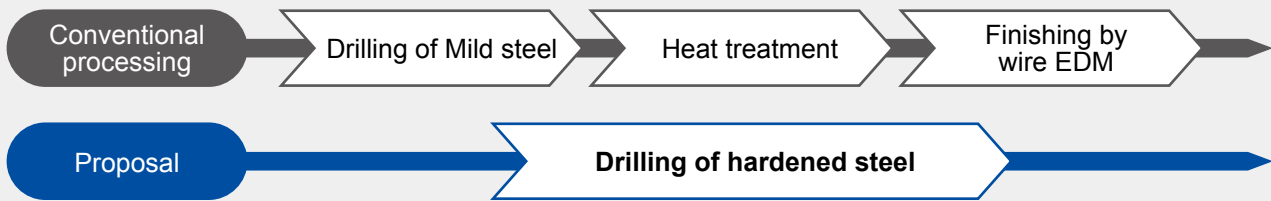
EMSB

EMSBH-ATH

Field data

Merits of drilling hardened steel

Example : Ejector pin drilling of SUS420J2 (52HRC) die



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

Comparison of process cost

Example: Fine hole drilling of SUS420J2 (52HRC); Hole diameter: $\phi 0.5$; Drilling depth: 11mm (L/D=22 \times); 300 holes

			Current processing	Proposal
Tool name or process			Fine hole electrodischarge machining	EMSBH0050-15-ATH
C	Tool unit price	(¥/piece)	¥250	¥12,300
L	Tool life	(hole/piece)	6	300
Nϕ	Hole count per lot	(hole/lot)	300	300
Tmϕ	Processing time per lot	(min./lot)	3000	750
Cϕ	Tool cost per lot	(¥/lot)	¥12,500	¥12,300
Tt	Tool replacement time	(min./piece)	1	1
Mc	Machine cost	(Assumed value 50¥/min.)	¥50	¥50
Xϕ	Processing cost per lot	(¥/lot)	¥165,000	¥49,800
	Processing cost ratio	(%)	100%	30.20%
	Monthly processed hole count	(hole)	300	300
	Monthly processing cost for current processing time	(¥/month)	¥165,000	¥49,800

Process cost is reduced by about 70% compared to conventional processing!!

※Conventional process condition (Electric discharge machining)

Electrodischarge machining

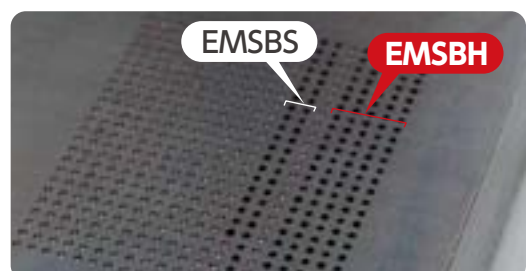
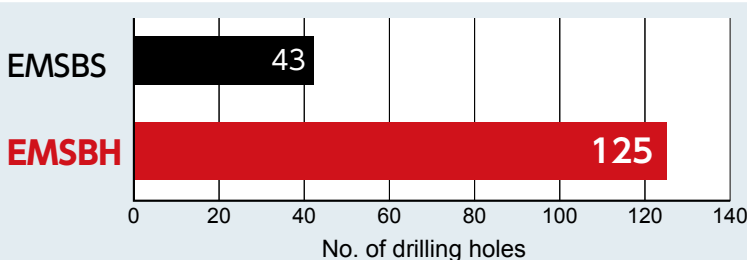
- ① Fine hole electrodischarge electrode $\phi 0.3 \times 150\text{mm}$
- ② Heat treatment
- ③ Finishing by wire EDM

- Electrode unit price: Unit price of $\phi 0.3$ copper pile electrode = **¥250**
- Processing time: Electrodischarge machining + wire EDM = **10 minutes**
- Tool life: 6 holes per electrode = **50 electrodes required**

New specifications suitable for high-hardened steels provide high performance.

01 Drilling for $\phi 0.5$ SUS420J2 (52HRC)

Work material : SUS420J2(52HRC) Tool : $\phi 0.5 \times$ under neck 15mm(L/D=30D) Drilling depth = 15mm
Coolant : External water base coolant $n=10,000\text{min}^{-1}$ $vc=15\text{m/min}$ $vf=50\text{mm/min}$ $f=0.005\text{mm/rev}$ Step=0.05mm



Although EMSBS broke on the 43rd hole, EMSBH was not broken up to the 125th hole.

