

# **WHNSB** Carbide Oil Hole **Non Step Borer**

**Solid Carbide Drills for High Efficiency**

**Over 1,000 Items**  
**D2mm ~ D13mm**

- Hole depth up to 30xD
- Diameter Range: D2-D13  
5xD: D2-D19.55
- Shank Diameter for standard collets: 4/6/8/10/12(13) mm

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### **HIGHLY EFFICIENT AND LONG-LIFE DRILLING OF DEEP HOLES BY USING INTERNAL COOLANT OR MINIMUM QUANTITY LUBRICATION METHOD.**

1. Higher accuracy due to four guide points
2. Special flute shape for high effective chip discharge
3. High efficiency drilling of holes depth up to 30x Tool-D
4. Four times more efficient than conventional gun drills – reduction of machining costs.
5. TH coating: High hardness & oxidising resistance for long tool life at high cutting temperatures
6. High accuracy shanks capable of shrink fitting.

### **HOCHEFFIZIENTES TIEFLOCHBOHREN MIT LANGER LEBENSDAUER – MIT INTERNER KÜHLUNG ODER MINIMAL-MENGENSCHMIERUNG**

1. Höhere Genauigkeit durch 4 Führungsfasen
2. Speziell geformte Schneiden für effektive Späneabfuhr
3. Hocheffizientes Tieflochbohren bis zu 30x Werkzeug-D
4. 4-fach höhere Performance gegenüber herkömmlichen Tieflochbohrern – Reduktion der Prozesskosten
5. TH-Beschichtung: Hohe Härte & Oxidationsresistenz für hohe Werkzeugstandzeiten bei hohen Bearbeitungstemperaturen
6. Für Schrumpffutter geeignete hochpräzise Schäfte.

### **FORATURA AD ALTA EFFICIENZA CON ELEVATA VITA UTENSILE DI FORI PROFONDI UTILIZZANDO REFRIGERANTE INTERNO O MINIMALE.**

1. Maggiore precisione grazie ai quattro margini guida
2. Affilatura speciale per agevolare lo scarico del truciolo
3. Alta efficienza per foratura con profondità fino a 30 x D
4. Quattro volte più efficienti delle punte a cannone tradizionali - riduzione dei costi di lavorazione.
5. Rivestimento TH: Alta durezza e resistenza ossidante per lunga durata a temperature elevate di taglio
6. Gambi di alta precisione permettono il calettamento a caldo.

### **BROCA PARA AGUJEROS PROFUNDOS DE ALTO RENDIMIENTO Y DE LARGA DURACIÓN – CON REFRIGERACIÓN INTERNA O SISTEMA MQL.**

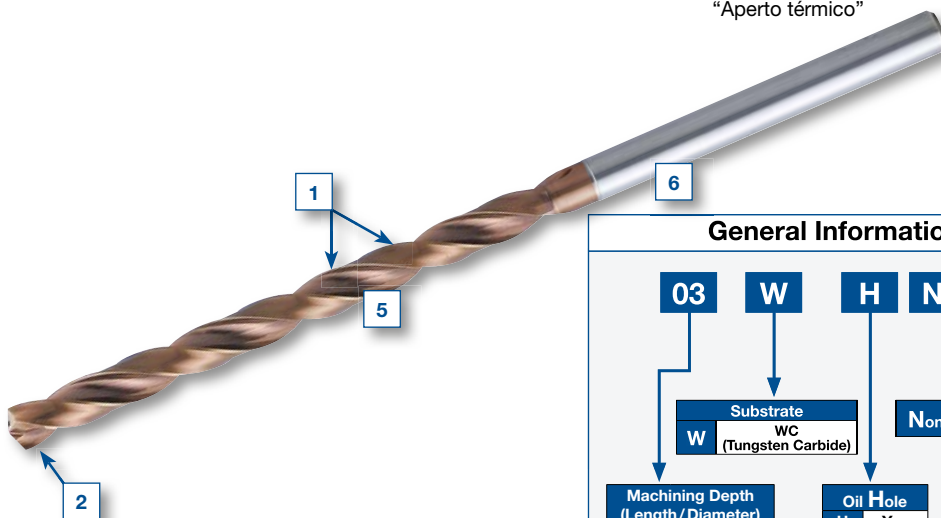
1. Mayor precisión debido a los cuatro puntos guía
2. El diseño especial de los canales garantiza una efectiva evacuación de viruta
3. Taladrado de alta eficiencia de agujeros de profundidad hasta 30x D
4. Cuatro veces más eficiente que una broca cañón convencional – Reducción de los costes de mecanizado.
5. Recubrimiento TH: Aumenta la resistencia a la oxidación y al desgaste en operaciones con elevadas temperaturas.
6. Mangos de alta precisión aptos para el uso en portaherramientas térmicos.

### **EFFICIENCE EXTRÊME ET GRANDES DURÉES DE VIES EN PERÇAGE PROFOND PAR L'UTILISATION DE L'ARROSAGE AU CENTRE OU DE LA MICRO PULVÉRISATION MQL (MINIMUM QUANTITY LUBRICATION).**

1. Précision accrue grâce aux doubles listels créant quatre points de guidage
2. Goujures à géométrie spéciale pour une bonne maîtrise de l'évacuation des copeaux
3. Perçage haut rendement jusqu'à 30 x D
4. Quatre fois plus efficient que les forets 3/4 conventionnels – Réduction des coûts de production
5. Revêtement TH: Haute dureté surfacique & résistance à l'oxydation pour une grande durée de vie sous d'importantes contraintes thermiques
6. Queue d'outil haute précision adaptée au frettage

### **ALTA EFICIÊNCIA E VIDA LONGA NA FURAÇÃO DE FUROS PROFUNDOS COM MÍNIMA REFRIGERAÇÃO INTERNA.**



1. Maior precisão devido a guia em quatro pontos
2. Geometria especial da navalha para transportar de forma eficaz a limalha.
3. Alta eficiência na furação de furos de profundidade até 30x o D ferramenta.
4. Quarto vezes mais eficiente que as brocas canhão convencionais e redução nos custos da furação.
5. Revestimento TH: Alta dureza e resistência à oxidação para conseguir mais tempo de vida da ferramenta em elevadas temperaturas de corte.
6. Alta precisão nos encabadouros para poder usar em sistemas "Aperto térmico"



















#### General Information: Item Code of NSB

03	W	H	NSB	0300	-4	-TH
Machining Depth (Length/Diameter)	Substrate W WC (Tungsten Carbide)	Oil Hole H Yes - No	Non Step Borer	Diameter	Shank D	Coating TH TH coating
03				0300	D 3.0	
05				0303	D 3.03	
08				0450	D 4.5	
10				1000	D 10.0	
15						
20						
30						

**WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)**
**WHNSB Lineup & Content**

			Item on page:		Cutting Conditions on page:	
Item	Drilling Depth	Diameter D				
WHNSB Shape, Reduction of boring time in Non-Step Process			4-5			
Pilot (Guide) Hole Drilling Method			6			
3xD Pilot Hole Drills	3xD	2.03 – 12.03	7	22	28-29	
03WHNSB-TH	3xD	3.0~13.0	8-9	22-23	28-29	
05WHNSB-TH	5xD	2.0~19.55	10-11	24-25	28-29	5xD Large D: 30-31
08WHNSB-TH	8xD	3.0~13.0	12-13	26	28-29	
10WHNSB-TH	10xD	2.0~13.0	14-15	26	32-33	
15WHNSB-TH	15xD	2.0~13.0	16-17	27	32-33	
20WHNSB-TH	20xD	2.0~13.0	18-19	27	32-33	
25WHNSB-TH	25xD	2.0 / 2.2 / 2.5	19	–	–	
30WHNSB-TH	30xD	2.0~12.0	20-21	27	32-33	
Trouble Shooting			34-39			









**EU standard / Semi-standard & Japanese standard**

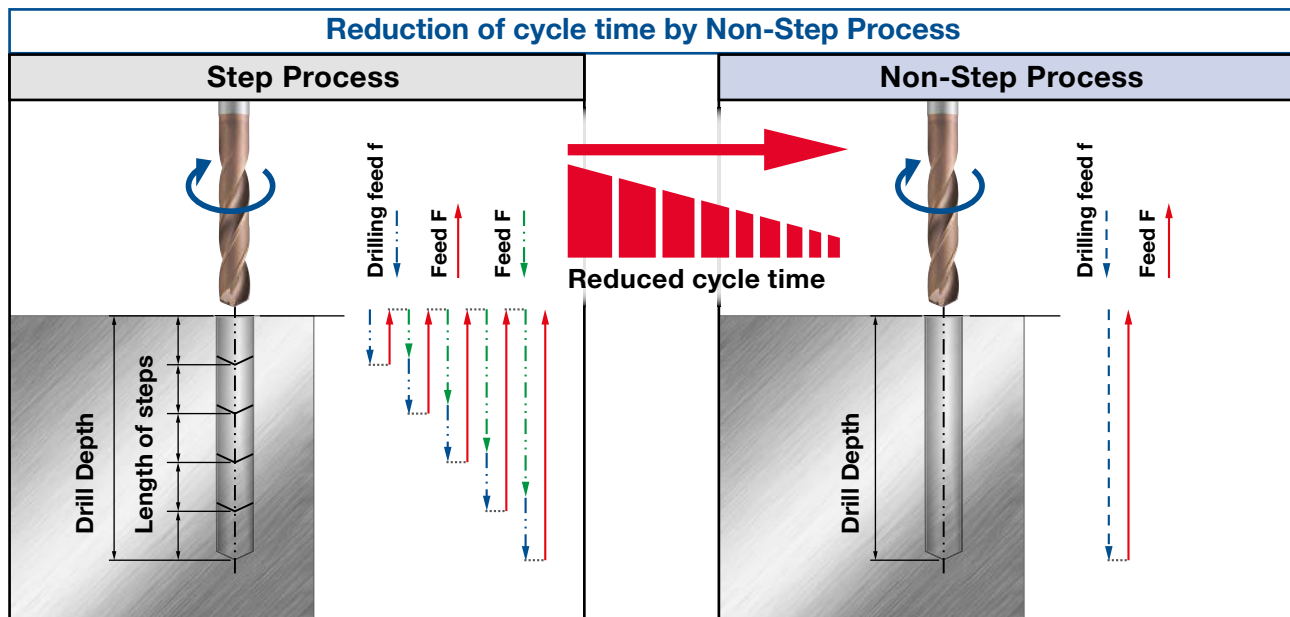
Flag:	Lang.:	Mark	Meaning	Delivery	Minimum Order Quantity	Remark	
		●	Stock in EU (Germany)		From 1 piece	(1) Endmill Shank Diameter (Even Number) Shank Dia. 4 / 6 / 8 / 10 / 12 mm *Drill Dia. 2.0-2.9 mm → Shank Diameter 3.0 mm *Drill Diameter 12.1-13.0 mm → Shank Diameter 13.0 mm	
		○	Semi-Standard (Produce by Order)	Overall length: less 200mm → 60 days Overall length: over 200mm → 90 days	3xD / 5xD / 8xD → From 10 pieces 10xD / 15xD / 20xD / 30xD → From 5 pieces	(2) Oil Slot on Shank Surface	
		●	Auf Lager in EU (Deutschland)		Ab 1 Stück	(1) Fräser-Schaftdurchmesser (gerade Zahl) Schaftdurchmesser 4 / 6 / 8 / 10 / 12 mm *Bohrdurchmesser 2.0-2.9 mm → Schaftdurchmesser 3.0 mm *Bohrdurchmesser 12.1-13.0 mm → Schaftdurchmesser 13.0 mm	
		○	Semi-Standard (Produktion auf Anfrage)	Gesamtlänge: unter 200mm → 60 Tage Gesamtlänge: über 200mm → 90 Tage	3xD / 5xD / 8xD → ab 10 Stück 10xD / 15xD / 20xD / 30xD → ab 5 Stück	(2) Ölkanal (Nutz) auf Schaftoberfläche	
		●	Magazzino EU (Germania)		Da 1 pezzo	(1) Diametro gambo utensile (Anche numero) Gambo Dia. 4 / 6 / 8 / 10 / 12 mm *Dia. Punta 2.0-2.9 mm → Diametro Gambo 3.0 mm *Diametro Punta 12.1-13.0 mm → Diametro Gambo 13.0 mm	
		○	Semi-Standard (Prodotto su ordinazione)	Lunghezza totale: inferiore a 200mm → 60 giorni Lunghezza totale: superiore a 200mm → 90 giorni	3xD / 5xD / 8xD → Minimo 10 pezzi 10xD / 15xD / 20xD / 30xD → Minimo 5 pezzi	(2) Cave per l'olio nel gambo	
		●	Stock en EU (Alemania)		A partir de 1 unidad	(1) Diámetro del mango (Número par) Mango Dia. 4 / 6 / 8 / 10 / 12 mm *Broca Dia. 2.0-2.9 mm → Mango Diámetro 3.0 mm *Broca Diámetro 12.1-13.0 mm → Mango Diámetro 13.0 mm	
		○	Semi-Standard (Producido por pedido)	Longitud Total: menos de 200mm → 60 días Longitud Total: más de 200mm → 90 días	3xD / 5xD / 8xD → A partir de 10 unidades 10xD / 15xD / 20xD / 30xD → A partir de 5 unidades	(2) Ranura para el lubricante en la cara del mango	
		●	Stock Europe (Allemagne)		À partir d' 1 pièce	(1) Diamètre de queue standard Europe (queues paires) Queues Dia. 4 / 6 / 8 / 10 / 12 mm *Forets Dia. 2.0-2.9 mm → Queues Diamètre 3.0 mm *Forets Diamètre 12.1-13.0 mm → Queues Diamètre 13.0 mm	
		○	Semi-Standard (Produit à la commande)	Longueur totale: Moins de 200mm → 60 jours Longueur totale: plus de 200mm → 90 jours	3xD / 5xD / 8xD → À partir de 10 pièces 10xD / 15xD / 20xD / 30xD → À partir de 5 pièces	(2) Rainure d'huile en bout de queue	
		●	Stock na EU (Alemanha)		a partir 1 peça	(1) Diâmetro do encabadouro gravado no topo (mesmo diâmetro) Encabadouro Dia. 4 / 6 / 8 / 10 / 12 mm *Broca Dia. 2.0-2.9 mm → Encabadouro diâmetro 3.0 mm *Broca diâmetro 12.1-13.0 mm → Encabadouro diâmetro 13.0 mm	
		○	Semi-Standard (Produção por encomenda)	Comprimento total: menos de 200 mm → 60 dias Comprimento total: mais de 200mm → 90 dias	3xD / 5xD / 8xD → a partir 10 peças 10xD / 15xD / 20xD / 30xD → a partir 5 peças	(2) Rasgo refrigeração no topo encabadouro	
		■	Stock in JAPAN	1 ~ 2 Weeks	From 1 piece	Japanese Standard Shank Diameter Shank Dia. 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 mm	
		■	Auf Lager in JAPAN	1 ~ 2 Wochen	Ab 1 Stück	Japanischer Standard-Schaftdurchmesser Schaftdurchm. 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 mm	
		■	Magazzino in Giappone	1 ~ 2 Settimane	Da 1 pezzo	Diametri gambi standard giapponese Gambi Dia. 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 mm	
		■	Stock en JAPÓN	1 ~ 2 Semanas	From 1 piece	Diámetro del mango estándar Japonés Mango Dia 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 mm	
		■	Stock Japon	1 ~ 2 Semaines	À partir d' 1 pièce	Standard Japon (queues nominales) Queues Dia. 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 mm	
		■	Stock no Japão	1 ~ 2 Semanas	A partir de 1 peça	Diâmetro de encabadouros standard no Japão Encabadouro diâ. 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 mm	



## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### Carbide Non Step Borer Overview

Item Code	Drilling Depth	Diameter D	Shape
03WHNSB-TH	3xD	3.0 ~ 13.0	
05WHNSB-TH	5xD	2.0 ~ 19.55	
08WHNSB-TH	8xD	3.0 ~ 13.0	
10WHNSB-TH	10xD	2.0 ~ 13.0	
15WHNSB-TH	15xD	2.0 ~ 13.0	
20WHNSB-TH	20xD	2.0 ~ 13.0	
25WHNSB-TH	25xD	2.0 / 2.2 / 2.5	
30WHNSB-TH	30xD	2.0 ~ 12.0	











#### REDUKTION DER BOHRZEIT DURCH „NON-STEP“ BOHRPROZESS

1. Bohrtiefe
2. Länge der Stufen
3. Vorschub der Bohrung  $f$
4. Vorschub  $F$
5. Reduzierte Bohrzeit

#### RIDUZIONE DEI TEMPI DI FORATURA TRAMITE PROCESSO NON-STEP

1. Profondità di foratura
2. Lunghezza degli steps
3. Avanzamento di foratura  $f$
4. Avanzamento  $F$
5. Tempo di foratura ridotto

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

	Work material								
	Structural Steels	Carbon Steels	Alloy Steels	Pre Hardend Steels		Stainless Steels	Heat resistant steels, Ti Alloy	Cast Iron	Ductile Cast Iron
	DIN: St**	DIN: 1,1***	DIN: 1,7*** / 1,3***	DIN: 1,2***		DIN: 1,4***		GG	GGG
	~ 180HB	~ 220HB	~ 30HRC	~ 40HRC	~ 50HRC	-			
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★
	★	★	★	★	☆	★	☆	★	★

★ = Suitable ☆ = OK

### REDUCCIÓN DEL TIEMPO DE TALADRADO CON EL PROCESO NON-STEP

1. Profundidad de taladrado
2. Profundidad de los pasos
3. Avance por vuelta f
4. Avance F
5. Reducción del tiempo del proceso


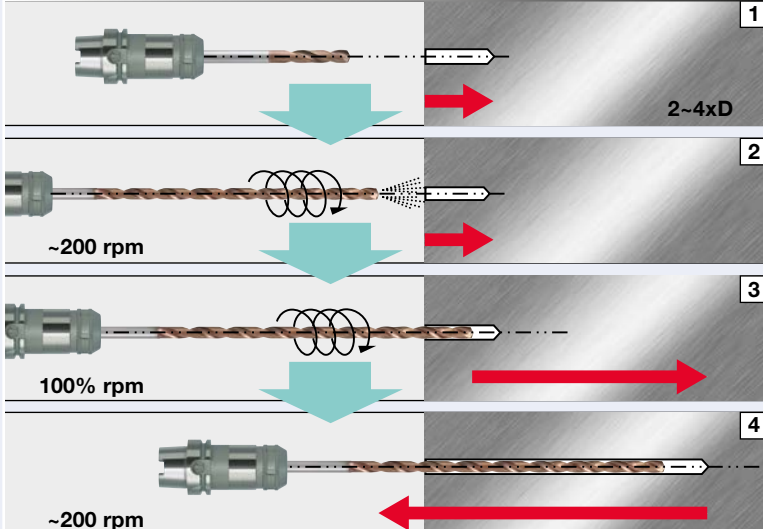
### REDUÇÃO DO TEMPO DERIVADO AO USO DA FURAÇÃO SEM PASSOS.

1. Profundidade da furação
2. Comprimento dos passos
3. Avanço por f
4. Avanço F
5. Redução tempo furação

### RÉDUCTION DU TEMPS DE PERÇAGE PAR L'UTILISATION D'UN CYCLE SANS DÉBOURRAGE

1. Profondeur de perçage
2. Longueur des pas
3. Avance de perçage f
4. Avance F
5. Temps de perçage réduit

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

Pilot (Guide) hole	
<p> <b>DRILLING METHOD</b></p> <p><b>1. Pilot hole drilling with 03WHNSB-TH</b> Machining diameter: <math>+0 \sim 0.1</math> mm Machining depth: 2~4 times drill diameter.</p> <p><b>2. Insert into pilot hole. (10~30WHNSB-TH)</b> (1) Start to supply internal coolant. (2) Approach and Insert into pilot hole by low revolution (<math>0 \sim 200</math> min<sup>-1</sup>) till 2.0~5.0 mm before bottom of pilot hole.</p> <p><b>3. Drilling Operation. (10~30WHNSB-TH)</b> Increase to set up cutting conditions and start drilling.</p> <p><b>4. After drilling operation.</b> Pull the NSB out of the material by low revolution (<math>0 \sim 200</math> min<sup>-1</sup>).</p>	 <p>1 2~4xD</p> <p>2 ~200 rpm</p> <p>3 100% rpm</p> <p>4 ~200 rpm</p>

### **PILOT (FÜHRUNGS-) BOHRUNG | BOHRMETHODE**

- Führungs-Bohrung mit 03WHNSB-TH**  
Bearbeitungsdurchmesser:  $+0 \sim 0.1$  mm  
Bearbeitungstiefe: 2~4 x Bohrdurchmesser
- Einfahren in Startbohrung. (10~30WHNSB-TH)**  
(1) Interne Kühlung einschalten.  
(2) Einfahren in Startbohrung bei niedriger Drehzahl ( $0 \sim 200$  min<sup>-1</sup>) bis 2.0~5.0 mm vor Grund der Startbohrung.
- Bohroperation. (10~30WHNSB-TH)**  
Drehzahl erhöhen (Vz 100%). Erstellen der Bohrung.
- Nach Bohroperation.**  
NSB bei niedriger Drehzahl aus dem Material entfernen ( $0 \sim 200$  min<sup>-1</sup>).

### **PREFORO (GUIDA) | METODO DI FORATURA**

- Foro guida con 03WHNSB-TH**  
Diametro da eseguire:  $+0 \sim 0.1$  mm  
Profondità da eseguire: 2~4 volte il diametro punta.
- Insert into pilot hole. (10~30WHNSB-TH)**  
(1) Accendere il refrigerante interno.  
(2) Avvicinarsi ed entrare nel preforo con giri bassi ( $0 \sim 200$  min<sup>-1</sup>) fino a 2.0~5.0 mm prima della fine del preforo
- Operazione di foratura. (10~30WHNSB-TH)**  
Portare i parametri ai valori definiti ed iniziare la foratura.
- Dopo l'operazione di foratura.**  
Estrarre la NSB dal foro abbassando i giri ( $0 \sim 200$  min<sup>-1</sup>).

### **AGUJERO PILOTO (GUÍA) | MÉTODO DE TALADRADO**

- Perforación del agujero piloto con 03WHNSB-TH**  
Diámetro de mecanizado:  $+0 \sim 0.1$  mm  
Profundidad de mecanizado: 2 ~ 4 veces el diámetro de la broca.
- Entrar en el agujero piloto. (10~30WHNSB-TH)**  
(1) Inicio de refrigeración interior.  
(2) Orientar e insertar en el agujero piloto a bajas revoluciones ( $0 \sim 200$  min<sup>-1</sup>) hasta 2.0 ~ 5.0 mm antes del fondo del agujero piloto
- Operación de taladrado. (10~30WHNSB-TH)**  
Aumentar a condiciones de corte de trabajo (vc 100%) y comenzar a perforar.
- Después de la operación de taladrado.**  
Saque la broca NSB del material a bajas revoluciones ( $0 \sim 200$  min<sup>-1</sup>).