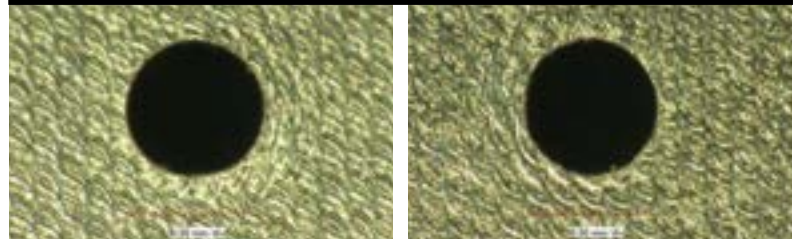
02 Drilling for $\phi 0.5$ Equivalent to SUS440C(60HRC)

Work material : Equivalent to SUS440CH (60HRC) Tool : EMSBH0050-5-TH (L/D=10D) Coolant : External water base coolant
 $n=10,000\text{min}^{-1}$ $v_c=15\text{m/min}$ $v_f=50\text{mm/min}$ $f=0.005\text{mm/rev}$ Step = 0.05mm Drilling time = 50sec./hole



Drilled hole count: 50 holes

Hole condition after 50th drilling process.



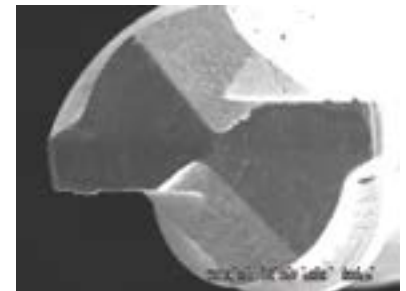
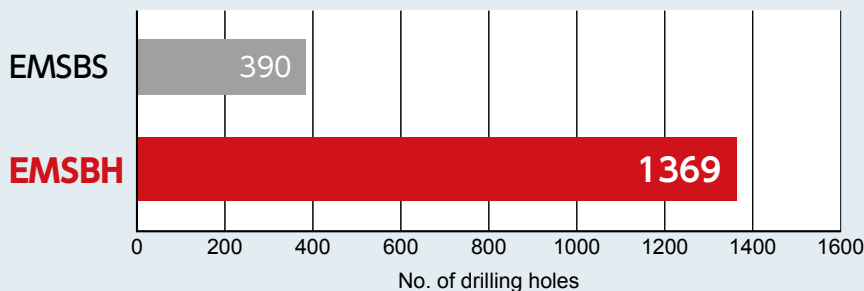
A way in

A way out

Possible drilling of up to 50 holes of L/D=10 on 60HRC material!

03 Drilling for $\phi 0.5$ Pre-hardened steels (40HRC)

Work material : Pre-hardened steel (40HRC) Tool : $\phi 0.5 \times$ Under neck 15mm (L/D=30D) Drilling depth = 15mm
 Coolant : External water base coolant $n=10,000\text{min}^{-1}$ $v_c=15\text{m/min}$ $v_f=50\text{mm/min}$ $f=0.005\text{mm/rev}$ Step = 0.05mm

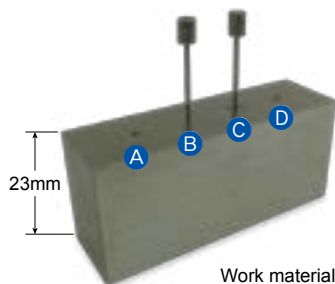


Condition of EMSBH cutting edge (after processing 1,050 holes)

Although EMSBS broke on the 390th hole, EMSBH was not broken up to the 1,369th holes.

04 Result of drilling for $\phi 0.8$ equivalent to SUS420J2 (52HRC)

Work material : Equivalent to SUS420J2 (52HRC) Tool : Special EMSBH0080-24-ATH (L/D=30D) Tolerance : $+0.001$ $+0.006\text{mm}$
 Coolant : External water base coolant $n=5,370\text{min}^{-1}$ $v_c=13.5\text{m/min}$ $v_f=43\text{mm/min}$ $f=0.008\text{mm/rev}$ Step=0.04mm
 Drilling depth=24mm



Work material : SUS420J2(52HRC)

Diameter of ejector pin : 0.790mm

	Dia.way-in	Dia.way-out
A	: 0.803mm	: 0.806mm
B	: 0.803mm	: 0.803mm
C	: 0.805mm	: 0.806mm
D	: 0.804mm	: 0.804mm

Hole diameters are quite similar to diameter of tool, with less discrepancy between way-in and way-out.



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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