### **PERÇAGE PILOTE (GUIDE) | MÉTHODE DE PERÇAGE**

**Perçage de pilote avec 03WHNSB-TH**  
Diamètre de l'outil:  $+0 \sim 0.1$  mm  
Profondeur d'usinage: 2~4 fois le diamètre.

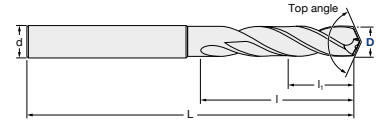
- Entrée dans le trou pilote. (10~30WHNSB-TH)**  
(1) Démarrage de l'arrosage au centre.  
(2) Approche et entrée dans le trou pilote avec une faible rotation ( $0 \sim 200$  min<sup>-1</sup>) jusqu'à 2.0~5.0 mm du fond du trou pilote.
- Opération de perçage. (10~30WHNSB-TH)**  
Temporisation jusqu'au paramètres programmés, puis démarrage du perçage
- Après l'opération de perçage.**  
Dégager le NSB hors matière avec une faible rotation ( $0 \sim 200$  min<sup>-1</sup>).

### **FURO PILOTO (GUÍA) | MÉTODO FURAÇÃO**

- Furação furo piloto com 03WHNSB-TH**  
Diâmetro da furação:  $+0 \sim 0.1$  mm  
Profundidade da maquinação: 2~4 vezes o diâmetro da broca.
- Inserir no furo piloto. (10~30WHNSB-TH)**  
(1) Primeiro ligar a lubrificação interna.  
(2) Aproximar e inserir no furo piloto com rotação baixa ( $0 \sim 200$  min<sup>-1</sup>) até 2.0~5.0 mm antes do fundo do furo piloto.
- Operação de furação. (10~30WHNSB-TH)**  
Aumentar para os valores corte finais e começar a furar.
- Depois operação da furação.**  
Retire a broca NSB parado ou com baixa rotação ( $0 \sim 200$  min<sup>-1</sup>).

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>3xD</b>	<b>140°</b> 3D~8D
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### 3xD Pilot Hole Drills

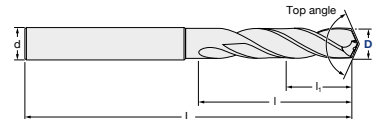
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD373	03WHNSB-0203-3-TH	●	2,03	6,09	16,0	50	69	3,0	1
CD374	03WHNSB-0213-3-TH	●	2,13	6,39	17,0	49	69	3,0	1
CD375	03WHNSB-0223-3-TH	●	2,23	6,69	17,0	49	69	3,0	1
CD376	03WHNSB-0233-3-TH	●	2,33	6,99	19,0	47	69	3,0	1
CD377	03WHNSB-0243-3-TH	●	2,43	7,29	19,0	47	69	3,0	1
CD378	03WHNSB-0253-3-TH	●	2,53	7,59	19,0	47	69	3,0	1
CD379	03WHNSB-0263-3-TH	●	2,63	7,89	19,0	47	69	3,0	1
CD380	03WHNSB-0273-3-TH	●	2,73	8,19	19,0	47	69	3,0	1
CD381	03WHNSB-0283-3-TH	●	2,83	8,49	19,0	47	69	3,0	1
CD382	03WHNSB-0293-3-TH	●	2,93	8,79	19,0	47	69	3,0	1
CD205	03WHNSB-0303-4-TH	●	3,03	9,09	23	48	73	4,0	1
CD208	03WHNSB-0353-4-TH	●	3,53	10,59	23	48	73	4,0	1
CD210	03WHNSB-0403-6-TH	●	4,03	12,09	29	51	82	6,0	1
CD213	03WHNSB-0453-6-TH	●	4,53	13,59	29	51	82	6,0	1
CD215	03WHNSB-0503-6-TH	●	5,03	15,09	29	51	82	6,0	1
CD217	03WHNSB-0553-6-TH	●	5,53	16,59	29	51	82	6,0	1
CD219	03WHNSB-0603-8-TH	●	6,03	18,09	34	53	89	8,0	1
CD221	03WHNSB-0653-8-TH	●	6,53	19,59	34	53	89	8,0	1
CD224	03WHNSB-0703-8-TH	●	7,03	21,09	39	54	95	8,0	1
CD226	03WHNSB-0753-8-TH	●	7,53	22,59	39	54	95	8,0	1
CD228	03WHNSB-0803-10-TH	●	8,03	24,09	44	55	101	10,0	1
CD230	03WHNSB-0853-10-TH	●	8,53	25,59	44	55	101	10,0	1
CD232	03WHNSB-0903-10-TH	●	9,03	27,09	49	56	107	10,0	1
CD234	03WHNSB-0953-10-TH	●	9,53	28,59	49	56	107	10,0	1
CD236	03WHNSB-1003-12-TH	●	10,03	30,09	54	61	117	12,0	1
CD241	03WHNSB-1103-12-TH	●	11,03	33,09	59	62	123	12,0	1
CD244	03WHNSB-1203-12-TH	●	12,03	36,09	64	63	129	12,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
3xD Pilot Hole Drills	3xD	2.03 – 12.03	28–29

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>3xD</b>	<b>140°</b> 3D~8D
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**3xD**

Tolerance Information on Page 39

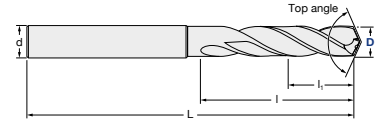
ID Code	Item Code	Stock	Diameter D	Using length l <sub>1</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD204	03WHNSB-0300-4-TH	●	3,00	9,0	19	48	69	4,0	1
CD485	03WHNSB-0310-4-TH	○	3,10	9,3	23	48	73	4,0	10
CD486	03WHNSB-0320-4-TH	○	3,20	9,6	23	48	73	4,0	10
CD206	03WHNSB-0330-4-TH	●	3,30	9,9	23	48	73	4,0	1
CD439	03WHNSB-0340-4-TH	●	3,40	10,2	23	48	73	4,0	1
CD207	03WHNSB-0350-4-TH	●	3,50	10,5	23	48	73	4,0	1
CD487	03WHNSB-0360-4-TH	○	3,60	10,8	23	48	73	4,0	10
CD488	03WHNSB-0370-4-TH	○	3,70	11,1	23	48	73	4,0	10
CD489	03WHNSB-0380-4-TH	○	3,80	11,4	23	48	73	4,0	10
CD490	03WHNSB-0390-4-TH	○	3,90	11,7	23	48	73	4,0	10
CD209	03WHNSB-0400-4-TH	●	4,00	12,0	23	48	73	4,0	1
CD491	03WHNSB-0410-6-TH	○	4,10	12,3	29	51	82	6,0	10
CD211	03WHNSB-0420-6-TH	●	4,20	12,6	29	51	82	6,0	1
CD492	03WHNSB-0430-6-TH	○	4,30	12,9	29	51	82	6,0	10
CD493	03WHNSB-0440-6-TH	○	4,40	13,2	29	51	82	6,0	10
CD212	03WHNSB-0450-6-TH	●	4,50	13,5	29	51	82	6,0	1
CD494	03WHNSB-0460-6-TH	○	4,60	13,8	29	51	82	6,0	10
CD495	03WHNSB-0470-6-TH	○	4,70	14,1	29	51	82	6,0	10
CD496	03WHNSB-0480-6-TH	○	4,80	14,4	29	51	82	6,0	10
CD497	03WHNSB-0490-6-TH	○	4,90	14,7	29	51	82	6,0	10
CD214	03WHNSB-0500-6-TH	●	5,00	15,0	29	51	82	6,0	1
CD498	03WHNSB-0510-6-TH	○	5,10	15,3	29	51	82	6,0	10
CD499	03WHNSB-0520-6-TH	○	5,20	15,6	29	51	82	6,0	10
CD500	03WHNSB-0530-6-TH	○	5,30	15,9	29	51	82	6,0	10
CD501	03WHNSB-0540-6-TH	○	5,40	16,2	29	51	82	6,0	10
CD216	03WHNSB-0550-6-TH	●	5,50	16,5	29	51	82	6,0	1
CD502	03WHNSB-0560-6-TH	○	5,60	16,8	29	51	82	6,0	10
CD503	03WHNSB-0570-6-TH	○	5,70	17,1	29	51	82	6,0	10
CD504	03WHNSB-0580-6-TH	○	5,80	17,4	29	51	82	6,0	10
CD505	03WHNSB-0590-6-TH	○	5,90	17,7	29	51	82	6,0	10
CD218	03WHNSB-0600-6-TH	●	6,00	18,0	29	51	82	6,0	1
CD506	03WHNSB-0610-8-TH	○	6,10	18,3	34	53	89	8,0	10
CD507	03WHNSB-0620-8-TH	○	6,20	18,6	34	53	89	8,0	10
CD508	03WHNSB-0630-8-TH	○	6,30	18,9	34	53	89	8,0	10
CD509	03WHNSB-0640-8-TH	○	6,40	19,2	34	53	89	8,0	10
CD220	03WHNSB-0650-8-TH	●	6,50	19,5	34	53	89	8,0	1
CD440	03WHNSB-0660-8-TH	●	6,60	19,8	34	53	89	8,0	1
CD510	03WHNSB-0670-8-TH	○	6,70	20,1	34	53	89	8,0	10
CD222	03WHNSB-0680-8-TH	●	6,80	20,4	34	53	89	8,0	1
CD511	03WHNSB-0690-8-TH	○	6,90	20,7	34	53	89	8,0	10
CD223	03WHNSB-0700-8-TH	●	7,00	21,0	34	53	89	8,0	1
CD512	03WHNSB-0710-8-TH	○	7,10	21,3	39	54	95	8,0	10
CD513	03WHNSB-0720-8-TH	○	7,20	21,6	39	54	95	8,0	10
CD514	03WHNSB-0730-8-TH	○	7,30	21,9	39	54	95	8,0	10
CD515	03WHNSB-0740-8-TH	○	7,40	22,2	39	54	95	8,0	10
CD225	03WHNSB-0750-8-TH	●	7,50	22,5	39	54	95	8,0	1
CD516	03WHNSB-0760-8-TH	○	7,60	22,8	39	54	95	8,0	10
CD517	03WHNSB-0770-8-TH	○	7,70	23,1	39	54	95	8,0	10
CD518	03WHNSB-0780-8-TH	○	7,80	23,4	39	54	95	8,0	10
CD519	03WHNSB-0790-8-TH	○	7,90	23,7	39	54	95	8,0	10
CD227	03WHNSB-0800-8-TH	●	8,00	24,0	39	54	95	8,0	1
CD520	03WHNSB-0810-10-TH	○	8,10	24,3	44	55	101	10,0	10
CD521	03WHNSB-0820-10-TH	○	8,20	24,6	44	55	101	10,0	10
CD522	03WHNSB-0830-10-TH	○	8,30	24,9	44	55	101	10,0	10
CD523	03WHNSB-0840-10-TH	○	8,40	25,2	44	55	101	10,0	10
CD229	03WHNSB-0850-10-TH	●	8,50	25,5	44	55	101	10,0	1
CD524	03WHNSB-0860-10-TH	○	8,60	25,8	44	55	101	10,0	10
CD525	03WHNSB-0870-10-TH	○	8,70	26,1	44	55	101	10,0	10
CD526	03WHNSB-0880-10-TH	○	8,80	26,4	44	55	101	10,0	10
CD527	03WHNSB-0890-10-TH	○	8,90	26,7	44	55	101	10,0	10
CD231	03WHNSB-0900-10-TH	●	9,00	27,0	44	55	101	10,0	1
CD528	03WHNSB-0910-10-TH	○	9,10	27,3	49	56	107	10,0	10
CD529	03WHNSB-0920-10-TH	○	9,20	27,6	49	56	107	10,0	10
CD530	03WHNSB-0930-10-TH	○	9,30	27,9	49	56	107	10,0	10
CD531	03WHNSB-0940-10-TH	○	9,40	28,2	49	56	107	10,0	10
CD233	03WHNSB-0950-10-TH	●	9,50	28,5	49	56	107	10,0	1
CD532	03WHNSB-0960-10-TH	○	9,60	28,8	49	56	107	10,0	10





## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>3xD</b>	<b>140°</b> 3D~8D
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**3xD**

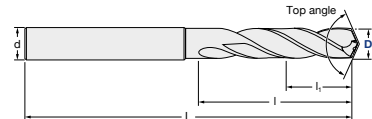
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>1</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD533	03WHNSB-0970-10-TH	○	9,70	29,1	49	56	107	10,0	10
CD534	03WHNSB-0980-10-TH	○	9,80	29,4	49	56	107	10,0	10
CD535	03WHNSB-0990-10-TH	○	9,90	29,7	49	56	107	10,0	10
CD235	03WHNSB-1000-10-TH	●	10,00	30,0	49	56	107	10,0	1
CD536	03WHNSB-1010-12-TH	○	10,10	30,3	54	61	117	12,0	10
CD237	03WHNSB-1020-12-TH	●	10,20	30,6	54	61	117	12,0	1
CD537	03WHNSB-1030-12-TH	○	10,30	30,9	54	61	117	12,0	10
CD538	03WHNSB-1040-12-TH	○	10,40	31,2	54	61	117	12,0	10
CD238	03WHNSB-1050-12-TH	●	10,50	31,5	54	61	117	12,0	1
CD539	03WHNSB-1060-12-TH	○	10,60	31,8	54	61	117	12,0	10
CD540	03WHNSB-1070-12-TH	○	10,70	32,1	54	61	117	12,0	10
CD239	03WHNSB-1080-12-TH	●	10,80	32,4	54	61	117	12,0	1
CD541	03WHNSB-1090-12-TH	○	10,90	32,7	54	61	117	12,0	10
CD240	03WHNSB-1100-12-TH	●	11,00	33,0	54	61	117	12,0	1
CD542	03WHNSB-1110-12-TH	○	11,10	33,3	59	62	123	12,0	10
CD543	03WHNSB-1120-12-TH	○	11,20	33,6	59	62	123	12,0	10
CD544	03WHNSB-1130-12-TH	○	11,30	33,9	59	62	123	12,0	10
CD545	03WHNSB-1140-12-TH	○	11,40	34,2	59	62	123	12,0	10
CD242	03WHNSB-1150-12-TH	●	11,50	34,5	59	62	123	12,0	1
CD546	03WHNSB-1160-12-TH	○	11,60	34,8	59	62	123	12,0	10
CD547	03WHNSB-1170-12-TH	○	11,70	35,1	59	62	123	12,0	10
CD548	03WHNSB-1180-12-TH	○	11,80	35,4	59	62	123	12,0	10
CD549	03WHNSB-1190-12-TH	○	11,90	35,7	59	62	123	12,0	10
CD243	03WHNSB-1200-12-TH	●	12,00	36,0	59	62	123	12,0	1
CD550	03WHNSB-1210-13-TH	○	12,10	36,3	64	63	129	13,0	10
CD551	03WHNSB-1220-13-TH	○	12,20	36,6	64	63	129	13,0	10
CD552	03WHNSB-1230-13-TH	○	12,30	36,9	64	63	129	13,0	10
CD553	03WHNSB-1240-13-TH	○	12,40	37,2	64	63	129	13,0	10
CD245	03WHNSB-1250-13-TH	●	12,50	37,5	64	63	129	13,0	1
CD554	03WHNSB-1260-13-TH	○	12,60	37,8	64	63	129	13,0	10
CD555	03WHNSB-1270-13-TH	○	12,70	38,1	64	63	129	13,0	10
CD556	03WHNSB-1280-13-TH	○	12,80	38,4	64	63	129	13,0	10
CD557	03WHNSB-1290-13-TH	○	12,90	38,7	64	63	129	13,0	10
CD246	03WHNSB-1300-13-TH	●	13,00	39,0	64	63	129	13,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
03WHNSB-TH	3xD	3.0 ~ 13.0	28-29

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>5xD</b>	<b>140°</b> 3D~8D
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**5xD**

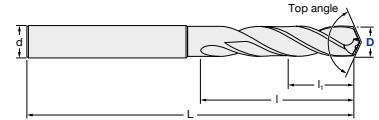
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>1</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD383	05WHNSB-0200-3-TH	●	2.00	10.00	20	43	66	3.0	1
CD384	05WHNSB-0205-3-TH	●	2.05	10.25	24	47	74	3.0	1
CD385	05WHNSB-0210-3-TH	●	2.10	10.50	24	47	74	3.0	1
CD386	05WHNSB-0215-3-TH	●	2.15	10.75	24	47	74	3.0	1
CD387	05WHNSB-0220-3-TH	●	2.20	11.00	24	47	74	3.0	1
CD388	05WHNSB-0230-3-TH	●	2.30	11.50	24	47	74	3.0	1
CD389	05WHNSB-0240-3-TH	●	2.40	12.00	24	47	74	3.0	1
CD390	05WHNSB-0250-3-TH	●	2.50	12.50	24	47	74	3.0	1
CD391	05WHNSB-0260-3-TH	●	2.60	13.00	29	47	79	3.0	1
CD392	05WHNSB-0265-3-TH	●	2.65	13.25	29	47	79	3.0	1
CD393	05WHNSB-0270-3-TH	●	2.70	13.50	29	47	79	3.0	1
CD394	05WHNSB-0280-3-TH	●	2.80	14.00	29	47	79	3.0	1
CD395	05WHNSB-0290-3-TH	●	2.90	14.50	29	47	79	3.0	1
CD247	05WHNSB-0300-4-TH	●	3.00	15.00	29	47	79	4.0	1
CD558	05WHNSB-0310-4-TH	○	3.10	15.50	37	47	87	4.0	10
CD559	05WHNSB-0320-4-TH	○	3.20	16.00	37	47	87	4.0	10
CD248	05WHNSB-0330-4-TH	●	3.30	16.50	37	47	87	4.0	1
CD441	05WHNSB-0340-4-TH	●	3.40	17.00	37	47	87	4.0	1
CD249	05WHNSB-0350-4-TH	●	3.50	17.50	37	47	87	4.0	1
CD560	05WHNSB-0360-4-TH	○	3.60	18.00	37	47	87	4.0	10
CD442	05WHNSB-0370-4-TH	●	3.70	18.50	37	47	87	4.0	1
CD561	05WHNSB-0380-4-TH	○	3.80	19.00	37	47	87	4.0	10
CD562	05WHNSB-0390-4-TH	○	3.90	19.50	37	47	87	4.0	10
CD250	05WHNSB-0400-4-TH	●	4.00	20.00	37	47	87	4.0	1
CD563	05WHNSB-0410-6-TH	○	4.10	20.50	47	50	100	6.0	10
CD251	05WHNSB-0420-6-TH	●	4.20	21.00	47	50	100	6.0	1
CD564	05WHNSB-0430-6-TH	○	4.30	21.50	47	50	100	6.0	10
CD565	05WHNSB-0440-6-TH	○	4.40	22.00	47	50	100	6.0	10
CD252	05WHNSB-0450-6-TH	●	4.50	22.50	47	50	100	6.0	1
CD566	05WHNSB-0460-6-TH	○	4.60	23.00	47	50	100	6.0	10
CD443	05WHNSB-0465-6-TH	●	4.65	23.25	47	50	100	6.0	1
CD567	05WHNSB-0470-6-TH	○	4.70	23.50	47	50	100	6.0	10
CD444	05WHNSB-0475-6-TH	●	4.75	23.75	47	50	100	6.0	1
CD568	05WHNSB-0480-6-TH	○	4.80	24.00	47	50	100	6.0	10
CD569	05WHNSB-0490-6-TH	○	4.90	24.50	47	50	100	6.0	10
CD253	05WHNSB-0500-6-TH	●	5.00	25.00	47	50	100	6.0	1
CD570	05WHNSB-0510-6-TH	○	5.10	25.50	47	50	100	6.0	10
CD445	05WHNSB-0520-6-TH	●	5.20	26.00	47	50	100	6.0	1
CD571	05WHNSB-0530-6-TH	○	5.30	26.50	47	50	100	6.0	10
CD572	05WHNSB-0540-6-TH	○	5.40	27.00	47	50	100	6.0	10
CD254	05WHNSB-0550-6-TH	●	5.50	27.50	47	50	100	6.0	1
CD446	05WHNSB-0555-6-TH	●	5.55	27.75	47	50	100	6.0	1
CD573	05WHNSB-0560-6-TH	○	5.60	28.00	47	50	100	6.0	10
CD447	05WHNSB-0565-6-TH	●	5.65	28.25	47	50	100	6.0	1
CD574	05WHNSB-0570-6-TH	○	5.70	28.50	47	50	100	6.0	10
CD575	05WHNSB-0580-6-TH	○	5.80	29.00	47	50	100	6.0	10
CD576	05WHNSB-0590-6-TH	○	5.90	29.50	47	50	100	6.0	10
CD255	05WHNSB-0600-6-TH	●	6.00	30.00	47	50	100	6.0	1
CD577	05WHNSB-0610-8-TH	○	6.10	30.50	55	53	110	8.0	10
CD578	05WHNSB-0620-8-TH	○	6.20	31.00	55	53	110	8.0	10
CD579	05WHNSB-0630-8-TH	○	6.30	31.50	55	53	110	8.0	10
CD580	05WHNSB-0640-8-TH	○	6.40	32.00	55	53	110	8.0	10
CD256	05WHNSB-0650-8-TH	●	6.50	32.50	55	53	110	8.0	1
CD448	05WHNSB-0660-8-TH	●	6.60	33.00	55	53	110	8.0	1
CD581	05WHNSB-0670-8-TH	○	6.70	33.50	55	53	110	8.0	10
CD257	05WHNSB-0680-8-TH	●	6.80	34.00	55	53	110	8.0	1
CD582	05WHNSB-0690-8-TH	○	6.90	34.50	55	53	110	8.0	10
CD258	05WHNSB-0700-8-TH	●	7.00	35.00	55	53	110	8.0	1
CD583	05WHNSB-0710-8-TH	○	7.10	35.50	63	54	119	8.0	10
CD449	05WHNSB-0720-8-TH	●	7.20	36.00	63	54	119	8.0	1
CD584	05WHNSB-0730-8-TH	○	7.30	36.50	63	54	119	8.0	10
CD450	05WHNSB-0740-8-TH	●	7.40	37.00	63	54	119	8.0	1
CD259	05WHNSB-0750-8-TH	●	7.50	37.50	63	54	119	8.0	1
CD451	05WHNSB-0755-8-TH	●	7.55	37.75	63	54	119	8.0	1
CD585	05WHNSB-0760-8-TH	○	7.60	38.00	63	54	119	8.0	10
CD452	05WHNSB-0765-8-TH	●	7.65	38.25	63	54	119	8.0	1
CD586	05WHNSB-0770-8-TH	○	7.70	38.50	63	54	119	8.0	10
CD587	05WHNSB-0780-8-TH	○	7.80	39.00	63	54	119	8.0	10
CD588	05WHNSB-0790-8-TH	○	7.90	39.50	63	54	119	8.0	10
CD260	05WHNSB-0800-8-TH	●	8.00	40.00	63	54	119	8.0	1
CD589	05WHNSB-0810-10-TH	○	8.10	40.50	71	55	128	10.0	10
CD590	05WHNSB-0820-10-TH	○	8.20	41.00	71	55	128	10.0	10



## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>5xD</b>	<b>140°</b> 3D~8D
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**5xD**

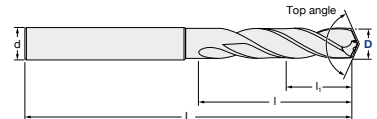
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD591	05WHNSB-0830-10-TH	○	8,30	41,50	71	55	128	10,0	10
CD592	05WHNSB-0840-10-TH	○	8,40	42,00	71	55	128	10,0	10
CD261	05WHNSB-0850-10-TH	●	8,50	42,50	71	55	128	10,0	1
CD593	05WHNSB-0860-10-TH	○	8,60	43,00	71	55	128	10,0	10
CD594	05WHNSB-0870-10-TH	○	8,70	43,50	71	55	128	10,0	10
CD453	05WHNSB-0880-10-TH	●	8,80	44,00	71	55	128	10,0	1
CD595	05WHNSB-0890-10-TH	○	8,90	44,50	71	55	128	10,0	10
CD262	05WHNSB-0900-10-TH	●	9,00	45,00	71	55	128	10,0	1
CD596	05WHNSB-0910-10-TH	○	9,10	45,50	79	56	137	10,0	10
CD454	05WHNSB-0920-10-TH	●	9,20	46,00	79	56	137	10,0	1
CD455	05WHNSB-0925-10-TH	●	9,25	46,25	79	56	137	10,0	1
CD597	05WHNSB-0930-10-TH	○	9,30	46,50	79	56	137	10,0	10
CD456	05WHNSB-0940-10-TH	●	9,40	47,00	79	56	137	10,0	1
CD263	05WHNSB-0950-10-TH	●	9,50	47,50	79	56	137	10,0	1
CD457	05WHNSB-0955-10-TH	●	9,55	47,75	79	56	137	10,0	1
CD598	05WHNSB-0960-10-TH	○	9,60	48,00	79	56	137	10,0	10
CD458	05WHNSB-0965-10-TH	●	9,65	48,25	79	56	137	10,0	1
CD599	05WHNSB-0970-10-TH	○	9,70	48,50	79	56	137	10,0	10
CD600	05WHNSB-0980-10-TH	○	9,80	49,00	79	56	137	10,0	10
CD601	05WHNSB-0990-10-TH	○	9,90	49,50	79	56	137	10,0	10
CD264	05WHNSB-1000-10-TH	●	10,00	50,00	79	56	137	10,0	1
CD602	05WHNSB-1010-12-TH	○	10,10	50,50	87	61	150	12,0	10
CD265	05WHNSB-1020-12-TH	●	10,20	51,00	87	61	150	12,0	1
CD603	05WHNSB-1030-12-TH	○	10,30	51,50	87	61	150	12,0	10
CD604	05WHNSB-1040-12-TH	○	10,40	52,00	87	61	150	12,0	10
CD266	05WHNSB-1050-12-TH	●	10,50	52,50	87	61	150	12,0	1
CD605	05WHNSB-1060-12-TH	○	10,60	53,00	87	61	150	12,0	10
CD606	05WHNSB-1070-12-TH	○	10,70	53,50	87	61	150	12,0	10
CD267	05WHNSB-1080-12-TH	●	10,80	54,00	87	61	150	12,0	1
CD607	05WHNSB-1090-12-TH	○	10,90	54,50	87	61	150	12,0	10
CD268	05WHNSB-1100-12-TH	●	11,00	55,00	87	61	150	12,0	1
CD608	05WHNSB-1110-12-TH	○	11,10	55,50	93	61	156	12,0	10
CD459	05WHNSB-1120-12-TH	●	11,20	56,00	93	61	156	12,0	1
CD460	05WHNSB-1130-12-TH	●	11,30	56,50	93	61	156	12,0	1
CD461	05WHNSB-1140-12-TH	●	11,40	57,00	93	61	156	12,0	1
CD269	05WHNSB-1150-12-TH	●	11,50	57,50	93	61	156	12,0	1
CD462	05WHNSB-1155-12-TH	●	11,55	57,75	93	61	156	12,0	1
CD609	05WHNSB-1160-12-TH	○	11,60	58,00	93	61	156	12,0	10
CD610	05WHNSB-1170-12-TH	○	11,70	58,50	93	61	156	12,0	10
CD611	05WHNSB-1180-12-TH	○	11,80	59,00	93	61	156	12,0	10
CD612	05WHNSB-1190-12-TH	○	11,90	59,50	93	61	156	12,0	10
CD270	05WHNSB-1200-12-TH	●	12,00	60,00	93	61	156	12,0	1
CD613	05WHNSB-1210-13-TH	○	12,10	60,50	104	63	169	13,0	10
CD463	05WHNSB-1220-13-TH	●	12,20	61,00	104	63	169	13,0	1
CD614	05WHNSB-1230-13-TH	○	12,30	61,50	104	63	169	13,0	10
CD615	05WHNSB-1240-13-TH	○	12,40	62,00	104	63	169	13,0	10
CD271	05WHNSB-1250-13-TH	●	12,50	62,50	104	63	169	13,0	1
CD616	05WHNSB-1260-13-TH	○	12,60	63,00	104	63	169	13,0	10
CD617	05WHNSB-1270-13-TH	○	12,70	63,50	104	63	169	13,0	10
CD618	05WHNSB-1280-13-TH	○	12,80	64,00	104	63	169	13,0	10
CD619	05WHNSB-1290-13-TH	○	12,90	64,50	104	63	169	13,0	10
CD272	05WHNSB-1300-13-TH	●	13,00	65,00	104	63	169	13,0	1
CD464	05WHNSB-1320-14-TH	●	13,20	66,00	114	64	180	14,0	1
CD465	05WHNSB-1350-14-TH	●	13,50	67,50	114	64	180	14,0	1
CD466	05WHNSB-1400-14-TH	●	14,00	70,00	114	64	180	14,0	1
CD467	05WHNSB-1450-16-TH	○	14,50	72,50	122	65	189	16,0	10
CD468	05WHNSB-1500-16-TH	○	15,00	75,00	122	65	189	16,0	10
CD469	05WHNSB-1510-16-TH	○	15,10	75,50	130	66	198	16,0	10
CD470	05WHNSB-1530-16-TH	○	15,30	76,50	130	66	198	16,0	10
CD471	05WHNSB-1555-16-TH	○	15,55	77,75	130	66	198	16,0	10
CD472	05WHNSB-1750-18-TH	●	17,50	87,50	147	68	217	18,0	1
CD473	05WHNSB-1800-18-TH	○	18,00	90,00	147	68	217	18,0	10
CD474	05WHNSB-1850-20-TH	○	18,50	92,50	155	69	226	20,0	10
CD475	05WHNSB-1890-20-TH	○	18,90	94,50	155	69	226	20,0	10
CD476	05WHNSB-1900-20-TH	○	19,00	95,00	155	69	226	20,0	10
CD477	05WHNSB-1930-20-TH	○	19,30	96,50	163	70	235	20,0	10
CD478	05WHNSB-1955-20-TH	○	19,55	97,75	163	70	235	20,0	10

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
05WHNSB-TH	5xD	2.0 ~ 19.55	28-29   5xD Large D: 30-31

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>8xD</b>	<b>140°</b> 3D~8D
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**8xD**

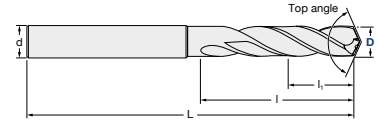
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD340	08WHNSB-0300-4-TH	●	3,00	24,0	35	47	83	4,0	1
CD620	08WHNSB-0310-4-TH	○	3,10	24,8	42	51	94	4,0	10
CD621	08WHNSB-0320-4-TH	○	3,20	25,6	42	51	94	4,0	10
CD622	08WHNSB-0330-4-TH	○	3,30	26,4	42	51	94	4,0	10
CD623	08WHNSB-0340-4-TH	○	3,40	27,2	42	51	94	4,0	10
CD341	08WHNSB-0350-4-TH	●	3,50	28,0	42	51	94	4,0	1
CD624	08WHNSB-0360-4-TH	○	3,60	28,8	46	47	94	4,0	10
CD625	08WHNSB-0370-4-TH	○	3,70	29,6	46	47	94	4,0	10
CD342	08WHNSB-0380-4-TH	●	3,80	30,4	46	47	94	4,0	1
CD626	08WHNSB-0390-4-TH	○	3,90	31,2	46	47	94	4,0	10
CD343	08WHNSB-0400-4-TH	●	4,00	32,0	46	47	94	4,0	1
CD627	08WHNSB-0410-6-TH	○	4,10	32,8	55	54	110	6,0	10
CD628	08WHNSB-0420-6-TH	○	4,20	33,6	55	54	110	6,0	10
CD629	08WHNSB-0430-6-TH	○	4,30	34,4	55	54	110	6,0	10
CD630	08WHNSB-0440-6-TH	○	4,40	35,2	55	54	110	6,0	10
CD344	08WHNSB-0450-6-TH	●	4,50	36,0	55	54	110	6,0	1
CD631	08WHNSB-0460-6-TH	○	4,60	36,8	59	50	110	6,0	10
CD632	08WHNSB-0470-6-TH	○	4,70	37,6	59	50	110	6,0	10
CD345	08WHNSB-0480-6-TH	●	4,80	38,4	59	50	110	6,0	1
CD633	08WHNSB-0490-6-TH	○	4,90	39,2	59	50	110	6,0	10
CD346	08WHNSB-0500-6-TH	●	5,00	40,0	59	50	110	6,0	1
CD634	08WHNSB-0510-6-TH	○	5,10	40,8	62	55	118	6,0	10
CD635	08WHNSB-0520-6-TH	○	5,20	41,6	62	55	118	6,0	10
CD636	08WHNSB-0530-6-TH	○	5,30	42,4	62	55	118	6,0	10
CD637	08WHNSB-0540-6-TH	○	5,40	43,2	62	55	118	6,0	10
CD347	08WHNSB-0550-6-TH	●	5,50	44,0	62	55	118	6,0	1
CD1042	08WHNSB-0560-6-TH	○	5,60	44,8	62	55	118	6,0	10
CD638	08WHNSB-0570-6-TH	○	5,70	45,6	67	50	118	6,0	10
CD348	08WHNSB-0580-6-TH	●	5,80	46,4	67	50	118	6,0	1
CD640	08WHNSB-0590-6-TH	○	5,90	47,2	67	50	118	6,0	10
CD349	08WHNSB-0600-6-TH	●	6,00	48,0	67	50	118	6,0	1
CD641	08WHNSB-0610-8-TH	○	6,10	48,8	73	57	132	8,0	10
CD350	08WHNSB-0620-8-TH	●	6,20	49,6	73	57	132	8,0	1
CD642	08WHNSB-0630-8-TH	○	6,30	50,4	73	57	132	8,0	10
CD643	08WHNSB-0640-8-TH	○	6,40	51,2	73	57	132	8,0	10
CD351	08WHNSB-0650-8-TH	●	6,50	52,0	73	57	132	8,0	1
CD644	08WHNSB-0660-8-TH	○	6,60	52,8	77	53	132	8,0	10
CD645	08WHNSB-0670-8-TH	○	6,70	53,6	77	53	132	8,0	10
CD352	08WHNSB-0680-8-TH	●	6,80	54,4	77	53	132	8,0	1
CD646	08WHNSB-0690-8-TH	○	6,90	55,2	77	53	132	8,0	10
CD353	08WHNSB-0700-8-TH	●	7,00	56,0	77	53	132	8,0	1
CD647	08WHNSB-0710-8-TH	○	7,10	56,8	84	58	144	8,0	10
CD479	08WHNSB-0720-8-TH	●	7,20	57,6	84	58	144	8,0	1
CD648	08WHNSB-0730-8-TH	○	7,30	58,4	84	58	144	8,0	10
CD649	08WHNSB-0740-8-TH	○	7,40	59,2	84	58	144	8,0	10
CD354	08WHNSB-0750-8-TH	●	7,50	60,0	84	58	144	8,0	1
CD650	08WHNSB-0760-8-TH	○	7,60	60,8	88	54	144	8,0	10
CD651	08WHNSB-0770-8-TH	○	7,70	61,6	88	54	144	8,0	10
CD355	08WHNSB-0780-8-TH	●	7,80	62,4	88	54	144	8,0	1
CD652	08WHNSB-0790-8-TH	○	7,90	63,2	88	54	144	8,0	10
CD356	08WHNSB-0800-8-TH	●	8,00	64,0	88	54	144	8,0	1
CD653	08WHNSB-0810-10-TH	○	8,10	64,8	94	60	156	10,0	10
CD480	08WHNSB-0820-10-TH	●	8,20	65,6	94	60	156	10,0	1
CD654	08WHNSB-0830-10-TH	○	8,30	66,4	94	60	156	10,0	10
CD655	08WHNSB-0840-10-TH	○	8,40	67,2	94	60	156	10,0	10
CD357	08WHNSB-0850-10-TH	●	8,50	68,0	94	60	156	10,0	1
CD656	08WHNSB-0860-10-TH	○	8,60	68,8	99	55	156	10,0	10
CD657	08WHNSB-0870-10-TH	○	8,70	69,6	99	55	156	10,0	10
CD658	08WHNSB-0880-10-TH	○	8,80	70,4	99	55	156	10,0	10
CD659	08WHNSB-0890-10-TH	○	8,90	71,2	99	55	156	10,0	10
CD358	08WHNSB-0900-10-TH	●	9,00	72,0	99	55	156	10,0	1
CD660	08WHNSB-0910-10-TH	○	9,10	72,8	105	61	168	10,0	10
CD481	08WHNSB-0920-10-TH	●	9,20	73,6	105	61	168	10,0	1
CD661	08WHNSB-0930-10-TH	○	9,30	74,4	105	61	168	10,0	10
CD662	08WHNSB-0940-10-TH	○	9,40	75,2	105	61	168	10,0	10
CD359	08WHNSB-0950-10-TH	●	9,50	76,0	105	61	168	10,0	1
CD663	08WHNSB-0960-10-TH	○	9,60	76,8	110	56	168	10,0	10
CD664	08WHNSB-0970-10-TH	○	9,70	77,6	110	56	168	10,0	10
CD360	08WHNSB-0980-10-TH	●	9,80	78,4	110	56	168	10,0	1



## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>8xD</b>	<b>140°</b> 3D~8D
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**8xD**

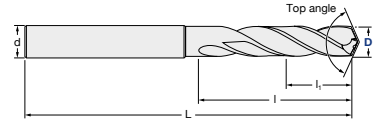
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD665	08WHNSB-0990-10-TH	○	9,90	79,2	110	56	168	10,0	10
CD361	08WHNSB-1000-10-TH	●	10,00	80,0	110	56	168	10,0	1
CD666	08WHNSB-1010-12-TH	○	10,10	80,8	116	66	184	12,0	10
CD362	08WHNSB-1020-12-TH	●	10,20	81,6	116	66	184	12,0	1
CD363	08WHNSB-1030-12-TH	●	10,30	82,4	116	66	184	12,0	1
CD667	08WHNSB-1040-12-TH	○	10,40	83,2	116	66	184	12,0	10
CD364	08WHNSB-1050-12-TH	●	10,50	84,0	116	66	184	12,0	1
CD668	08WHNSB-1060-12-TH	○	10,60	84,8	121	61	184	12,0	10
CD365	08WHNSB-1070-12-TH	●	10,70	85,6	121	61	184	12,0	1
CD366	08WHNSB-1080-12-TH	●	10,80	86,4	121	61	184	12,0	1
CD669	08WHNSB-1090-12-TH	○	10,90	87,2	121	61	184	12,0	10
CD367	08WHNSB-1100-12-TH	●	11,00	88,0	121	61	184	12,0	1
CD670	08WHNSB-1110-12-TH	○	11,10	88,8	127	66	195	12,0	10
CD671	08WHNSB-1120-12-TH	○	11,20	89,6	127	66	195	12,0	10
CD672	08WHNSB-1130-12-TH	○	11,30	90,4	127	66	195	12,0	10
CD673	08WHNSB-1140-12-TH	○	11,40	91,2	127	66	195	12,0	10
CD368	08WHNSB-1150-12-TH	●	11,50	92,0	127	66	195	12,0	1
CD369	08WHNSB-1160-12-TH	●	11,60	92,8	132	61	195	12,0	1
CD674	08WHNSB-1170-12-TH	○	11,70	93,6	132	61	195	12,0	10
CD675	08WHNSB-1180-12-TH	○	11,80	94,4	132	61	195	12,0	10
CD676	08WHNSB-1190-12-TH	○	11,90	95,2	132	61	195	12,0	10
CD370	08WHNSB-1200-12-TH	●	12,00	96,0	132	61	195	12,0	1
CD677	08WHNSB-1210-13-TH	○	12,10	96,8	138	68	208	13,0	10
CD678	08WHNSB-1220-13-TH	○	12,20	97,6	138	68	208	13,0	10
CD679	08WHNSB-1230-13-TH	○	12,30	98,4	138	68	208	13,0	10
CD680	08WHNSB-1240-13-TH	○	12,40	99,2	138	68	208	13,0	10
CD371	08WHNSB-1250-13-TH	●	12,50	100,0	138	68	208	13,0	1
CD681	08WHNSB-1260-13-TH	○	12,60	100,8	143	63	208	13,0	10
CD682	08WHNSB-1270-13-TH	○	12,70	101,6	143	63	208	13,0	10
CD683	08WHNSB-1280-13-TH	○	12,80	102,4	143	63	208	13,0	10
CD684	08WHNSB-1290-13-TH	○	12,90	103,2	143	63	208	13,0	10
CD372	08WHNSB-1300-13-TH	●	13,00	104,0	143	63	208	13,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
08WHNSB-TH	8xD	3.0 ~ 13.0	28-29

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>10xD</b>	<b>135°</b> 100-300
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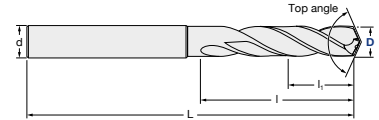

**10xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD396	10WHNSB-0200-3-TH	●	2,00	20,00	30	40	73	3,0	1
CD397	10WHNSB-0210-3-TH	●	2,10	21,00	33	40	76	3,0	1
CD398	10WHNSB-0220-3-TH	●	2,20	22,00	33	40	76	3,0	1
CD399	10WHNSB-0230-3-TH	●	2,30	23,00	37	40	80	3,0	1
CD400	10WHNSB-0240-3-TH	●	2,40	24,00	37	40	80	3,0	1
CD401	10WHNSB-0250-3-TH	●	2,50	25,00	37	40	80	3,0	1
CD402	10WHNSB-0260-3-TH	●	2,60	26,00	39	45	87	3,0	1
CD403	10WHNSB-0270-3-TH	●	2,70	27,00	39	45	87	3,0	1
CD404	10WHNSB-0280-3-TH	●	2,80	28,00	39	45	87	3,0	1
CD405	10WHNSB-0290-3-TH	●	2,90	29,00	39	45	87	3,0	1
CD273	10WHNSB-0300-4-TH	●	3,00	30,00	39	45	87	4,0	1
CD685	10WHNSB-0310-4-TH	○	3,10	31,00	46	47	94	4,0	5
CD686	10WHNSB-0320-4-TH	○	3,20	32,00	46	47	94	4,0	5
CD687	10WHNSB-0330-4-TH	○	3,30	33,00	46	47	94	4,0	5
CD688	10WHNSB-0340-4-TH	○	3,40	34,00	46	47	94	4,0	5
CD274	10WHNSB-0350-4-TH	●	3,50	35,00	46	47	94	4,0	1
CD689	10WHNSB-0360-4-TH	○	3,60	36,00	52	48	101	4,0	5
CD690	10WHNSB-0370-4-TH	○	3,70	37,00	52	48	101	4,0	5
CD691	10WHNSB-0380-4-TH	○	3,80	38,00	52	48	101	4,0	5
CD692	10WHNSB-0390-4-TH	○	3,90	39,00	52	48	101	4,0	5
CD275	10WHNSB-0400-4-TH	●	4,00	40,00	52	48	101	4,0	1
CD693	10WHNSB-0410-6-TH	○	4,10	41,00	59	50	110	6,0	5
CD1041	10WHNSB-0420-6-TH	○	4,20	42,00	59	50	110	6,0	5
CD694	10WHNSB-0430-6-TH	○	4,30	43,00	59	50	110	6,0	5
CD695	10WHNSB-0440-6-TH	○	4,40	44,00	59	50	110	6,0	5
CD276	10WHNSB-0450-6-TH	●	4,50	45,00	59	50	110	6,0	1
CD696	10WHNSB-0460-6-TH	○	4,60	46,00	66	50	117	6,0	5
CD697	10WHNSB-0470-6-TH	○	4,70	47,00	66	50	117	6,0	5
CD698	10WHNSB-0480-6-TH	○	4,80	48,00	66	50	117	6,0	5
CD699	10WHNSB-0490-6-TH	○	4,90	49,00	66	50	117	6,0	5
CD277	10WHNSB-0500-6-TH	●	5,00	50,00	66	50	117	6,0	1
CD700	10WHNSB-0510-6-TH	○	5,10	51,00	72	50	123	6,0	5
CD482	10WHNSB-0520-6-TH	●	5,20	52,00	72	50	123	6,0	1
CD701	10WHNSB-0530-6-TH	○	5,30	53,00	72	50	123	6,0	5
CD702	10WHNSB-0540-6-TH	○	5,40	54,00	72	50	123	6,0	5
CD278	10WHNSB-0550-6-TH	●	5,50	55,00	72	50	123	6,0	1
CD703	10WHNSB-0560-6-TH	○	5,60	56,00	79	50	130	6,0	5
CD704	10WHNSB-0570-6-TH	○	5,70	57,00	79	50	130	6,0	5
CD705	10WHNSB-0580-6-TH	○	5,80	58,00	79	50	130	6,0	5
CD706	10WHNSB-0590-6-TH	○	5,90	59,00	79	50	130	6,0	5
CD279	10WHNSB-0600-6-TH	●	6,00	60,00	79	50	130	6,0	1
CD707	10WHNSB-0610-8-TH	○	6,10	61,00	85	52	138	8,0	5
CD708	10WHNSB-0620-8-TH	○	6,20	62,00	85	52	138	8,0	5
CD709	10WHNSB-0630-8-TH	○	6,30	63,00	85	52	138	8,0	5
CD710	10WHNSB-0640-8-TH	○	6,40	64,00	85	52	138	8,0	5
CD280	10WHNSB-0650-8-TH	●	6,50	65,00	85	52	138	8,0	1
CD711	10WHNSB-0660-8-TH	○	6,60	66,00	92	52	145	8,0	5
CD712	10WHNSB-0670-8-TH	○	6,70	67,00	92	52	145	8,0	5
CD713	10WHNSB-0680-8-TH	○	6,80	68,00	92	52	145	8,0	5
CD714	10WHNSB-0690-8-TH	○	6,90	69,00	92	52	145	8,0	5
CD281	10WHNSB-0700-8-TH	●	7,00	70,00	92	52	145	8,0	1
CD715	10WHNSB-0710-8-TH	○	7,10	71,00	98	54	153	8,0	5
CD716	10WHNSB-0720-8-TH	○	7,20	72,00	98	54	153	8,0	5
CD717	10WHNSB-0730-8-TH	○	7,30	73,00	98	54	153	8,0	5
CD718	10WHNSB-0740-8-TH	○	7,40	74,00	98	54	153	8,0	5
CD282	10WHNSB-0750-8-TH	●	7,50	75,00	98	54	153	8,0	1
CD719	10WHNSB-0760-8-TH	○	7,60	76,00	105	54	161	8,0	5
CD720	10WHNSB-0770-8-TH	○	7,70	77,00	105	54	161	8,0	5
CD721	10WHNSB-0780-8-TH	○	7,80	78,00	105	54	161	8,0	5
CD722	10WHNSB-0790-8-TH	○	7,90	79,00	105	54	161	8,0	5
CD283	10WHNSB-0800-8-TH	●	8,00	80,00	105	54	161	8,0	1
CD723	10WHNSB-0810-10-TH	○	8,10	81,00	111	54	166	10,0	5
CD724	10WHNSB-0820-10-TH	○	8,20	82,00	111	54	166	10,0	5
CD725	10WHNSB-0830-10-TH	○	8,30	83,00	111	54	166	10,0	5
CD726	10WHNSB-0840-10-TH	○	8,40	84,00	111	54	166	10,0	5
CD284	10WHNSB-0850-10-TH	●	8,50	85,00	111	54	166	10,0	1
CD727	10WHNSB-0860-10-TH	○	8,60	86,00	118	54	173	10,0	5
CD728	10WHNSB-0870-10-TH	○	8,70	87,00	118	54	173	10,0	5
CD729	10WHNSB-0880-10-TH	○	8,80	88,00	118	54	173	10,0	5

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>10xD</b>	<b>135°</b> 100~300
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**10xD**

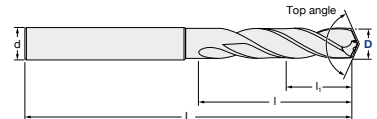
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD730	10WHNSB-0890-10-TH	○	8,90	89,00	118	54	173	10,0	5
CD285	10WHNSB-0900-10-TH	●	9,00	90,00	118	54	173	10,0	1
CD731	10WHNSB-0910-10-TH	○	9,10	91,00	124	54	179	10,0	5
CD732	10WHNSB-0920-10-TH	○	9,20	92,00	124	54	179	10,0	5
CD733	10WHNSB-0930-10-TH	○	9,30	93,00	124	54	179	10,0	5
CD734	10WHNSB-0940-10-TH	○	9,40	94,00	124	54	179	10,0	5
CD286	10WHNSB-0950-10-TH	●	9,50	95,00	124	54	179	10,0	1
CD735	10WHNSB-0960-10-TH	○	9,60	96,00	131	54	186	10,0	5
CD736	10WHNSB-0970-10-TH	○	9,70	97,00	131	54	186	10,0	5
CD737	10WHNSB-0980-10-TH	○	9,80	98,00	131	54	186	10,0	5
CD738	10WHNSB-0990-10-TH	○	9,90	99,00	131	54	186	10,0	5
CD287	10WHNSB-1000-10-TH	●	10,00	100,00	131	54	186	10,0	1
CD739	10WHNSB-1010-12-TH	○	10,10	101,00	138	54	193	12,0	5
CD740	10WHNSB-1020-12-TH	○	10,20	102,00	138	54	193	12,0	5
CD741	10WHNSB-1030-12-TH	○	10,30	103,00	138	54	193	12,0	5
CD742	10WHNSB-1040-12-TH	○	10,40	104,00	138	54	193	12,0	5
CD743	10WHNSB-1050-12-TH	○	10,50	105,00	138	54	193	12,0	5
CD744	10WHNSB-1060-12-TH	○	10,60	106,00	144	60	205	12,0	5
CD745	10WHNSB-1070-12-TH	○	10,70	107,00	144	60	205	12,0	5
CD746	10WHNSB-1080-12-TH	○	10,80	108,00	144	60	205	12,0	5
CD747	10WHNSB-1090-12-TH	○	10,90	109,00	144	60	205	12,0	5
CD288	10WHNSB-1100-12-TH	●	11,00	110,00	144	60	205	12,0	1
CD748	10WHNSB-1110-12-TH	○	11,10	111,00	151	60	212	12,0	5
CD749	10WHNSB-1120-12-TH	○	11,20	112,00	151	60	212	12,0	5
CD750	10WHNSB-1130-12-TH	○	11,30	113,00	151	60	212	12,0	5
CD751	10WHNSB-1140-12-TH	○	11,40	114,00	151	60	212	12,0	5
CD752	10WHNSB-1150-12-TH	○	11,50	115,00	151	60	212	12,0	5
CD753	10WHNSB-1160-12-TH	○	11,60	116,00	157	60	218	12,0	5
CD754	10WHNSB-1170-12-TH	○	11,70	117,00	157	60	218	12,0	5
CD755	10WHNSB-1180-12-TH	○	11,80	118,00	157	60	218	12,0	5
CD756	10WHNSB-1190-12-TH	○	11,90	119,00	157	60	218	12,0	5
CD289	10WHNSB-1200-12-TH	●	12,00	120,00	157	60	218	12,0	1
CD757	10WHNSB-1210-13-TH	○	12,10	121,00	164	60	225	13,0	5
CD758	10WHNSB-1220-13-TH	○	12,20	122,00	164	60	225	13,0	5
CD759	10WHNSB-1230-13-TH	○	12,30	123,00	164	60	225	13,0	5
CD760	10WHNSB-1240-13-TH	○	12,40	124,00	164	60	225	13,0	5
CD761	10WHNSB-1250-13-TH	○	12,50	125,00	164	60	225	13,0	5
CD762	10WHNSB-1260-13-TH	○	12,60	126,00	170	65	236	13,0	5
CD763	10WHNSB-1270-13-TH	○	12,70	127,00	170	65	236	13,0	5
CD764	10WHNSB-1280-13-TH	○	12,80	128,00	170	65	236	13,0	5
CD765	10WHNSB-1290-13-TH	○	12,90	129,00	170	65	236	13,0	5
CD766	10WHNSB-1300-13-TH	○	13,00	130,00	170	65	236	13,0	5

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
10WHNSB-TH	10xD	2.0 ~ 13.0	32-33

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>15xD</b>	<b>135°</b> 100-300
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**15xD**

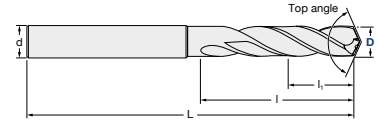
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD406	15WHNSB-0200-3-TH	●	2,00	30,0	40	40	83	3,0	1
CD407	15WHNSB-0210-3-TH	●	2,10	31,5	44	40	87	3,0	1
CD408	15WHNSB-0220-3-TH	●	2,20	33,0	44	40	87	3,0	1
CD409	15WHNSB-0230-3-TH	●	2,30	34,5	50	40	93	3,0	1
CD410	15WHNSB-0240-3-TH	●	2,40	36,0	50	40	93	3,0	1
CD411	15WHNSB-0250-3-TH	●	2,50	37,5	50	40	93	3,0	1
CD412	15WHNSB-0260-3-TH	●	2,60	39,0	54	45	102	3,0	1
CD413	15WHNSB-0270-3-TH	●	2,70	40,5	54	45	102	3,0	1
CD414	15WHNSB-0280-3-TH	●	2,80	42,0	54	45	102	3,0	1
CD415	15WHNSB-0290-3-TH	●	2,90	43,5	54	45	102	3,0	1
CD290	15WHNSB-0300-4-TH	●	3,00	45,0	54	45	102	4,0	1
CD767	15WHNSB-0310-4-TH	○	3,10	46,5	63	47	111	4,0	5
CD768	15WHNSB-0320-4-TH	○	3,20	48,0	63	47	111	4,0	5
CD769	15WHNSB-0330-4-TH	○	3,30	49,5	63	47	111	4,0	5
CD770	15WHNSB-0340-4-TH	○	3,40	51,0	63	47	111	4,0	5
CD291	15WHNSB-0350-4-TH	●	3,50	52,5	63	47	111	4,0	1
CD771	15WHNSB-0360-4-TH	○	3,60	54,0	72	48	121	4,0	5
CD772	15WHNSB-0370-4-TH	○	3,70	55,5	72	48	121	4,0	5
CD773	15WHNSB-0380-4-TH	○	3,80	57,0	72	48	121	4,0	5
CD774	15WHNSB-0390-4-TH	○	3,90	58,5	72	48	121	4,0	5
CD292	15WHNSB-0400-4-TH	●	4,00	60,0	72	48	121	4,0	1
CD775	15WHNSB-0410-6-TH	○	4,10	61,5	81	50	132	6,0	5
CD483	15WHNSB-0420-6-TH	●	4,20	63,0	81	50	132	6,0	1
CD776	15WHNSB-0430-6-TH	○	4,30	64,5	81	50	132	6,0	5
CD777	15WHNSB-0440-6-TH	○	4,40	66,0	81	50	132	6,0	5
CD293	15WHNSB-0450-6-TH	●	4,50	67,5	81	50	132	6,0	1
CD778	15WHNSB-0460-6-TH	○	4,60	69,0	91	50	142	6,0	5
CD779	15WHNSB-0470-6-TH	○	4,70	70,5	91	50	142	6,0	5
CD780	15WHNSB-0480-6-TH	○	4,80	72,0	91	50	142	6,0	5
CD781	15WHNSB-0490-6-TH	○	4,90	73,5	91	50	142	6,0	5
CD294	15WHNSB-0500-6-TH	●	5,00	75,0	91	50	142	6,0	1
CD782	15WHNSB-0510-6-TH	○	5,10	76,5	100	50	151	6,0	5
CD783	15WHNSB-0520-6-TH	○	5,20	78,0	100	50	151	6,0	5
CD784	15WHNSB-0530-6-TH	○	5,30	79,5	100	50	151	6,0	5
CD785	15WHNSB-0540-6-TH	○	5,40	81,0	100	50	151	6,0	5
CD295	15WHNSB-0550-6-TH	●	5,50	82,5	100	50	151	6,0	1
CD786	15WHNSB-0560-6-TH	○	5,60	84,0	109	50	160	6,0	5
CD787	15WHNSB-0570-6-TH	○	5,70	85,5	109	50	160	6,0	5
CD788	15WHNSB-0580-6-TH	○	5,80	87,0	109	50	160	6,0	5
CD789	15WHNSB-0590-6-TH	○	5,90	88,5	109	50	160	6,0	5
CD296	15WHNSB-0600-6-TH	●	6,00	90,0	109	50	160	6,0	1
CD790	15WHNSB-0610-8-TH	○	6,10	91,5	118	52	171	8,0	5
CD791	15WHNSB-0620-8-TH	○	6,20	93,0	118	52	171	8,0	5
CD792	15WHNSB-0630-8-TH	○	6,30	94,5	118	52	171	8,0	5
CD793	15WHNSB-0640-8-TH	○	6,40	96,0	118	52	171	8,0	5
CD297	15WHNSB-0650-8-TH	●	6,50	97,5	118	52	171	8,0	1
CD794	15WHNSB-0660-8-TH	○	6,60	99,0	127	52	180	8,0	5
CD795	15WHNSB-0670-8-TH	○	6,70	100,5	127	52	180	8,0	5
CD796	15WHNSB-0680-8-TH	○	6,80	102,0	127	52	180	8,0	5
CD797	15WHNSB-0690-8-TH	○	6,90	103,5	127	52	180	8,0	5
CD298	15WHNSB-0700-8-TH	●	7,00	105,0	127	52	180	8,0	1
CD798	15WHNSB-0710-8-TH	○	7,10	106,5	136	54	191	8,0	5
CD799	15WHNSB-0720-8-TH	○	7,20	108,0	136	54	191	8,0	5
CD800	15WHNSB-0730-8-TH	○	7,30	109,5	136	54	191	8,0	5
CD801	15WHNSB-0740-8-TH	○	7,40	111,0	136	54	191	8,0	5
CD299	15WHNSB-0750-8-TH	●	7,50	112,5	136	54	191	8,0	1
CD802	15WHNSB-0760-8-TH	○	7,60	114,0	145	54	200	8,0	5
CD803	15WHNSB-0770-8-TH	○	7,70	115,5	145	54	200	8,0	5
CD804	15WHNSB-0780-8-TH	○	7,80	117,0	145	54	200	8,0	5
CD805	15WHNSB-0790-8-TH	○	7,90	118,5	145	54	200	8,0	5
CD300	15WHNSB-0800-8-TH	●	8,00	120,0	145	54	200	8,0	1
CD806	15WHNSB-0810-10-TH	○	8,10	121,5	154	54	209	10,0	5
CD807	15WHNSB-0820-10-TH	○	8,20	123,0	154	54	209	10,0	5
CD808	15WHNSB-0830-10-TH	○	8,30	124,5	154	54	209	10,0	5
CD809	15WHNSB-0840-10-TH	○	8,40	126,0	154	54	209	10,0	5
CD301	15WHNSB-0850-10-TH	●	8,50	127,5	154	54	209	10,0	1
CD810	15WHNSB-0860-10-TH	○	8,60	129,0	163	54	218	10,0	5
CD811	15WHNSB-0870-10-TH	○	8,70	130,5	163	54	218	10,0	5
CD812	15WHNSB-0880-10-TH	○	8,80	132,0	163	54	218	10,0	5



## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>15xD</b>	<b>135°</b> 100~300
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**15xD**

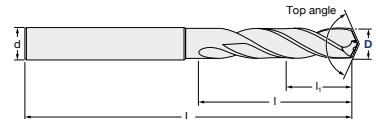
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>1</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD813	15WHNSB-0890-10-TH	○	8,90	133,5	163	54	218	10,0	5
CD302	15WHNSB-0900-10-TH	●	9,00	135,0	163	54	218	10,0	1
CD814	15WHNSB-0910-10-TH	○	9,10	136,5	172	54	227	10,0	5
CD815	15WHNSB-0920-10-TH	○	9,20	138,0	172	54	227	10,0	5
CD816	15WHNSB-0930-10-TH	○	9,30	139,5	172	54	227	10,0	5
CD817	15WHNSB-0940-10-TH	○	9,40	141,0	172	54	227	10,0	5
CD303	15WHNSB-0950-10-TH	●	9,50	142,5	172	54	227	10,0	1
CD818	15WHNSB-0960-10-TH	○	9,60	144,0	181	54	236	10,0	5
CD819	15WHNSB-0970-10-TH	○	9,70	145,5	181	54	236	10,0	5
CD820	15WHNSB-0980-10-TH	○	9,80	147,0	181	54	236	10,0	5
CD821	15WHNSB-0990-10-TH	○	9,90	148,5	181	54	236	10,0	5
CD304	15WHNSB-1000-10-TH	●	10,00	150,0	181	54	236	10,0	1
CD822	15WHNSB-1010-12-TH	○	10,10	151,5	190	54	245	12,0	5
CD823	15WHNSB-1020-12-TH	○	10,20	153,0	190	54	245	12,0	5
CD824	15WHNSB-1030-12-TH	○	10,30	154,5	190	54	245	12,0	5
CD825	15WHNSB-1040-12-TH	○	10,40	156,0	190	54	245	12,0	5
CD826	15WHNSB-1050-12-TH	○	10,50	157,5	190	54	245	12,0	5
CD827	15WHNSB-1060-12-TH	○	10,60	159,0	199	60	260	12,0	5
CD828	15WHNSB-1070-12-TH	○	10,70	160,5	199	60	260	12,0	5
CD829	15WHNSB-1080-12-TH	○	10,80	162,0	199	60	260	12,0	5
CD830	15WHNSB-1090-12-TH	○	10,90	163,5	199	60	260	12,0	5
CD305	15WHNSB-1100-12-TH	●	11,00	165,0	199	60	260	12,0	1
CD831	15WHNSB-1110-12-TH	○	11,10	166,5	208	60	269	12,0	5
CD832	15WHNSB-1120-12-TH	○	11,20	168,0	208	60	269	12,0	5
CD833	15WHNSB-1130-12-TH	○	11,30	169,5	208	60	269	12,0	5
CD834	15WHNSB-1140-12-TH	○	11,40	171,0	208	60	269	12,0	5
CD835	15WHNSB-1150-12-TH	○	11,50	172,5	208	60	269	12,0	5
CD836	15WHNSB-1160-12-TH	○	11,60	174,0	217	60	278	12,0	5
CD837	15WHNSB-1170-12-TH	○	11,70	175,5	217	60	278	12,0	5
CD838	15WHNSB-1180-12-TH	○	11,80	177,0	217	60	278	12,0	5
CD839	15WHNSB-1190-12-TH	○	11,90	178,5	217	60	278	12,0	5
CD306	15WHNSB-1200-12-TH	●	12,00	180,0	217	60	278	12,0	1
CD840	15WHNSB-1210-13-TH	○	12,10	181,5	226	60	287	13,0	5
CD841	15WHNSB-1220-13-TH	○	12,20	183,0	226	60	287	13,0	5
CD842	15WHNSB-1230-13-TH	○	12,30	184,5	226	60	287	13,0	5
CD843	15WHNSB-1240-13-TH	○	12,40	186,0	226	60	287	13,0	5
CD844	15WHNSB-1250-13-TH	○	12,50	187,5	226	60	287	13,0	5
CD845	15WHNSB-1260-13-TH	○	12,60	189,0	235	65	301	13,0	5
CD846	15WHNSB-1270-13-TH	○	12,70	190,5	235	65	301	13,0	5
CD847	15WHNSB-1280-13-TH	○	12,80	192,0	235	65	301	13,0	5
CD848	15WHNSB-1290-13-TH	○	12,90	193,5	235	65	301	13,0	5
CD849	15WHNSB-1300-13-TH	○	13,00	195,0	235	65	301	13,0	5

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
15WHNSB-TH	15xD	2.0 ~ 13.0	32-33

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>20xD</b>	<b>135°</b> 100-300
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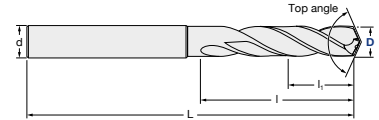

**20xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD416	20WHNSB-0200-3-TH	●	2,00	40,00	50	40	93	3,0	1
CD417	20WHNSB-0210-3-TH	●	2,10	42,00	55	40	98	3,0	1
CD418	20WHNSB-0220-3-TH	●	2,20	44,00	55	40	98	3,0	1
CD419	20WHNSB-0230-3-TH	●	2,30	46,00	62	40	105	3,0	1
CD420	20WHNSB-0240-3-TH	●	2,40	48,00	62	40	105	3,0	1
CD421	20WHNSB-0250-3-TH	●	2,50	50,00	62	40	105	3,0	1
CD422	20WHNSB-0260-3-TH	●	2,60	52,00	67	40	110	3,0	1
CD423	20WHNSB-0270-3-TH	●	2,70	54,00	67	40	110	3,0	1
CD424	20WHNSB-0280-3-TH	●	2,80	56,00	69	43	115	3,0	1
CD425	20WHNSB-0290-3-TH	●	2,90	58,00	69	43	115	3,0	1
CD307	20WHNSB-0300-4-TH	●	3,00	60,00	69	43	117	4,0	1
CD850	20WHNSB-0310-4-TH	○	3,10	62,00	81	47	129	4,0	5
CD484	20WHNSB-0320-4-TH	●	3,20	64,00	81	47	129	4,0	1
CD851	20WHNSB-0330-4-TH	○	3,30	66,00	81	47	129	4,0	5
CD852	20WHNSB-0340-4-TH	○	3,40	68,00	81	47	129	4,0	5
CD308	20WHNSB-0350-4-TH	●	3,50	70,00	81	47	129	4,0	1
CD853	20WHNSB-0360-4-TH	○	3,60	72,00	92	48	141	4,0	5
CD854	20WHNSB-0370-4-TH	○	3,70	74,00	92	48	141	4,0	5
CD855	20WHNSB-0380-4-TH	○	3,80	76,00	92	48	141	4,0	5
CD856	20WHNSB-0390-4-TH	○	3,90	78,00	92	48	141	4,0	5
CD309	20WHNSB-0400-4-TH	●	4,00	80,00	92	48	141	4,0	1
CD857	20WHNSB-0410-6-TH	○	4,10	82,00	104	50	155	6,0	5
CD858	20WHNSB-0420-6-TH	○	4,20	84,00	104	50	155	6,0	5
CD859	20WHNSB-0430-6-TH	○	4,30	86,00	104	50	155	6,0	5
CD860	20WHNSB-0440-6-TH	○	4,40	88,00	104	50	155	6,0	5
CD310	20WHNSB-0450-6-TH	●	4,50	90,00	104	50	155	6,0	1
CD861	20WHNSB-0460-6-TH	○	4,60	92,00	116	50	167	6,0	5
CD862	20WHNSB-0470-6-TH	○	4,70	94,00	116	50	167	6,0	5
CD863	20WHNSB-0480-6-TH	○	4,80	96,00	116	50	167	6,0	5
CD864	20WHNSB-0490-6-TH	○	4,90	98,00	116	50	167	6,0	5
CD311	20WHNSB-0500-6-TH	●	5,00	100,00	116	50	167	6,0	1
CD865	20WHNSB-0510-6-TH	○	5,10	102,00	127	50	178	6,0	5
CD866	20WHNSB-0520-6-TH	○	5,20	104,00	127	50	178	6,0	5
CD867	20WHNSB-0530-6-TH	○	5,30	106,00	127	50	178	6,0	5
CD868	20WHNSB-0540-6-TH	○	5,40	108,00	127	50	178	6,0	5
CD312	20WHNSB-0550-6-TH	●	5,50	110,00	127	50	178	6,0	1
CD869	20WHNSB-0560-6-TH	○	5,60	112,00	139	50	190	6,0	5
CD870	20WHNSB-0570-6-TH	○	5,70	114,00	139	50	190	6,0	5
CD871	20WHNSB-0580-6-TH	○	5,80	116,00	139	50	190	6,0	5
CD872	20WHNSB-0590-6-TH	○	5,90	118,00	139	50	190	6,0	5
CD313	20WHNSB-0600-6-TH	●	6,00	120,00	139	50	190	6,0	1
CD873	20WHNSB-0610-8-TH	○	6,10	122,00	150	52	203	8,0	5
CD874	20WHNSB-0620-8-TH	○	6,20	124,00	150	52	203	8,0	5
CD875	20WHNSB-0630-8-TH	○	6,30	126,00	150	52	203	8,0	5
CD876	20WHNSB-0640-8-TH	○	6,40	128,00	150	52	203	8,0	5
CD314	20WHNSB-0650-8-TH	●	6,50	130,00	150	52	203	8,0	1
CD877	20WHNSB-0660-8-TH	○	6,60	132,00	162	52	215	8,0	5
CD878	20WHNSB-0670-8-TH	○	6,70	134,00	162	52	215	8,0	5
CD879	20WHNSB-0680-8-TH	○	6,80	136,00	162	52	215	8,0	5
CD880	20WHNSB-0690-8-TH	○	6,90	138,00	162	52	215	8,0	5
CD315	20WHNSB-0700-8-TH	●	7,00	140,00	162	52	215	8,0	1
CD881	20WHNSB-0710-8-TH	○	7,10	142,00	173	54	228	8,0	5
CD882	20WHNSB-0720-8-TH	○	7,20	144,00	173	54	228	8,0	5
CD883	20WHNSB-0730-8-TH	○	7,30	146,00	173	54	228	8,0	5
CD884	20WHNSB-0740-8-TH	○	7,40	148,00	173	54	228	8,0	5
CD316	20WHNSB-0750-8-TH	●	7,50	150,00	173	54	228	8,0	1
CD885	20WHNSB-0760-8-TH	○	7,60	152,00	185	54	240	8,0	5
CD886	20WHNSB-0770-8-TH	○	7,70	154,00	185	54	240	8,0	5
CD887	20WHNSB-0780-8-TH	○	7,80	156,00	185	54	240	8,0	5
CD888	20WHNSB-0790-8-TH	○	7,90	158,00	185	54	240	8,0	5
CD317	20WHNSB-0800-8-TH	●	8,00	160,00	185	54	240	8,0	1
CD889	20WHNSB-0810-10-TH	○	8,10	162,00	196	54	251	10,0	5
CD890	20WHNSB-0820-10-TH	○	8,20	164,00	196	54	251	10,0	5
CD891	20WHNSB-0830-10-TH	○	8,30	166,00	196	54	251	10,0	5
CD892	20WHNSB-0840-10-TH	○	8,40	168,00	196	54	251	10,0	5
CD318	20WHNSB-0850-10-TH	●	8,50	170,00	196	54	251	10,0	1
CD893	20WHNSB-0860-10-TH	○	8,60	172,00	208	54	263	10,0	5
CD894	20WHNSB-0870-10-TH	○	8,70	174,00	208	54	263	10,0	5
CD895	20WHNSB-0880-10-TH	○	8,80	176,00	208	54	263	10,0	5

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

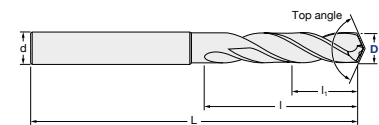
<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>20xD</b>	<b>135°</b> 100-300
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**20xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD896	20WHNSB-0890-10-TH	○	8,90	178,00	208	54	263	10,0	5
CD319	20WHNSB-0900-10-TH	●	9,00	180,00	208	54	263	10,0	1
CD897	20WHNSB-0910-10-TH	○	9,10	182,00	219	54	274	10,0	5
CD898	20WHNSB-0920-10-TH	○	9,20	184,00	219	54	274	10,0	5
CD899	20WHNSB-0930-10-TH	○	9,30	186,00	219	54	274	10,0	5
CD900	20WHNSB-0940-10-TH	○	9,40	188,00	219	54	274	10,0	5
CD320	20WHNSB-0950-10-TH	●	9,50	190,00	219	54	274	10,0	1
CD901	20WHNSB-0960-10-TH	○	9,60	192,00	231	54	286	10,0	5
CD902	20WHNSB-0970-10-TH	○	9,70	194,00	231	54	286	10,0	5
CD903	20WHNSB-0980-10-TH	○	9,80	196,00	231	54	286	10,0	5
CD904	20WHNSB-0990-10-TH	○	9,90	198,00	231	54	286	10,0	5
CD321	20WHNSB-1000-10-TH	●	10,00	200,00	231	54	286	10,0	1
CD905	20WHNSB-1010-12-TH	○	10,10	202,00	243	54	298	12,0	5
CD906	20WHNSB-1020-12-TH	○	10,20	204,00	243	54	298	12,0	5
CD907	20WHNSB-1030-12-TH	○	10,30	206,00	243	54	298	12,0	5
CD908	20WHNSB-1040-12-TH	○	10,40	208,00	243	54	298	12,0	5
CD909	20WHNSB-1050-12-TH	○	10,50	210,00	243	54	298	12,0	5
CD910	20WHNSB-1060-12-TH	○	10,60	212,00	254	60	315	12,0	5
CD911	20WHNSB-1070-12-TH	○	10,70	214,00	254	60	315	12,0	5
CD912	20WHNSB-1080-12-TH	○	10,80	216,00	254	60	315	12,0	5
CD913	20WHNSB-1090-12-TH	○	10,90	218,00	254	60	315	12,0	5
CD322	20WHNSB-1100-12-TH	●	11,00	220,00	254	60	315	12,0	1
CD914	20WHNSB-1110-12-TH	○	11,10	222,00	266	60	327	12,0	5
CD915	20WHNSB-1120-12-TH	○	11,20	224,00	266	60	327	12,0	5
CD916	20WHNSB-1130-12-TH	○	11,30	226,00	266	60	327	12,0	5
CD917	20WHNSB-1140-12-TH	○	11,40	228,00	266	60	327	12,0	5
CD918	20WHNSB-1150-12-TH	○	11,50	230,00	266	60	327	12,0	5
CD919	20WHNSB-1160-12-TH	○	11,60	232,00	277	60	338	12,0	5
CD920	20WHNSB-1170-12-TH	○	11,70	234,00	277	60	338	12,0	5
CD921	20WHNSB-1180-12-TH	○	11,80	236,00	277	60	338	12,0	5
CD922	20WHNSB-1190-12-TH	○	11,90	238,00	277	60	338	12,0	5
CD323	20WHNSB-1200-12-TH	●	12,00	240,00	277	60	338	12,0	1
CD923	20WHNSB-1210-13-TH	○	12,10	242,00	292	59	352	13,0	5
CD924	20WHNSB-1220-13-TH	○	12,20	244,00	292	59	352	13,0	5
CD925	20WHNSB-1230-13-TH	○	12,30	246,00	292	59	352	13,0	5
CD926	20WHNSB-1240-13-TH	○	12,40	248,00	292	59	352	13,0	5
CD927	20WHNSB-1250-13-TH	○	12,50	250,00	292	59	352	13,0	5
CD928	20WHNSB-1260-13-TH	○	12,60	252,00	302	65	368	13,0	5
CD929	20WHNSB-1270-13-TH	○	12,70	254,00	302	65	368	13,0	5
CD930	20WHNSB-1280-13-TH	○	12,80	256,00	302	65	368	13,0	5
CD931	20WHNSB-1290-13-TH	○	12,90	258,00	302	65	368	13,0	5
CD932	20WHNSB-1300-13-TH	○	13,00	260,00	302	65	368	13,0	5

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>25xD</b>	<b>135°</b> 100-300
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**25xD**

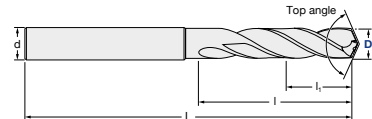
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD426	25WHNSB-0200-3-TH	●	2,00	50,0	60	40	103	3,0	1
CD427	25WHNSB-0220-3-TH	●	2,20	55,0	66	40	109	3,0	1
CD428	25WHNSB-0250-3-TH	●	2,50	62,5	75	40	118	3,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
20WHNSB-TH	20xD	2.0 ~ 13.0	32-33
25WHNSB-TH	25xD	2.0 / 2.2 / 2.5	32-33

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>30xD</b>	<b>135°</b> 100-300
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**30xD**

Tolerance Information on Page 39

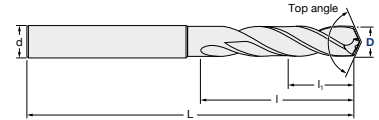
ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD429	30WHNSB-0200-3-TH	●	2,00	60,0	70	40	113	3,0	1
CD430	30WHNSB-0210-3-TH	●	2,10	63,0	77	40	120	3,0	1
CD431	30WHNSB-0220-3-TH	●	2,20	66,0	77	40	120	3,0	1
CD432	30WHNSB-0230-3-TH	●	2,30	69,0	87	40	130	3,0	1
CD433	30WHNSB-0240-3-TH	●	2,40	72,0	87	40	130	3,0	1
CD434	30WHNSB-0250-3-TH	●	2,50	75,0	87	40	130	3,0	1
CD435	30WHNSB-0260-3-TH	●	2,60	78,0	94	40	137	3,0	1
CD436	30WHNSB-0270-3-TH	●	2,70	81,0	94	40	137	3,0	1
CD437	30WHNSB-0280-3-TH	●	2,80	84,0	99	42	144	3,0	1
CD438	30WHNSB-0290-3-TH	●	2,90	87,0	99	42	144	3,0	1
CD324	30WHNSB-0300-4-TH	●	3,00	90,0	99	42	147	4,0	1
CD933	30WHNSB-0310-4-TH	○	3,10	93,0	116	47	164	4,0	5
CD934	30WHNSB-0320-4-TH	○	3,20	96,0	116	47	164	4,0	5
CD935	30WHNSB-0330-4-TH	○	3,30	99,0	116	47	164	4,0	5
CD936	30WHNSB-0340-4-TH	○	3,40	102,0	116	47	164	4,0	5
CD325	30WHNSB-0350-4-TH	●	3,50	105,0	116	47	164	4,0	1
CD937	30WHNSB-0360-4-TH	○	3,60	108,0	132	48	181	4,0	5
CD938	30WHNSB-0370-4-TH	○	3,70	111,0	132	48	181	4,0	5
CD939	30WHNSB-0380-4-TH	○	3,80	114,0	132	48	181	4,0	5
CD940	30WHNSB-0390-4-TH	○	3,90	117,0	132	48	181	4,0	5
CD326	30WHNSB-0400-4-TH	●	4,00	120,0	132	48	181	4,0	1
CD941	30WHNSB-0410-6-TH	○	4,10	123,0	149	50	200	6,0	5
CD942	30WHNSB-0420-6-TH	○	4,20	126,0	149	50	200	6,0	5
CD943	30WHNSB-0430-6-TH	○	4,30	129,0	149	50	200	6,0	5
CD944	30WHNSB-0440-6-TH	○	4,40	132,0	149	50	200	6,0	5
CD327	30WHNSB-0450-6-TH	●	4,50	135,0	149	50	200	6,0	1
CD945	30WHNSB-0460-6-TH	○	4,60	138,0	166	50	217	6,0	5
CD946	30WHNSB-0470-6-TH	○	4,70	141,0	166	50	217	6,0	5
CD947	30WHNSB-0480-6-TH	○	4,80	144,0	166	50	217	6,0	5
CD948	30WHNSB-0490-6-TH	○	4,90	147,0	166	50	217	6,0	5
CD328	30WHNSB-0500-6-TH	●	5,00	150,0	166	50	217	6,0	1
CD949	30WHNSB-0510-6-TH	○	5,10	153,0	182	50	233	6,0	5
CD950	30WHNSB-0520-6-TH	○	5,20	156,0	182	50	233	6,0	5
CD951	30WHNSB-0530-6-TH	○	5,30	159,0	182	50	233	6,0	5
CD952	30WHNSB-0540-6-TH	○	5,40	162,0	182	50	233	6,0	5
CD329	30WHNSB-0550-6-TH	●	5,50	165,0	182	50	233	6,0	1
CD953	30WHNSB-0560-6-TH	○	5,60	168,0	199	50	250	6,0	5
CD954	30WHNSB-0570-6-TH	○	5,70	171,0	199	50	250	6,0	5
CD955	30WHNSB-0580-6-TH	○	5,80	174,0	199	50	250	6,0	5
CD956	30WHNSB-0590-6-TH	○	5,90	177,0	199	50	250	6,0	5
CD330	30WHNSB-0600-6-TH	●	6,00	180,0	199	50	250	6,0	1
CD957	30WHNSB-0610-8-TH	○	6,10	183,0	215	52	268	8,0	5
CD958	30WHNSB-0620-8-TH	○	6,20	186,0	215	52	268	8,0	5
CD959	30WHNSB-0630-8-TH	○	6,30	189,0	215	52	268	8,0	5
CD960	30WHNSB-0640-8-TH	○	6,40	192,0	215	52	268	8,0	5
CD331	30WHNSB-0650-8-TH	●	6,50	195,0	215	52	268	8,0	1
CD961	30WHNSB-0660-8-TH	○	6,60	198,0	232	52	285	8,0	5
CD962	30WHNSB-0670-8-TH	○	6,70	201,0	232	52	285	8,0	5
CD963	30WHNSB-0680-8-TH	○	6,80	204,0	232	52	285	8,0	5
CD964	30WHNSB-0690-8-TH	○	6,90	207,0	232	52	285	8,0	5
CD332	30WHNSB-0700-8-TH	●	7,00	210,0	232	52	285	8,0	1
CD965	30WHNSB-0710-8-TH	○	7,10	213,0	248	54	303	8,0	5
CD966	30WHNSB-0720-8-TH	○	7,20	216,0	248	54	303	8,0	5
CD967	30WHNSB-0730-8-TH	○	7,30	219,0	248	54	303	8,0	5
CD968	30WHNSB-0740-8-TH	○	7,40	222,0	248	54	303	8,0	5
CD333	30WHNSB-0750-8-TH	●	7,50	225,0	248	54	303	8,0	1
CD969	30WHNSB-0760-8-TH	○	7,60	228,0	265	54	320	8,0	5
CD970	30WHNSB-0770-8-TH	○	7,70	231,0	265	54	320	8,0	5
CD971	30WHNSB-0780-8-TH	○	7,80	234,0	265	54	320	8,0	5
CD972	30WHNSB-0790-8-TH	○	7,90	237,0	265	54	320	8,0	5
CD334	30WHNSB-0800-8-TH	●	8,00	240,0	265	54	320	8,0	1





## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>30xD</b>	<b>135°</b> 100~300
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**30xD**

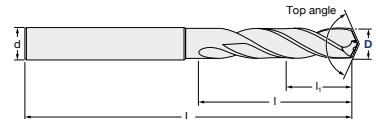
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD973	30WHNSB-0810-10-TH	○	8,10	243,0	281	54	336	10,0	5
CD974	30WHNSB-0820-10-TH	○	8,20	246,0	281	54	336	10,0	5
CD975	30WHNSB-0830-10-TH	○	8,30	249,0	281	54	336	10,0	5
CD976	30WHNSB-0840-10-TH	○	8,40	252,0	281	54	336	10,0	5
CD335	30WHNSB-0850-10-TH	●	8,50	255,0	281	54	336	10,0	1
CD977	30WHNSB-0860-10-TH	○	8,60	258,0	298	54	353	10,0	5
CD978	30WHNSB-0870-10-TH	○	8,70	261,0	298	54	353	10,0	5
CD979	30WHNSB-0880-10-TH	○	8,80	264,0	298	54	353	10,0	5
CD980	30WHNSB-0890-10-TH	○	8,90	267,0	298	54	353	10,0	5
CD336	30WHNSB-0900-10-TH	●	9,00	270,0	298	54	353	10,0	1
CD981	30WHNSB-0910-10-TH	○	9,10	273,0	314	54	369	10,0	5
CD982	30WHNSB-0920-10-TH	○	9,20	276,0	314	54	369	10,0	5
CD983	30WHNSB-0930-10-TH	○	9,30	279,0	314	54	369	10,0	5
CD984	30WHNSB-0940-10-TH	○	9,40	282,0	314	54	369	10,0	5
CD337	30WHNSB-0950-10-TH	●	9,50	285,0	314	54	369	10,0	1
CD985	30WHNSB-0960-10-TH	○	9,60	288,0	331	54	386	10,0	5
CD986	30WHNSB-0970-10-TH	○	9,70	291,0	331	54	386	10,0	5
CD987	30WHNSB-0980-10-TH	○	9,80	294,0	331	54	386	10,0	5
CD988	30WHNSB-0990-10-TH	○	9,90	297,0	331	54	386	10,0	5
CD338	30WHNSB-1000-10-TH	●	10,00	300,0	331	54	386	10,0	1
CD989	30WHNSB-1010-12-TH	○	10,10	303,0	350	54	405	12,0	5
CD990	30WHNSB-1020-12-TH	○	10,20	306,0	350	54	405	12,0	5
CD991	30WHNSB-1030-12-TH	○	10,30	309,0	350	54	405	12,0	5
CD992	30WHNSB-1040-12-TH	○	10,40	312,0	350	54	405	12,0	5
CD993	30WHNSB-1050-12-TH	○	10,50	315,0	350	54	405	12,0	5
CD994	30WHNSB-1060-12-TH	○	10,60	318,0	364	54	420	12,0	5
CD995	30WHNSB-1070-12-TH	○	10,70	321,0	364	54	420	12,0	5
CD996	30WHNSB-1080-12-TH	○	10,80	324,0	364	54	420	12,0	5
CD997	30WHNSB-1090-12-TH	○	10,90	327,0	364	54	420	12,0	5
CD339	30WHNSB-1100-12-TH	●	11,00	330,0	364	60	425	12,0	1
CD998	30WHNSB-1110-12-TH	○	11,10	333,0	383	60	444	12,0	5
CD999	30WHNSB-1120-12-TH	○	11,20	336,0	383	60	444	12,0	5
CD1000	30WHNSB-1130-12-TH	○	11,30	339,0	383	60	444	12,0	5
CD1001	30WHNSB-1140-12-TH	○	11,40	342,0	383	60	444	12,0	5
CD1002	30WHNSB-1150-12-TH	○	11,50	345,0	383	60	444	12,0	5
CD1003	30WHNSB-1160-12-TH	○	11,60	348,0	399	60	460	12,0	5
CD1004	30WHNSB-1170-12-TH	○	11,70	351,0	399	60	460	12,0	5
CD1005	30WHNSB-1180-12-TH	○	11,80	354,0	399	60	460	12,0	5
CD1006	30WHNSB-1190-12-TH	○	11,90	357,0	399	60	460	12,0	5
CD1007	30WHNSB-1200-12-TH	○	12,00	360,0	399	60	460	12,0	5

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
30WHNSB-TH	30xD	2.0 ~ 12.0	32-33

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>3xD</b>	<b>140°</b> 3D
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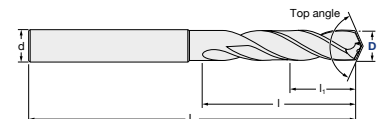


### 3xD Pilot Hole Drills

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD076	03WHNSB-0305-TH	■	3,05	9,15	23	48	73	4,0	1
CD084	03WHNSB-0405-TH	■	4,05	12,15	29	51	82	5,0	1
CD092	03WHNSB-0505-TH	■	5,05	15,15	29	51	82	6,0	1
CD097	03WHNSB-0555-TH	■	5,55	16,65	29	51	82	6,0	1
CD102	03WHNSB-0605-TH	■	6,05	18,15	34	53	89	7,0	1
CD107	03WHNSB-0655-TH	■	6,55	19,65	34	53	89	7,0	1
CD111	03WHNSB-0705-TH	■	7,05	21,15	39	54	95	8,0	1
CD120	03WHNSB-0805-TH	■	8,05	24,15	44	55	101	9,0	1

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>3xD</b>	<b>140°</b> 3D
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### 3xD

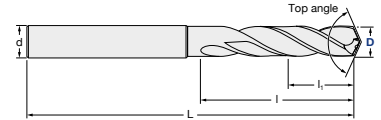
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD001	03WHNSB-0300-TH	■	3,00	9,0	19	48	69	3,0	1
CD077	03WHNSB-0310-TH	■	3,10	9,3	23	48	73	4,0	1
CD078	03WHNSB-0320-TH	■	3,20	9,6	23	48	73	4,0	1
CD002	03WHNSB-0330-TH	■	3,30	9,9	23	48	73	4,0	1
CD079	03WHNSB-0340-TH	■	3,40	10,2	23	48	73	4,0	1
CD003	03WHNSB-0350-TH	■	3,50	10,5	23	48	73	4,0	1
CD080	03WHNSB-0360-TH	■	3,60	10,8	23	48	73	4,0	1
CD081	03WHNSB-0370-TH	■	3,70	11,1	23	48	73	4,0	1
CD082	03WHNSB-0380-TH	■	3,80	11,4	23	48	73	4,0	1
CD083	03WHNSB-0390-TH	■	3,90	11,7	23	48	73	4,0	1
CD004	03WHNSB-0400-TH	■	4,00	12,0	23	48	73	4,0	1
CD085	03WHNSB-0410-TH	■	4,10	12,3	29	51	82	5,0	1
CD005	03WHNSB-0420-TH	■	4,20	12,6	29	51	82	5,0	1
CD086	03WHNSB-0430-TH	■	4,30	12,9	29	51	82	5,0	1
CD087	03WHNSB-0440-TH	■	4,40	13,2	29	51	82	5,0	1
CD006	03WHNSB-0450-TH	■	4,50	13,5	29	51	82	5,0	1
CD088	03WHNSB-0460-TH	■	4,60	13,8	29	51	82	5,0	1
CD089	03WHNSB-0470-TH	■	4,70	14,1	29	51	82	5,0	1
CD090	03WHNSB-0480-TH	■	4,80	14,4	29	51	82	5,0	1
CD091	03WHNSB-0490-TH	■	4,90	14,7	29	51	82	5,0	1
CD007	03WHNSB-0500-TH	■	5,00	15,0	29	51	82	6,0	1
CD093	03WHNSB-0510-TH	■	5,10	15,3	29	51	82	6,0	1
CD094	03WHNSB-0520-TH	■	5,20	15,6	29	51	82	6,0	1
CD095	03WHNSB-0530-TH	■	5,30	15,9	29	51	82	6,0	1
CD096	03WHNSB-0540-TH	■	5,40	16,2	29	51	82	6,0	1
CD008	03WHNSB-0550-TH	■	5,50	16,5	29	51	82	6,0	1
CD098	03WHNSB-0560-TH	■	5,60	16,8	30	51	82	6,0	1
CD099	03WHNSB-0570-TH	■	5,70	17,1	30	51	82	6,0	1
CD100	03WHNSB-0580-TH	■	5,80	17,4	30	51	82	6,0	1
CD101	03WHNSB-0590-TH	■	5,90	17,7	30	51	82	6,0	1
CD009	03WHNSB-0600-TH	■	6,00	18,0	30	51	82	6,0	1
CD103	03WHNSB-0610-TH	■	6,10	18,3	34	53	89	7,0	1
CD104	03WHNSB-0620-TH	■	6,20	18,6	34	53	89	7,0	1
CD105	03WHNSB-0630-TH	■	6,30	18,9	34	53	89	7,0	1
CD106	03WHNSB-0640-TH	■	6,40	19,2	34	53	89	7,0	1



## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>3xD</b>	<b>140°</b> 3D
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**3xD**

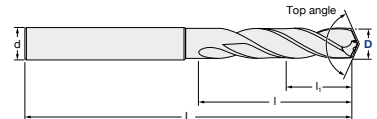
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD010	03WHNSB-0650-TH	■	6,50	19,5	34	53	89	7,0	1
CD108	03WHNSB-0660-TH	■	6,60	19,8	34	53	89	7,0	1
CD109	03WHNSB-0670-TH	■	6,70	20,1	34	53	89	7,0	1
CD011	03WHNSB-0680-TH	■	6,80	20,4	34	53	89	7,0	1
CD110	03WHNSB-0690-TH	■	6,90	20,7	34	53	89	7,0	1
CD012	03WHNSB-0700-TH	■	7,00	21,0	34	53	89	7,0	1
CD112	03WHNSB-0710-TH	■	7,10	21,3	39	54	95	8,0	1
CD113	03WHNSB-0720-TH	■	7,20	21,6	39	54	95	8,0	1
CD114	03WHNSB-0730-TH	■	7,30	21,9	39	54	95	8,0	1
CD115	03WHNSB-0740-TH	■	7,40	22,2	39	54	95	8,0	1
CD013	03WHNSB-0750-TH	■	7,50	22,5	39	54	95	8,0	1
CD116	03WHNSB-0760-TH	■	7,60	22,8	39	54	95	8,0	1
CD117	03WHNSB-0770-TH	■	7,70	23,1	39	54	95	8,0	1
CD118	03WHNSB-0780-TH	■	7,80	23,4	39	54	95	8,0	1
CD119	03WHNSB-0790-TH	■	7,90	23,7	39	54	95	8,0	1
CD014	03WHNSB-0800-TH	■	8,00	24,0	39	54	95	8,0	1
CD121	03WHNSB-0810-TH	■	8,10	24,3	44	55	101	9,0	1
CD122	03WHNSB-0820-TH	■	8,20	24,6	44	55	101	9,0	1
CD123	03WHNSB-0830-TH	■	8,30	24,9	44	55	101	9,0	1
CD124	03WHNSB-0840-TH	■	8,40	25,2	44	55	101	9,0	1
CD015	03WHNSB-0850-TH	■	8,50	25,5	44	55	101	9,0	1
CD125	03WHNSB-0860-TH	■	8,60	25,8	44	55	101	9,0	1
CD126	03WHNSB-0870-TH	■	8,70	26,1	44	55	101	9,0	1
CD127	03WHNSB-0880-TH	■	8,80	26,4	44	55	101	9,0	1
CD128	03WHNSB-0890-TH	■	8,90	26,7	44	55	101	9,0	1
CD016	03WHNSB-0900-TH	■	9,00	27,0	44	55	101	9,0	1
CD017	03WHNSB-0950-TH	■	9,50	28,5	49	56	107	10,0	1
CD129	03WHNSB-0980-TH	■	9,80	29,4	49	56	107	10,0	1
CD018	03WHNSB-1000-TH	■	10,00	30,0	49	56	107	10,0	1
CD130	03WHNSB-1020-TH	■	10,20	30,6	54	61	117	11,0	1
CD131	03WHNSB-1030-TH	■	10,30	30,9	54	61	117	11,0	1
CD019	03WHNSB-1050-TH	■	10,50	31,5	54	61	117	11,0	1
CD020	03WHNSB-1080-TH	■	10,80	32,4	54	61	117	11,0	1
CD021	03WHNSB-1100-TH	■	11,00	33,0	54	61	117	11,0	1
CD022	03WHNSB-1150-TH	■	11,50	34,5	59	62	123	12,0	1
CD132	03WHNSB-1180-TH	■	11,80	35,4	59	62	123	12,0	1
CD023	03WHNSB-1200-TH	■	12,00	36,0	59	62	123	12,0	1
CD024	03WHNSB-1250-TH	■	12,50	37,5	64	63	129	13,0	1
CD025	03WHNSB-1300-TH	■	13,00	39,0	64	63	129	13,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
3xD Pilot Hole Drills	3xD	3.05 – 8.05	28–29
03WHNSB-TH	3xD	3.0 ~ 13.0	28–29

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>5xD</b>	<b>140°</b> 3D~8D
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**5xD**

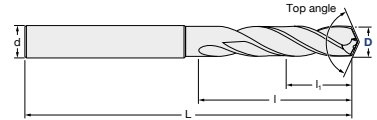
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter	Using length	Flute length	Shank length	Total length	Shank Dia.	Minimum Order Quantity
			D	l <sub>1</sub>	l	l <sub>s</sub>	L	d	
CD026	05WHNSB-0300-TH	■	3,00	15,00	29	47	79	3,0	1
CD133	05WHNSB-0310-TH	■	3,10	15,50	37	47	87	4,0	1
CD134	05WHNSB-0320-TH	■	3,20	16,00	37	47	87	4,0	1
CD027	05WHNSB-0330-TH	■	3,30	16,50	37	47	87	4,0	1
CD135	05WHNSB-0340-TH	■	3,40	17,00	37	47	87	4,0	1
CD028	05WHNSB-0350-TH	■	3,50	17,50	37	47	87	4,0	1
CD136	05WHNSB-0360-TH	■	3,60	18,00	37	47	87	4,0	1
CD137	05WHNSB-0370-TH	■	3,70	18,50	37	47	87	4,0	1
CD138	05WHNSB-0380-TH	■	3,80	19,00	37	47	87	4,0	1
CD139	05WHNSB-0390-TH	■	3,90	19,50	37	47	87	4,0	1
CD029	05WHNSB-0400-TH	■	4,00	20,00	37	47	87	4,0	1
CD140	05WHNSB-0410-TH	■	4,10	20,50	47	50	100	5,0	1
CD030	05WHNSB-0420-TH	■	4,20	21,00	47	50	100	5,0	1
CD141	05WHNSB-0430-TH	■	4,30	21,50	47	50	100	5,0	1
CD142	05WHNSB-0440-TH	■	4,40	22,00	47	50	100	5,0	1
CD031	05WHNSB-0450-TH	■	4,50	22,50	47	50	100	5,0	1
CD143	05WHNSB-0460-TH	■	4,60	23,00	47	50	100	5,0	1
CD144	05WHNSB-0470-TH	■	4,70	23,50	47	50	100	5,0	1
CD145	05WHNSB-0480-TH	■	4,80	24,00	47	50	100	5,0	1
CD146	05WHNSB-0490-TH	■	4,90	24,50	47	50	100	5,0	1
CD032	05WHNSB-0500-TH	■	5,00	25,00	47	50	100	5,0	1
CD147	05WHNSB-0510-TH	■	5,10	25,50	47	50	100	6,0	1
CD148	05WHNSB-0520-TH	■	5,20	26,00	47	50	100	6,0	1
CD149	05WHNSB-0530-TH	■	5,30	26,50	47	50	100	6,0	1
CD150	05WHNSB-0540-TH	■	5,40	27,00	47	50	100	6,0	1
CD033	05WHNSB-0550-TH	■	5,50	27,50	47	50	100	6,0	1
CD151	05WHNSB-0560-TH	■	5,60	28,00	47	50	100	6,0	1
CD152	05WHNSB-0570-TH	■	5,70	28,50	47	50	100	6,0	1
CD153	05WHNSB-0580-TH	■	5,80	29,00	47	50	100	6,0	1
CD154	05WHNSB-0590-TH	■	5,90	29,50	47	50	100	6,0	1
CD034	05WHNSB-0600-TH	■	6,00	30,00	47	50	100	6,0	1
CD155	05WHNSB-0610-TH	■	6,10	30,50	55	53	110	7,0	1
CD156	05WHNSB-0620-TH	■	6,20	31,00	55	53	110	7,0	1
CD157	05WHNSB-0630-TH	■	6,30	31,50	55	53	110	7,0	1
CD158	05WHNSB-0640-TH	■	6,40	32,00	55	53	110	7,0	1
CD035	05WHNSB-0650-TH	■	6,50	32,50	55	53	110	7,0	1
CD159	05WHNSB-0660-TH	■	6,60	33,00	55	53	110	7,0	1



## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>5xD</b>	<b>140°</b> 3D~8D
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**5xD**

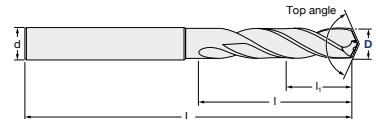
Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD160	05WHNSB-0670-TH	■	6,70	33,50	55	53	110	7,0	1
CD036	05WHNSB-0680-TH	■	6,80	34,00	55	53	110	7,0	1
CD161	05WHNSB-0690-TH	■	6,90	34,50	55	53	110	7,0	1
CD037	05WHNSB-0700-TH	■	7,00	35,00	55	53	110	7,0	1
CD162	05WHNSB-0710-TH	■	7,10	35,50	63	54	119	8,0	1
CD163	05WHNSB-0720-TH	■	7,20	36,00	63	54	119	8,0	1
CD164	05WHNSB-0730-TH	■	7,30	36,50	63	54	119	8,0	1
CD165	05WHNSB-0740-TH	■	7,40	37,00	63	54	119	8,0	1
CD038	05WHNSB-0750-TH	■	7,50	37,50	63	54	119	8,0	1
CD166	05WHNSB-0760-TH	■	7,60	38,00	63	54	119	8,0	1
CD167	05WHNSB-0770-TH	■	7,70	38,50	63	54	119	8,0	1
CD168	05WHNSB-0780-TH	■	7,80	39,00	63	54	119	8,0	1
CD169	05WHNSB-0790-TH	■	7,90	39,50	63	54	119	8,0	1
CD039	05WHNSB-0800-TH	■	8,00	40,00	63	54	119	8,0	1
CD170	05WHNSB-0810-TH	■	8,10	40,50	71	55	128	9,0	1
CD171	05WHNSB-0820-TH	■	8,20	41,00	71	55	128	9,0	1
CD172	05WHNSB-0830-TH	■	8,30	41,50	71	55	128	9,0	1
CD173	05WHNSB-0840-TH	■	8,40	42,00	71	55	128	9,0	1
CD040	05WHNSB-0850-TH	■	8,50	42,50	71	55	128	9,0	1
CD174	05WHNSB-0860-TH	■	8,60	43,00	71	55	128	9,0	1
CD175	05WHNSB-0870-TH	■	8,70	43,50	71	55	128	9,0	1
CD176	05WHNSB-0880-TH	■	8,80	44,00	71	55	128	9,0	1
CD177	05WHNSB-0890-TH	■	8,90	44,50	71	55	128	9,0	1
CD041	05WHNSB-0900-TH	■	9,00	45,00	71	55	128	9,0	1
CD042	05WHNSB-0950-TH	■	9,50	47,50	79	56	137	10,0	1
CD178	05WHNSB-0980-TH	■	9,80	49,00	79	56	137	10,0	1
CD043	05WHNSB-1000-TH	■	10,00	50,00	79	56	137	10,0	1
CD179	05WHNSB-1020-TH	■	10,20	51,00	87	61	150	11,0	1
CD180	05WHNSB-1030-TH	■	10,30	51,50	87	61	150	11,0	1
CD044	05WHNSB-1050-TH	■	10,50	52,50	87	61	150	11,0	1
CD045	05WHNSB-1080-TH	■	10,80	54,00	87	61	150	11,0	1
CD046	05WHNSB-1100-TH	■	11,00	55,00	87	61	150	11,0	1
CD047	05WHNSB-1150-TH	■	11,50	57,50	93	61	156	12,0	1
CD181	05WHNSB-1180-TH	■	11,80	59,00	93	61	156	12,0	1
CD048	05WHNSB-1200-TH	■	12,00	60,00	93	61	156	12,0	1
CD049	05WHNSB-1250-TH	■	12,50	62,50	104	63	169	13,0	1
CD050	05WHNSB-1300-TH	■	13,00	65,00	104	63	169	13,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:	
05WHNSB-TH	5xD	3.0 ~ 13.00	28-29	5xD Large D: 30-31

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>8xD</b>	<b>140°</b> 3D~8D
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**8xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD1008	08WHNSB-0300-TH	■	3,00	24,0	35	47	83	3,0	1
CD1009	08WHNSB-0350-TH	■	3,50	28,0	42	51	94	4,0	1
CD1010	08WHNSB-0380-TH	■	3,80	30,4	46	47	94	4,0	1
CD1011	08WHNSB-0400-TH	■	4,00	32,0	46	47	94	4,0	1
CD1012	08WHNSB-0450-TH	■	4,50	36,0	55	54	110	5,0	1
CD1013	08WHNSB-0480-TH	■	4,80	38,4	59	50	110	5,0	1
CD1014	08WHNSB-0500-TH	■	5,00	40,0	59	50	110	5,0	1
CD1015	08WHNSB-0550-TH	■	5,50	44,0	62	55	118	6,0	1
CD1016	08WHNSB-0580-TH	■	5,80	46,4	67	50	118	6,0	1
CD1017	08WHNSB-0600-TH	■	6,00	48,0	67	50	118	6,0	1
CD1018	08WHNSB-0620-TH	■	6,20	49,6	73	57	132	7,0	1
CD1019	08WHNSB-0650-TH	■	6,50	52,0	73	57	132	7,0	1
CD1020	08WHNSB-0680-TH	■	6,80	54,4	77	53	132	7,0	1
CD1021	08WHNSB-0700-TH	■	7,00	56,0	77	53	132	7,0	1
CD1022	08WHNSB-0750-TH	■	7,50	60,0	84	58	144	8,0	1
CD1023	08WHNSB-0780-TH	■	7,80	62,4	88	54	144	8,0	1
CD1024	08WHNSB-0800-TH	■	8,00	64,0	88	54	144	8,0	1
CD1025	08WHNSB-0850-TH	■	8,50	68,0	94	60	156	9,0	1
CD1026	08WHNSB-0900-TH	■	9,00	72,0	99	55	156	9,0	1
CD1027	08WHNSB-0950-TH	■	9,50	76,0	105	61	168	10,0	1
CD1028	08WHNSB-0980-TH	■	9,80	78,4	110	56	168	10,0	1
CD1029	08WHNSB-1000-TH	■	10,00	80,0	110	56	168	10,0	1
CD1030	08WHNSB-1020-TH	■	10,20	81,6	116	66	184	11,0	1
CD1031	08WHNSB-1030-TH	■	10,30	82,4	116	66	184	11,0	1
CD1032	08WHNSB-1050-TH	■	10,50	84,0	116	66	184	11,0	1
CD1033	08WHNSB-1070-TH	■	10,70	85,6	121	61	184	11,0	1
CD1034	08WHNSB-1080-TH	■	10,80	86,4	121	61	184	11,0	1
CD1035	08WHNSB-1100-TH	■	11,00	88,0	121	61	184	11,0	1
CD1036	08WHNSB-1150-TH	■	11,50	92,0	127	66	195	12,0	1
CD1037	08WHNSB-1160-TH	■	11,60	92,8	132	61	195	12,0	1
CD1038	08WHNSB-1200-TH	■	12,00	96,0	132	61	195	12,0	1
CD1039	08WHNSB-1250-TH	■	12,50	100,0	138	68	208	13,0	1
CD1040	08WHNSB-1300-TH	■	13,00	104,0	143	63	208	13,0	1

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50	<b>10xD</b>	<b>135°</b> 10D~30D
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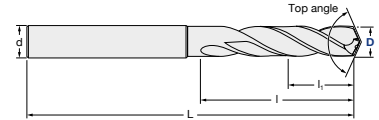

**10xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD051	10WHNSB-0300-TH	■	3,00	30,00	39	45	87	3,0	1
CD182	10WHNSB-0350-TH	■	3,50	35,00	46	47	94	4,0	1
CD052	10WHNSB-0400-TH	■	4,00	40,00	52	48	101	4,0	1
CD183	10WHNSB-0450-TH	■	4,50	45,00	59	50	110	5,0	1
CD053	10WHNSB-0500-TH	■	5,00	50,00	66	50	117	5,0	1
CD184	10WHNSB-0550-TH	■	5,50	55,00	72	50	123	6,0	1
CD054	10WHNSB-0600-TH	■	6,00	60,00	79	50	130	6,0	1
CD185	10WHNSB-0650-TH	■	6,50	65,00	85	52	138	7,00	1
CD055	10WHNSB-0700-TH	■	7,00	70,00	92	52	145	7,00	1
CD186	10WHNSB-0750-TH	■	7,50	75,00	98	54	153	8,00	1
CD056	10WHNSB-0800-TH	■	8,00	80,00	105	54	160	8,00	1
CD187	10WHNSB-0850-TH	■	8,50	85,00	111	54	166	9,00	1
CD057	10WHNSB-0900-TH	■	9,00	90,00	118	54	173	9,00	1

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

<b>Carbide</b> Micro Grain	<b>No. of Teeth</b> 2	<b>TH</b> Nano-PVD Coating	<b>HRC</b> ~50		
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**15xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD058	15WHNSB-0300-TH	■	3,00	45,0	54	45	102	3,0	1
CD188	15WHNSB-0350-TH	■	3,50	52,5	63	47	111	4,0	1
CD059	15WHNSB-0400-TH	■	4,00	60,0	72	48	121	4,0	1
CD189	15WHNSB-0450-TH	■	4,50	67,5	81	50	132	5,0	1
CD060	15WHNSB-0500-TH	■	5,00	75,0	91	50	142	5,0	1
CD190	15WHNSB-0550-TH	■	5,50	82,5	100	50	151	6,0	1
CD061	15WHNSB-0600-TH	■	6,00	90,0	109	50	160	6,0	1
CD191	15WHNSB-0650-TH	■	6,50	97,5	118	52	171	7,0	1
CD062	15WHNSB-0700-TH	■	7,00	105,0	127	52	180	7,0	1
CD192	15WHNSB-0750-TH	■	7,50	112,5	136	54	191	8,0	1
CD063	15WHNSB-0800-TH	■	8,00	120,0	145	54	200	8,0	1
CD193	15WHNSB-0850-TH	■	8,50	127,5	154	54	209	9,0	1
CD064	15WHNSB-0900-TH	■	9,00	135,0	163	54	218	9,0	1
CD194	15WHNSB-1000-TH	■	10,00	150,0	181	54	236	10,0	1


**20xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD065	20WHNSB-0300-TH	■	3,00	60,00	69	43	117	3,0	1
CD195	20WHNSB-0350-TH	■	3,50	70,00	81	47	129	4,0	1
CD066	20WHNSB-0400-TH	■	4,00	80,00	92	48	141	4,0	1
CD196	20WHNSB-0450-TH	■	4,50	90,00	104	50	155	5,0	1
CD067	20WHNSB-0500-TH	■	5,00	100,00	116	50	167	5,0	1
CD197	20WHNSB-0550-TH	■	5,50	110,00	127	50	178	6,0	1
CD068	20WHNSB-0600-TH	■	6,00	120,00	139	50	190	6,0	1
CD198	20WHNSB-0650-TH	■	6,50	130,00	150	52	203	7,0	1
CD069	20WHNSB-0700-TH	■	7,00	140,00	162	52	215	7,0	1
CD199	20WHNSB-0750-TH	■	7,50	150,00	173	54	228	8,0	1
CD070	20WHNSB-0800-TH	■	8,00	160,00	185	54	240	8,0	1
CD200	20WHNSB-0850-TH	■	8,50	170,00	196	54	251	9,0	1
CD071	20WHNSB-0900-TH	■	9,00	180,00	208	54	263	10,0	1


**30xD**

Tolerance Information on Page 39

ID Code	Item Code	Stock	Diameter D	Using length l <sub>i</sub>	Flute length l	Shank length l <sub>s</sub>	Total length L	Shank Dia. d	Minimum Order Quantity
CD072	30WHNSB-0300-TH	■	3,00	90,0	99	42	147	3,0	1
CD201	30WHNSB-0350-TH	■	3,50	105,0	116	47	164	4,0	1
CD073	30WHNSB-0400-TH	■	4,00	120,0	132	48	181	4,0	1
CD202	30WHNSB-0450-TH	■	4,50	135,0	149	50	200	5,0	1
CD074	30WHNSB-0500-TH	■	5,00	150,0	166	50	217	5,0	1
CD203	30WHNSB-0550-TH	■	5,50	165,0	182	50	233	6,0	1
CD075	30WHNSB-0600-TH	■	6,00	180,0	199	50	250	6,0	1

Item	Drilling Depth	Diameter D	Cutting Conditions on page:
08WHNSB-TH	8xD	3.0 ~ 13.0	28-29
10WHNSB-TH	10xD	3.0 ~ 9.0	32-33
15WHNSB-TH	15xD	3.0 ~ 10.0	32-33
20WHNSB-TH	20xD	3.0 ~ 9.0	32-33
30WHNSB-TH	30xD	3.0 ~ 6.0	32-33

**WHNSB-TH** | Cutting Conditions for NSB 3D | 5D | 8D

Cutting Conditions for NSB 3D ~ 8D				Tool Diameter					
Work material	Coolant	Cutting Speed V <sub>c</sub> (m/min)		2	2.25	2.5	2.75	3	
<b>Structural steel ~180HB ST37 - ST52</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.12)	0.09 (0.07~0.14)	0.10 (0.08~0.15)	0.11 (0.08~0.17)	0.12 (0.09~0.18)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.12)	0.09 (0.07~0.14)	0.10 (0.08~0.15)	0.11 (0.08~0.17)	0.12 (0.09~0.18)	
<b>Carbon steel ~220HB 1.1730, 1.1191</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.12)	0.09 (0.07~0.14)	0.10 (0.08~0.15)	0.11 (0.08~0.17)	0.12 (0.09~0.18)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~ 0.12)	0.09 (0.07~0.14)	0.10 (0.08~0.15)	0.11 (0.08~0.17)	0.12 (0.09~0.18)	
<b>Alloy steel ~30HRC 1.3505, 1.7131, 1.7225</b>	Water or Oil	80(60~140)	n (min <sup>-1</sup> )	12.740	11.320	10.200	9.260	8.500	
			f (mm/rev)	0.07 (0.05~0.10)	0.08 (0.06~0.113)	0.09 (0.06~0.125)	0.10 (0.07~0.138)	0.11 (0.08~0.15)	
	Mist oil	80(60~120)	n (min <sup>-1</sup> )	12.740	11.320	10.200	9.260	8.500	
			f (mm/rev)	0.07 (0.05~0.10)	0.08 (0.06~0.113)	0.09 (0.06~0.125)	0.10 (0.07~0.138)	0.11 (0.08~0.15)	
<b>Stainless steel 1.4301, 1.4401, 1.4542</b>	Water or Oil	70(50~100)	n (min <sup>-1</sup> )	11.140	9.900	8.910	8.100	7.420	
			f (mm/rev)	0.05 (0.04~0.07)	0.06 (0.05~0.08)	0.06 (0.05~0.09)	0.07 (0.06~0.10)	0.08 (0.06~0.11)	
<b>Titanium alloy</b>	Water or Oil	60(50~100)	n (min <sup>-1</sup> )	9.540	8.480	7.630	6.940	6.360	
			f (mm/rev)	0.04 (0.03~0.06)	0.045 (0.035~0.068)	0.05 (0.038~0.075)	0.055 (0.041~0.083)	0.06 (0.045~0.09)	
<b>Prehardened steel &lt; ~40HRC 1.2343, 1.2344</b>	Water or Oil	70(50~100)	n (min <sup>-1</sup> )	11.140	9.900	8.910	8.100	7.420	
			f (mm/rev)	0.05 (0.04~0.06)	0.06 (0.05~0.068)	0.06 (0.05~0.075)	0.07 (0.06~0.083)	0.08 (0.06~0.09)	
	Mist oil	60(50~100)	n (min <sup>-1</sup> )	9.540	8.480	7.630	6.940	6.360	
			f (mm/rev)	0.05 (0.04~0.06)	0.06 (0.05~0.068)	0.06 (0.05~0.075)	0.07 (0.06~0.083)	0.08 (0.06~0.09)	
<b>Hardened Steel ~ 50HRC 1.2343, 1.2344, 1.2367</b>	Water or Oil	30(20~40)	n (min <sup>-1</sup> )	4770	4240	3820	3470	3180	
			f (mm/rev)	0.03 (0.02~0.04)	0.034 (0.023~0.045)	0.038 (0.025~0.05)	0.041 (0.028~0.055)	0.045 (0.03~0.06)	
	Mist oil	20(10~30)	n (min <sup>-1</sup> )	3180	2820	2540	2310	2120	
			f (mm/rev)	0.03 (0.02~0.04)	0.034 (0.023~0.045)	0.038 (0.025~0.05)	0.041 (0.028~0.055)	0.045 (0.03~0.06)	
<b>Ductile iron EN-JS1072, EN-JS1102 GGG-40, GGG-70</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)	0.12 (0.09~0.21)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)	0.12 (0.09~0.21)	
<b>Cast iron EN-JL1040, EN-JL1060 (GG-25, GG-35)</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)	0.12 (0.09~0.21)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	14.320	12.730	11.460	10.420	9.550	
			f (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)	0.12 (0.09~0.21)	
<b>Inconel 718, Heatproof steel 2.4668</b>	Water or Oil	20(15 ~ 30)	n (min <sup>-1</sup> )	3.180,00	2.820,00	2.540,00	2.320,00	2.120,00	
			f (mm/rev)	0.03 (0.02~0.04)	0.034 (0.023~0.045)	0.038 (0.025~0.05)	0.041 (0.028~0.055)	0.045 (0.03~0.06)	

3 - 5 - 8 x D





## WHNSB-TH | Cutting Conditions for NSB 3D | 5D | 8D

	Tool Diameter									
	4	5	6	7	8	9	10	11	12	13
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.26	0.28	0.30	0.30	0.30	0.30	0.30
	(0.12~0.24)	(0.15~0.3)	(0.18~0.36)	(0.19~0.40)	(0.20~0.44)	(0.23~0.47)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.26	0.28	0.30	0.30	0.30	0.30	0.33
	(0.12~0.24)	(0.15~0.3)	(0.18~0.36)	(0.19~0.40)	(0.20~0.44)	(0.23~0.47)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)	(0.27~0.5)
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.26	0.28	0.30	0.30	0.30	0.30	0.30
	(0.12~0.24)	(0.15~0.3)	(0.18~0.36)	(0.19~0.40)	(0.20~0.44)	(0.23~0.47)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.26	0.28	0.30	0.30	0.30	0.30	0.30
	(0.12~0.24)	(0.15~0.3)	(0.18~0.36)	(0.19~0.40)	(0.20~0.44)	(0.23~0.47)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	6.370	5.100	4.250	3.640	3.200	2.830	2.550	2.320	2.130	1.960
	0.14	0.18	0.21	0.22	0.24	0.25	0.25	0.25	0.25	0.25
	(0.1~0.20)	(0.13~0.25)	(0.15~0.30)	(0.15~0.329)	(0.16~0.36)	(0.18~0.378)	(0.20~0.40)	(0.20~0.40)	(0.20~0.40)	(0.20~0.40)
	6.370	5.100	4.250	3.640	3.200	2.830	2.550	2.320	2.130	1.960
	0.14	0.18	0.21	0.22	0.24	0.25	0.25	0.25	0.25	0.25
	(0.1~0.20)	(0.13~0.25)	(0.15~0.30)	(0.15~0.329)	(0.16~0.36)	(0.18~0.378)	(0.20~0.40)	(0.20~0.40)	(0.20~0.40)	(0.20~0.40)
	5.570	4.450	3.710	3.180	2.780	2.470	2.220	2.020	1.850	1.710
	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.22	0.24	0.26
	(0.08~0.14)	(0.10~0.18)	(0.12~0.21)	(0.14~0.25)	(0.16~0.28)	(0.18~0.32)	(0.20~0.35)	(0.19~0.36)	(0.21~0.39)	(0.23~0.42)
	4.770	3.810	3.180	2.720	2.380	2.120	1.900	1.730	1.590	1.460
	0.08	0.1	0.12	0.14	0.16	0.18	0.20	0.2	0.21	0.23
	(0.06~0.12)	(0.075~0.15)	(0.09~0.18)	(0.11~0.21)	(0.12~0.24)	(0.14~0.27)	(0.15~0.30)	(0.15~0.30)	(0.15~0.33)	(0.16~0.36)
	5.570	4.450	3.710	3.180	2.780	2.470	2.220	2.020	1.850	1.710
	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.22	0.24	0.26
	(0.08~0.12)	(0.10~0.15)	(0.12~0.18)	(0.14~0.21)	(0.16~0.24)	(0.18~0.27)	(0.20~0.30)	(0.19~0.30)	(0.21~0.33)	(0.23~0.36)
	4.770	3.810	3.180	2.720	2.380	2.120	1.900	1.730	1.590	1.460
	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.22	0.24	0.26
	(0.08~0.12)	(0.10~0.15)	(0.12~0.18)	(0.14~0.21)	(0.16~0.24)	(0.18~0.27)	(0.20~0.30)	(0.19~0.30)	(0.21~0.33)	(0.23~0.36)
	2380	1910	1590	1360	1190	1060	950	860	790	730
	0.06	0.075	0.09	0.105	0.12	0.135	0.15	0.15	0.15	0.163
	(0.04~0.08)	(0.05~0.10)	(0.06~0.12)	(0.07~0.14)	(0.08~0.16)	(0.09~0.18)	(0.10~0.20)	(0.10~0.20)	(0.10~0.20)	(0.13~0.23)
	1590	1270	1060	900	790	700	630	580	530	490
	0.06	0.075	0.09	0.105	0.12	0.135	0.15	0.15	0.15	0.163
	(0.04~0.08)	(0.05~0.10)	(0.06~0.12)	(0.07~0.14)	(0.08~0.16)	(0.09~0.18)	(0.10~0.20)	(0.10~0.20)	(0.10~0.20)	(0.13~0.23)
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.28	0.32	0.36	0.40 (0.3~0.7)	0.40	0.42	0.46
	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)		(0.33~0.66)	(0.36~0.72)	(0.39~0.78)
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.28	0.32	0.36	0.40 (0.3~0.7)	0.40	0.42	0.46
	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)		(0.33~0.66)	(0.36~0.72)	(0.39~0.78)
	7.160	5.730	4.770	4.100	3.580	3.180	2.860	2.600	2.380	2.200
	0.16	0.20	0.24	0.28	0.32	0.36	0.40 (0.3~0.7)	0.40	0.42	0.46
	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)		(0.33~0.66)	(0.36~0.72)	(0.39~0.78)
	1.590,00	1.270,00	1.060,00	900,00	790,00	700,00	630,00	570,00	530,00	490,00
	0.06	0.075	0.09	0.105	0.12	0.12	0.125	0.138	0.15	0.163
	(0.04~0.08)	(0.05~0.10)	(0.06~0.12)	(0.07~0.14)	(0.08~0.16)	(0.08~0.16)	(0.075~0.175)	(0.083~0.193)	(0.09~0.21)	(0.098~0.23)

**WHNSB-TH | Cutting Conditions for NSB 5 D (Large Diameter Cutting Condition)**

<b>5D (Large Diameter Cutting Condition)</b>				<b>Tool Diameter</b>				
<b>Work material</b>	<b>Coolant</b>	<b>Cutting Speed V<sub>c</sub> (m/min)</b>		<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	
<b>Structural steel ~180HB ST37 - ST52</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	
<b>Carbon steel ~220HB 1.1730, 1.1191</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	0.30 (0.25~0.50)	
<b>Alloy steel ~30HRC 1.3505, 1.7131, 1.7225</b>	Water or Oil	80(60~140)	n (min <sup>-1</sup> )	1.820	1.700	1.590	1.500	
			f (mm/rev)	0.25 (0.20~0.40)	0.25 (0.20~0.40)	0.25 (0.20~0.40)	0.25 (0.20~0.40)	
	Mist oil	80(60~120)	n (min <sup>-1</sup> )	1.820	1.700	1.590	1.500	
			f (mm/rev)	0.25 (0.20~0.40)	0.25 (0.20~0.40)	0.25 (0.20~0.40)	0.25 (0.20~0.40)	
<b>Stainless steel 1.4301, 1.4401, 1.4542</b>	Water or Oil	70(50~100)	n (min <sup>-1</sup> )	1.590	1.490	1.390	1.310	
			f (mm/rev)	0.26 (0.23~0.42)	0.26 (0.23~0.42)	0.26 (0.23~0.42)	0.26 (0.23~0.42)	
<b>Titanium alloy</b>	Water or Oil	60(50~100)	n (min <sup>-1</sup> )	1.360	1.270	1.190	1.120	
			f (mm/rev)	0.23 (0.16~0.36)	0.23 (0.16~0.36)	0.23 (0.16~0.36)	0.23 (0.16~0.36)	
<b>Prehardened steel &lt; ~40HRC 1.2343, 1.2344</b>	Water or Oil	70(50~100)	n (min <sup>-1</sup> )	1.590	1.490	1.390	1.310	
			f (mm/rev)	0.26 (0.23~0.36)	0.26 (0.23~0.36)	0.26 (0.23~0.36)	0.26 (0.23~0.36)	
	Mist oil	60(50~100)	n (min <sup>-1</sup> )	1.360	1.270	1.190	1.120	
			f (mm/rev)	0.26 (0.23~0.36)	0.26 (0.23~0.36)	0.26 (0.23~0.36)	0.26 (0.23~0.36)	
<b>Hardened Steel ~ 50HRC 1.2343, 1.2344, 1.2367</b>	Water or Oil	30(20~40)	n (min <sup>-1</sup> )	680	640	600	560	
			f (mm/rev)	0.163 (0.13~0.23)	0.163 (0.13~0.23)	0.163 (0.13~0.23)	0.163 (0.13~0.23)	
	Mist oil	20(10~30)	n (min <sup>-1</sup> )	460	420	400	370	
			f (mm/rev)	0.163 (0.13~0.23)	0.163 (0.13~0.23)	0.163 (0.13~0.23)	0.163 (0.13~0.23)	
<b>Ductile iron EN-JS1072, EN-JS1102 GGG-40, GGG-70</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	
<b>Cast iron EN-JL1040, EN-JL1060 (GG-25, GG-35)</b>	Water or Oil	90(70~150)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	
	Mist oil	90(70~130)	n (min <sup>-1</sup> )	2.040	1.910	1.790	1.690	
			f (mm/rev)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	0.46 (0.39~0.78)	
<b>Inconel 718, Heatproof steel 2.4668</b>	Water or Oil	20(15 ~ 30)	n (min <sup>-1</sup> )	460	420	400	370	
			f (mm/rev)	0.163 (0.098~0.23)	0.163 (0.098~0.23)	0.163 (0.098~0.23)	0.163 (0.098~0.23)	

Large Diameter 5 x D

## WHNSB-TH | Cutting Conditions for NSB 5 D (Large Diameter Cutting Condition)

	Tool Diameter		
	18	19	19.55
	1.590	1.510	1.470
	0.30	0.30	0.30
	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	1.590	1.510	1.470
	0.30	0.30	0.30
	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	1.590	1.510	1.470
	0.30	0.30	0.30
	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	1.590	1.510	1.470
	0.30	0.30	0.30
	(0.25~0.50)	(0.25~0.50)	(0.25~0.50)
	1.410	1.340	1.300
	0.25	0.25	0.25
	(0.20~0.40)	(0.20~0.40)	(0.20~0.40)
	1.410	1.340	1.300
	0.25	0.25	0.25
	(0.20~0.40)	(0.20~0.40)	(0.20~0.40)
	1.240	1.170	1.140
	0.26	0.26	0.26
	(0.23~0.42)	(0.23~0.42)	(0.23~0.42)
	1.060	1.010	980
	0.23	0.23	0.23
	(0.16~0.36)	(0.16~0.36)	(0.16~0.36)
	1.240	1.170	1.140
	0.26	0.26	0.26
	(0.23~0.36)	(0.23~0.36)	(0.23~0.36)
	1.060	1.010	980
	0.26	0.26	0.26
	(0.23~0.36)	(0.23~0.36)	(0.23~0.36)
	530	500	490
	0.163	0.163	0.163
	(0.13~0.23)	(0.13~0.23)	(0.13~0.23)
	350	340	330
	0.163	0.163	0.163
	(0.13~0.23)	(0.13~0.23)	(0.13~0.23)
	1.590	1.510	1.470
	0.46	0.46	0.46
	(0.39~0.78)	(0.39~0.78)	(0.39~0.78)
	1.590	1.510	1.470
	0.46	0.46	0.46
	(0.39~0.78)	(0.39~0.78)	(0.39~0.78)
	1.590	1.510	1.470
	0.46	0.46	0.46
	(0.39~0.78)	(0.39~0.78)	(0.39~0.78)
	1.590	1.510	1.470
	0.46	0.46	0.46
	(0.39~0.78)	(0.39~0.78)	(0.39~0.78)
	350	340	330
	0.163	0.163	0.163
	(0.098~0.23)	(0.098~0.23)	(0.098~0.23)

**WHNSB-TH** | Cutting Conditions for NSB 10D | 15D | 20D | 25D | 30D

Cutting Conditions for NSB 10D ~ 30D				Tool Diameter			
Work material	Coolant	Cutting Speed $V_c$ (m/min)		2	2.25	2.5	2.75
<b>Structural steel ~180HB ST37 - ST52</b>	Water or Oil	90(70~120)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.10)	0.09 (0.07~0.113)	0.10 (0.08~0.125)	0.11 (0.08~0.138)
	Mist oil	90(70~120)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.10)	0.09 (0.07~0.113)	0.10 (0.08~0.125)	0.11 (0.08~0.138)
<b>Carbon steel ~220HB 1.1730, 1.1191</b>	Water or Oil	90(70~120)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.12)	0.09 (0.07~0.14)	0.10 (0.08~0.15)	0.11 (0.08~0.17)
	Mist oil	90(70~120)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.12)	0.09 (0.07~0.14)	0.10 (0.08~0.15)	0.11 (0.08~0.17)
<b>Alloy steel ~30HRC 1.3505, 1.7131, 1.7225</b>	Water or Oil	80(60~100)	$n$ (min <sup>-1</sup> )	12.740	11.320	10.200	9.260
			$f$ (mm/rev)	0.07 (0.05~0.12)	0.08 (0.06~0.14)	0.09 (0.06~0.15)	0.10 (0.07~0.17)
	Mist oil	80(60~100)	$n$ (min <sup>-1</sup> )	12.740	11.320	10.200	9.260
			$f$ (mm/rev)	0.07 (0.05~0.12)	0.08 (0.06~0.14)	0.09 (0.06~0.15)	0.10 (0.07~0.17)
<b>Stainless steel 1.4301, 1.4401, 1.4542</b>	Water or Oil	60(30~100)	$n$ (min <sup>-1</sup> )	9.540	8.480	7.630	6.940
			$f$ (mm/rev)	0.05 (0.04~0.07)	0.06 (0.05~0.08)	0.06 (0.05~0.09)	0.07 (0.06~0.10)
<b>Prehardened steel &lt; -40HRC 1.2343, 1.2344</b>	Water or Oil	40(30~70)	$n$ (min <sup>-1</sup> )	6.360	5.950	5.090	4.630
			$f$ (mm/rev)	0.04 (0.03~0.05)	0.045 (0.038~0.056)	0.05 (0.038~0.063)	0.055 (0.041~0.069)
	Mist oil	30(20~60)	$n$ (min <sup>-1</sup> )	4.770	4.240	3.820	3.470
			$f$ (mm/rev)	0.04 (0.03~0.05)	0.045 (0.038~0.056)	0.05 (0.038~0.063)	0.055 (0.041~0.069)
<b>Hardened Steel ~ 50HRC 1.2343, 1.2344, 1.2367</b>	Water or Oil	15(10~25)	$n$ (min <sup>-1</sup> )	2380	2120	1910	1740
			$f$ (mm/rev)	0.02 (0.015~0.025)	0.023 (0.017~0.028)	0.025 (0.019~0.031)	0.028 (0.021~0.034)
<b>Ductile iron EN-JS1072, EN-JS1102 GGG-40, GGG-70</b>	Water or Oil	90(70~120)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)
	Mist oil	90(70~110)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)
<b>Cast iron EN-JL1040, EN-JL1060 (GG-25, GG-35)</b>	Water or Oil	90(70~120)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)
	Mist oil	90(70~110)	$n$ (min <sup>-1</sup> )	14.320	12.730	11.460	10.420
			$f$ (mm/rev)	0.08 (0.06~0.14)	0.09 (0.068~0.16)	0.10 (0.075~0.175)	0.11 (0.083~0.193)

 \* In case of over 50HRC work material, we would like to recommend step process by each 1xD.

 \* Für Materialhärten über 50HRC empfehlen wir den Stufenprozess für jede Erhöhung um 1xD.


 \* Nel caso il materiale da lavorare superi i 50HRC, raccomandiamo una foratura con step di 1xD.




## WHNSB-TH | Cutting Conditions for NSB 10D | 15D | 20D | 25D | 30D

	Tool Diameter							
	3	4	5	6	7	8	9	10
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.26	0.28	0.30	0.30
	(0.09~0.15)	(0.12~0.20)	(0.15~0.25)	(0.18~0.30)	(0.19~0.329)	(0.20~0.36)	(0.23~0.378)	(0.25~0.40)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.26	0.28	0.30	0.30
	(0.09~0.15)	(0.12~0.20)	(0.15~0.25)	(0.18~0.30)	(0.19~0.329)	(0.20~0.36)	(0.23~0.378)	(0.25~0.40)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.26	0.28	0.30	0.30
	(0.09~0.18)	(0.12~0.24)	(0.15~0.3)	(0.18~0.36)	(0.19~0.40)	(0.20~0.44)	(0.23~0.47)	(0.25~0.50)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.26	0.28	0.30	0.30
	(0.09~0.18)	(0.12~0.24)	(0.15~0.3)	(0.18~0.36)	(0.19~0.40)	(0.20~0.44)	(0.23~0.47)	(0.25~0.50)
	8.500	6.370	5.100	4.250	3.640	3.200	2.830	2.550
	0.11	0.14	0.18	0.21	0.22	0.24	0.25	0.25
	(0.08~0.18)	(0.1~0.24)	(0.13~0.30)	(0.15~0.36)	(0.15~0.40)	(0.16~0.44)	(0.18~0.47)	(0.20~0.50)
	8.500	6.370	5.100	4.250	3.640	3.200	2.830	2.550
	0.11	0.14	0.18	0.21	0.22	0.24	0.25	0.25
	(0.08~0.18)	(0.1~0.24)	(0.13~0.30)	(0.15~0.36)	(0.15~0.40)	(0.16~0.44)	(0.18~0.47)	(0.20~0.50)
	6.360	4.770	3.820	3.180	2.720	2.380	2.120	1.920
	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25
	(0.06~0.11)	(0.08~0.14)	(0.10~0.18)	(0.12~0.21)	(0.14~0.25)	(0.16~0.28)	(0.18~0.32)	(0.20~0.35)
	4.240	3.180	2.540	2.120	1.810	1.590	1.410	1.270
	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	(0.045~0.075)	(0.06~0.10)	(0.075~0.125)	(0.09~0.15)	(0.105~0.175)	(0.12~0.20)	(0.135~0.225)	(0.15~0.25)
	3.180	2.380	1.910	1.590	1.360	1.190	1.060	950
	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	(0.045~0.075)	(0.06~0.10)	(0.075~0.125)	(0.09~0.15)	(0.105~0.175)	(0.12~0.20)	(0.135~0.225)	(0.15~0.25)
	1590	1190	950	800	680	600	530	480
	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
	(0.023~0.038)	(0.03~0.05)	(0.038~0.063)	(0.045~0.075)	(0.053~0.088)	(0.06~0.01)	(0.068~0.113)	(0.075~0.125)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
	(0.09~0.21)	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)	(0.3~0.7)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
	(0.09~0.21)	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)	(0.3~0.7)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
	(0.09~0.21)	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)	(0.3~0.7)
	9.550	7.160	5.730	4.770	4.100	3.580	3.180	2.860
	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
	(0.09~0.21)	(0.12~0.28)	(0.15~0.35)	(0.18~0.42)	(0.21~0.49)	(0.24~0.56)	(0.27~0.63)	(0.3~0.7)

 \* En el caso de materiales de más de 50HRC, recomendamos taladrar en pasos de 1xD (picoteo)

 \* En cas de matières au-delà de 50HRC, nous recommandons des arrêts tous les 1xD.

 \* No caso de aço temperado superior a 50 HRC, nós recomendamos o processo com passos de 1 X D

## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### Trouble Shooting

#### Broken drill

Cause (Remedy)		Remedy
<ul style="list-style-type: none"> <li>• Cutting condition not suitable</li> <li>• Regrinding failure</li> <li>• Machine rigidity short</li> <li>• Chips clogging</li> <li>• Work setting failure</li> <li>• Tool setting failure</li> </ul>	(a, b, c) (d) (e, f) (a, b, c) (g) (h, i, j)	a) Reduce cutting force. b) Reduce cutting speed. c) Perform step feed. d) Perform thinning or regrind the lip height properly. e) Use a highly rigid spindle. f) Adjust backlash in the machine. g) Firmly clamp the work. h) Adjust the peripheral run-out of a drill after setting it to the machine. i) Steady the drill retainer. j) Use a guide bush.

#### Cracked cutting edge or chisel

<ul style="list-style-type: none"> <li>• Cutting condition not suitable</li> <li>• Regrinding failure</li> <li>• Backlashing the machine</li> <li>• Work setting failure</li> <li>• Tool setting failure</li> <li>• Use of a drill not suitable</li> </ul>	(a, b) (c) (d) (e) (f, g, h) (i)	a) Reduce feed rate. b) Reduce feed at the time of biting. c) Properly regrind biased thinning or lip height. d) Adjust run-out of spindle or backlash the machine. e) Firmly clamp the work. f) Adjust the peripheral run-out of a drill after setting it to the machine. g) Steady the drill retainer. h) Use a guide bush. i) Reduce a groove length of the drill to increase rigidity.
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#### Drill abrasion

<ul style="list-style-type: none"> <li>• Cutting condition not suitable</li> <li>• Cutting fluid level low</li> <li>• Cutting fluid not suitable</li> <li>• Chips discharge failure</li> <li>• Work material hardness uneven</li> <li>• Drill not suitable</li> </ul>	(a, b) (c) (d, e) (a, b, f) (g) (h)	a) Lower the cutting speed. b) Perform step feed. c) Increase cutting fluid discharge rate. d) Use extreme-pressure additives. e) Correct the oiling direction. f) Regrind and obtain a proper thinning and relieving angle. g) Select work material of even hardness. h) Change the drill material (to the one with higher abrasion & heat resistance).
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#### Hole accuracy (hole enlargement, bend or failing)

<ul style="list-style-type: none"> <li>• Backlash in the machine or spindle runout (a)</li> <li>• Excessive feed</li> <li>• Biting failure</li> <li>• Drill run-out</li> <li>• Tooth edge accuracy failure</li> <li>• Insufficient drill rigidity</li> </ul>	(b) (f, g) (d, e) (f, g) (h)	a) Adjust the machine and increase rigidity of the machine. b) Adjust the feed. c) Preprocess with a starting drill. d) Use a guide bush. e) Correct drill setting. f) Regrind to get proper lip height and chisel centering. g) Perform thinning properly. h) Use a short and rigid drill.
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#### Breakage in the shank

<ul style="list-style-type: none"> <li>• A flaw on the taper of a taper shank</li> <li>• Abrasion or flaw in the sleeve</li> </ul>	(a) (b)	a) Eliminate the flaw on the taper. b) Regrind the sleeve or replace it.
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#### Insufficient surface roughness of drilled hole

<ul style="list-style-type: none"> <li>• Excessive feed</li> <li>• Cutting fluid level low or improper</li> <li>• Work loading failure</li> </ul>	(a) (b) (c)	a) Adjust the feed. b) Change oil feeding direction, method or type of cutting fluid. c) Retighten the work clamp.
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## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### Problembehebung

#### Bruch des Bohrers

Ursache (Abhilfe)	Abhilfe
<ul style="list-style-type: none"> <li>Schnittbedingung ungeeignet (a, b, c)</li> <li>Fehler beim Nachschleifen (d)</li> <li>Geringe Maschinestabilität (e, f)</li> <li>Spänestau (a, b, c)</li> <li>Falsch eingerichtetes Werkstück (g)</li> <li>Falsch eingerichtetes Werkzeug (h, i, j)</li> </ul>	<ul style="list-style-type: none"> <li>a) Schnittkräfte reduzieren.</li> <li>b) Schnittgeschwindigkeit reduzieren.</li> <li>c) Mit stufenweisem Vorschub arbeiten.</li> <li>d) Ausdünnung oder sorgfältiges Nachschleifen.</li> <li>e) Verwendung einer stabilen Maschine</li> <li>f) Nachlauf der Maschine reduzieren.</li> <li>g) Werkstück sorgfältig spannen.</li> <li>h) Den Rundlauf des Bohrers nach Einsatz in die Maschine justieren.</li> <li>i) Bohrer Aufnahme mit Lünette stabilisieren.</li> <li>j) Verwendung einer Führungsbuchse.</li> </ul>

#### Ausbrüche an Schneidkante oder Spitze

<ul style="list-style-type: none"> <li>Schnittbedingung ungeeignet (a, b)</li> <li>Fehler beim Nachschleifen (c)</li> <li>Nachlauf der Maschine (d)</li> <li>Falsch eingerichtetes Werkstück (e)</li> <li>Falsch eingerichtetes Werkzeug (f, g, h)</li> <li>Verwendung eines unpassenden Bohrers (i)</li> </ul>	<ul style="list-style-type: none"> <li>a) Vorschubrate reduzieren.</li> <li>b) Vorschub beim Einfahren reduzieren.</li> <li>c) Ausdünnung oder sorgfältiges Nachschleifen</li> <li>d) Nachjustieren von Spindelrundlaufgenauigkeit oder Maschinennachlauf.</li> <li>e) Werkstück sorgfältig spannen.</li> <li>f) Den Rundlauf des Bohrers nach Einsatz in die Maschine justieren.</li> <li>g) Bohrer Aufnahme mit Lünette stabilisieren.</li> <li>h) Verwendung einer Führungsbuchse.</li> <li>i) Nutenlänge des Bohrers reduzieren, um die Stabilität zu erhöhen.</li> </ul>
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#### Bohrerverschleiß

<ul style="list-style-type: none"> <li>Schnittbedingung ungeeignet (a, b)</li> <li>Zu niedriger Kühlschmiermittel-Pegel (c)</li> <li>Kuschmiermittel ungeeignet (d, e)</li> <li>Fehlerhafte Spanabfuhr (a, b, f)</li> <li>Ungleichmäßige Werkstückhärte (g)</li> </ul>	<ul style="list-style-type: none"> <li>a) Schnittgeschwindigkeit reduzieren.</li> <li>b) Mit stufenweisem Vorschub arbeiten.</li> <li>c) Erhöhen des Drucks der IKZ.</li> <li>d) Verwendung von Hochdruck-Additiven.</li> <li>e) Korrektur der Ölzufuhrichtung.</li> <li>f) Den Rundlauf des Bohrers nach Einsatz in die Maschine justieren.</li> <li>g) Bohrer Aufnahme mit Lünette stabilisieren</li> <li>h) Auswahl eines Werkstoffs mit gleichmäßiger Härte.</li> </ul>
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#### Bohrungsgenauigkeit (Bohrung ausgeweitet, gekrümmt oder fehlerhaft)

<ul style="list-style-type: none"> <li>Nachlauf der Maschine oder Spindelrundlaufgenauigkeit (a)</li> <li>Überhöhter Vorschub (b)</li> <li>Einstechfehler (f, g)</li> <li>Seitenschlag des Bohrers (d, e)</li> <li>Fehler an den Schneidkanten (f, g)</li> <li>Unzureichende Bohrerstabilität (h)</li> </ul>	<ul style="list-style-type: none"> <li>a) Justieren der Maschine und Erhöhung der Stabilität.</li> <li>b) Vorschub justieren.</li> <li>c) Vorbearbeitung mit einem Startlochbohrer.</li> <li>d) Verwendung einer Führungsbuchse.</li> <li>e) Korrektur der Bohreinstellung.</li> <li>f) Sorgfältiges Nachschleifen der Schneidkantenhöhe und Spitzenkegel-Zentrierung.</li> <li>g) Sorgfältiges Nachschleifen der Ausdünnung.</li> <li>h) Verwendung eines kurzen und stabilen Bohrers.</li> </ul>
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#### Bruch des Werkzeugschafts

<ul style="list-style-type: none"> <li>Beschädigung am Kegel der Werkzeugaufnahme (a)</li> <li>Abnutzung oder Beschädigung der Spannhülse (b)</li> </ul>	<ul style="list-style-type: none"> <li>a) Behebung des Fehlers am Werkzeugkegel.</li> <li>b) Spannhülse nachschleifen oder ersetzen.</li> </ul>
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#### Unzureichende Oberflächenrautiefe der Bohrung

<ul style="list-style-type: none"> <li>Überhöhter Vorschub (a)</li> <li>Zu niedriger oder unpassender Kühlschmiermittel-Pegel (b)</li> <li>Fehler beim Nachführen des Werkstücks (c)</li> </ul>	<ul style="list-style-type: none"> <li>a) Vorschub justieren.</li> <li>b) Korrektur der Ölzufuhrichtung, -Methode oder Kühlschmiermittelsorte.</li> <li>c) Werkstückklemmung nachspannen.</li> </ul>
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## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### Risoluzione dei problemi

#### Punta rotta

Possibili cause (rimedi)	Rimedi
<ul style="list-style-type: none"> <li>Parametri di taglio non appropriati (a, b, c)</li> <li>Riaffilatura difettosa (d)</li> <li>Scarsa rigidità della macchina (e, f)</li> <li>Trucioli intasati (a, b, c)</li> <li>Bloccaggio pezzo non adeguato (g)</li> <li>Bloccaggio utensile non adeguato (h, i, j)</li> </ul>	<ul style="list-style-type: none"> <li>a) Ridurre la forza di taglio.</li> <li>b) Ridurre la velocità di taglio.</li> <li>c) Passare a foratura con step.</li> <li>d) Eseguire un assottigliamento del vertice punta o riaffilare l'altezza del filo tagliente in modo opportuno.</li> <li>e) Usare un mandrino più rigido.</li> <li>f) Ridurre i giochi della macchina.</li> <li>g) Bloccare saldamente il pezzo.</li> <li>h) Regolare l'eccentricità dell'utensile in mandrino dopo averlo montato in macchina.</li> <li>i) Assicurarsi che la punta sia correttamente serrata nel portautensile.</li> <li>j) Utilizzare una boccola di guida.</li> </ul>

#### Scheggiatura tagliente o vertice

<ul style="list-style-type: none"> <li>Parametri di taglio non appropriati (a, b)</li> <li>Riaffilatura difettosa (c)</li> <li>Giochi nella macchina (d)</li> <li>Bloccaggio pezzo non adeguato (e)</li> <li>Bloccaggio utensile non adeguato (f, g, h)</li> <li>Utilizzo della punta non adatta (i)</li> </ul>	<ul style="list-style-type: none"> <li>a) Ridurre la velocità d'avanzamento.</li> <li>b) Ridurre l'avanzamento durante il contatto con il pezzo.</li> <li>c) Riaffilare in modo opportuno lo sbilanciamento del assottigliamento o il filo tagliente.</li> <li>d) Regolare l'eccentricità del mandrino o ridurre i giochi della macchina.</li> <li>e) Bloccare adeguatamente il pezzo.</li> <li>f) Regolare l'eccentricità dell'utensile in mandrino dopo averlo montato in macchina.</li> <li>g) Assicurarsi che la punta sia correttamente serrata nel portautensile</li> <li>h) Utilizzare una boccola di guida.</li> <li>i) Accorciare, se possibile, la sporgenza della punta dal portautensile per aumentarne la rigidità.</li> </ul>
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#### Abrasioni sulla punta

<ul style="list-style-type: none"> <li>Parametri di taglio non appropriati (a, b)</li> <li>Mancanza refrigerante sufficiente (c)</li> <li>Tipologia di refrigerante non appropriato (d, e)</li> <li>Problema nello scarico dei trucioli (a, b, f)</li> <li>Durezza del materiale da lavorare irregolare (g)</li> <li>Tipologia della punta non adatta (h)</li> </ul>	<ul style="list-style-type: none"> <li>a) Abbassare la velocità di taglio.(rpm)</li> <li>b) Passare a foratura con step.</li> <li>c) Aumentare la quantità di refrigerante.</li> <li>d) Usare pompa ad altra pressione.</li> <li>e) Correggere la percentuale di olio.</li> <li>f) Riaffilare per ottenere degli angoli al vertice o dello scarico adeguati.</li> <li>g) Modificare il materiale o la durezza.</li> <li>h) Cambiare la tipologia della punta (selezionare rivestimento e substrato con specifiche di resistenza ad usura e calore superiori).</li> </ul>
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#### Precisione del foro (allargamento del diametro, deviazione o problematiche varie)

<ul style="list-style-type: none"> <li>Giochi nella macchina o eccentricità del mandrino (a)</li> <li>Avanzamento eccessivo (b)</li> <li>Problemi nell'approccio al materiale da forare (f, g)</li> <li>Eccentricità punta (d, e)</li> <li>Problemi nell'accuratezza del tagliente (f, g)</li> <li>Rigidità punta insufficiente (h)</li> </ul>	<ul style="list-style-type: none"> <li>a) Sistemare la macchina per aumentarne la rigidità.</li> <li>b) Adeguare l'avanzamento.</li> <li>c) Preforare con una punta pilota.</li> <li>d) Usare una bussola guida.</li> <li>e) Verificare il serraggio della punta nel portautensile.</li> <li>f) Riaffilare per ottenere un adeguato tagliente e vertice.</li> <li>g) Eseguire scarico adeguato.</li> <li>h) Usare una punta corta e rigida.</li> </ul>
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#### Rottura del gambo

<ul style="list-style-type: none"> <li>Difetto del gambo (a)</li> <li>Abrasione o difetto nella bussola di bloccaggio (b)</li> </ul>	<ul style="list-style-type: none"> <li>a) Eliminare il difetto.</li> <li>b) Rettificare la bussola o sostituirla</li> </ul>
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#### Rugosità del foro non sufficiente

<ul style="list-style-type: none"> <li>Avanzamento eccessivo (a)</li> <li>Refrigerante non sufficiente o non adeguato (b)</li> <li>Staffaggio pezzo non adeguato (c)</li> </ul>	<ul style="list-style-type: none"> <li>a) Adeguare l'avanzamento.</li> <li>b) Cambiare il tipo o il metodo di refrigerazione della punta.</li> <li>c) Serrare adeguatamente il pezzo (e la punta).</li> </ul>
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## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### Resolución de problemas

#### Rotura de broca

Causa (Solución)	Solución
<ul style="list-style-type: none"> <li>Las condiciones de corte no son adecuadas (a, b, c)</li> <li>El reafilado no es adecuado (d)</li> <li>Poca rigidez de la máquina (e, f)</li> <li>Obstrucción de la viruta (a, b, c)</li> <li>Pieza con un amarre incorrecto (g)</li> <li>Herramienta con un amarre incorrecto (h, i, j)</li> </ul>	<ul style="list-style-type: none"> <li>a) Reducir la fuerza de corte.</li> <li>b) Reducir la velocidad de corte.</li> <li>c) Realizar el taladrado por pasos (picoteo).</li> <li>d) Afilar adecuadamente la geometría de la broca.</li> <li>e) Usar un cabezal de rigidez superior.</li> <li>f) Ajustar la holgura en la máquina.</li> <li>g) Amarrar firmemente la pieza.</li> <li>h) Verificar la concentricidad de la broca después de fijarla en la máquina.</li> <li>i) Sujetar la broca con un retenedor.</li> <li>j) Utilizar un casquillo guía.</li> </ul>

#### Rotura del filo de corte o de la punta

<ul style="list-style-type: none"> <li>Las condiciones de corte no son adecuadas (a, b)</li> <li>El reafilado no es adecuado (c)</li> <li>Holgura en la máquina (d)</li> <li>Pieza con un amarre incorrecto (e)</li> <li>Herramienta con un amarre incorrecto (f, g, h)</li> <li>Uso de una broca inadecuada (i)</li> </ul>	<ul style="list-style-type: none"> <li>a) Reducir el avance.</li> <li>b) Reducir el avance en el momento del contacto.</li> <li>c) Afilar adecuadamente la geometría de la broca.</li> <li>d) Ajustar la concentricidad y la holgura de la máquina.</li> <li>e) Amarrar firmemente la pieza.</li> <li>f) Verificar la concentricidad de la broca después de fijarla en la máquina..</li> <li>g) Sujetar la broca con un retenedor</li> <li>h) Utilizar un casquillo guía.</li> <li>i) Reducir la longitud útil para incrementar la rigidez.</li> </ul>
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#### Desgaste en la broca

<ul style="list-style-type: none"> <li>Las condiciones de corte no son adecuadas (a, b)</li> <li>El caudal de refrigerante es bajo (c)</li> <li>El refrigerante no es el adecuado (d, e)</li> <li>La evacuación de viruta no es correcta. (a, b, f)</li> <li>La dureza del material en la pieza es irregular (g)</li> <li>Uso de una broca inadecuada (h)</li> </ul>	<ul style="list-style-type: none"> <li>a) Reducir la velocidad de corte.</li> <li>b) Realizar el taladrado por pasos (picoteo)</li> <li>c) Aumentar el caudal del refrigerante.</li> <li>d) Utilizar aditivos de alta presión.</li> <li>e) Corregir la dirección del lubricante.</li> <li>f) Reafililar y obtener un correcto ángulo de incidencia y desprendimiento.</li> <li>g) Seleccionar el material con dureza homogénea.</li> <li>h) Cambiar el sustrato de la broca (a uno con una resistencia mayor a la temperatura y al desgaste).</li> </ul>
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#### Precisión del agujero (agujero sobredimensionado, desviado o defectuoso)

<ul style="list-style-type: none"> <li>Holgura en la máquina o excentricidad en el cabezal (a)</li> <li>Excesivo avance (b)</li> <li>Fallo al inicio del contacto (f, g)</li> <li>Broca descentrada (d, e)</li> <li>Insuficiente precisión en el filo (f, g)</li> <li>Insuficiente rigidez de la broca (h)</li> </ul>	<ul style="list-style-type: none"> <li>a) Ajustar la máquina y aumentar la rigidez del sistema.</li> <li>b) Ajustar el avance.</li> <li>c) Realizar un taladrado guía con una broca piloto.</li> <li>d) Utilizar un casquillo guía.</li> <li>e) Corregir la sujeción de la broca.</li> <li>f) Afilar adecuadamente la geometría de la broca.</li> <li>g) Obtener un correcto ángulo de desprendimiento.</li> <li>h) Usar una broca corta y rígida.</li> </ul>
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#### Rotura en el mango

<ul style="list-style-type: none"> <li>Un error en la sujeción de la broca (a)</li> <li>Desgaste o daño en el mango (b)</li> </ul>	<ul style="list-style-type: none"> <li>a) Eliminar el error en la sujeción.</li> <li>b) Rectificar el mango o sustituir la broca.</li> </ul>
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#### Acabado insuficiente en la superficie del agujero

<ul style="list-style-type: none"> <li>Avance excesivo (a)</li> <li>Caudal de refrigerante inadecuado (b)</li> <li>Amarre de la pieza incorrecto (c)</li> </ul>	<ul style="list-style-type: none"> <li>a) Ajustar el avance.</li> <li>b) Redireccionar el refrigerante, método o tipo de lubricante.</li> <li>c) Reforzar el amarre de la pieza.</li> </ul>
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## WHNSB-TH | Carbide Oil Hole Non-Step Borer (NSB)

### ■ ■ Résolution des problèmes

#### Foret cassé

Cause (Remède)		Remède
<ul style="list-style-type: none"> <li>Conditions de coupe inadaptées</li> <li>Problème d'affûtage</li> <li>Manque de rigidité machine</li> <li>Bourrage copeaux</li> <li>Problème de bridage</li> <li>Mauvais réglage de l'outil</li> </ul>	(a, b, c) (d) (e, f) (a, b, c) (g) (h, i, j)	a) Réduire l'effort de coupe. b) Réduire la vitesse de coupe. c) Générer une avance par étapes avec des pas. d) Amincir l'âme ou réaffûter les lèvres correctement. e) Utiliser une machine rigide. f) Ajuster le jeu de la machine. g) Brider la pièce correctement. h) Ajuster le faux-rond après montage. i) Régler le porte outil. j) Utiliser un canon de perçage.

#### Arrête de coupe ou âme écaillée

<ul style="list-style-type: none"> <li>Conditions de coupe inadaptées</li> <li>Problème de réaffûtage</li> <li>Problème de machine</li> <li>Problème de bridage</li> <li>Mauvais réglage de l'outil</li> <li>Utilisation d'un foret inadapté</li> </ul>	(a, b) (c) (d) (e) (f, g, h) (i)	a) Réduire l'avance. b) Réduire l'avance à l'entrée. c) Amincir l'âme ou réaffûter les lèvres correctement. d) Ajuster le faux-rond de la broche ou le jeu machine. e) Brider la pièce correctement. f) Ajuster le faux-rond après montage. g) Régler le porte outil. h) Utiliser un canon de perçage. i) Réduire la longueur taillée du foret pour accroître la rigidité.
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#### Abrasion du foret

<ul style="list-style-type: none"> <li>Conditions de coupe inadaptées</li> <li>Niveau de lubrifiant faible</li> <li>Lubrifiant inadapté</li> <li>Problème d'évacuation copeaux</li> <li>Dureté de matière inégale</li> <li>Utilisation d'un foret inadapté</li> </ul>	(a, b) (c) (d, e) (a, b, f) (g) (h)	a) Réduire la vitesse de coupe. b) Générer une avance avec pas. c) Améliorer la circulation du lubrifiant. d) Utiliser des additifs pour pressions extrêmes. e) Corriger la direction d'arrosage, vérifier le débit. f) Réaffûter pour obtenir un amincissement et un angle de dépouille adapté. g) Utiliser une matière avec une dureté homogène. h) Changer de nuance (pour une nuance avec meilleure résistance thermique et à l'abrasion).
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#### Précision du trou (trou plus grand, flexion ou défaut)

<ul style="list-style-type: none"> <li>Ajuster le faux-rond de la broche ou le jeu machine</li> <li>Avance excessive</li> <li>Défaut d'affûtage</li> <li>Faux rond</li> <li>Problème de tolérance de l'arrête de coupe</li> <li>Manque de rigidité</li> </ul>	(a) (b) (f, g) (d, e) (f, g) (h)	a) Régler la machine et augmenter sa rigidité. b) Ajuster l'avance. c) Utiliser un foret pilote. d) Utiliser un canon de perçage. e) Corriger le réglage de l'outil. f) Réaffûter en ayant des arrêtes de coupe et un angle de dépouille adapté. g) Utiliser un amincissement d'âme adapté. h) Utiliser un foret court et rigide.
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#### Casse de la queue

<ul style="list-style-type: none"> <li>Défaut au niveau du cône d'un outil renforcé</li> <li>Abrasion ou défaut de la queue</li> </ul>	(a) (b)	a) Éliminer le défaut sur le cône. b) Rectifier la queue ou remplacer l'outil.
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#### Qualité surfacique insuffisante d'un trou

<ul style="list-style-type: none"> <li>Avance excessive</li> <li>Lubrification insuffisante ou impropre</li> <li>Pression de coupe excessive sur la pièce</li> </ul>	(a) (b) (c)	a) Ajuster l'avance. b) Changer l'approvisionnement, la méthode ou le type de fluide de coupe. c) Vérifier le serrage de la pièce à usiner.
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## WHNSB-TH | Tolerance Information

Item code	D Tol. [mm]	d Tol.
03WHNSB	h8	0/-0.01mm
05WHNSB	h8	0/-0.01mm
08WHNSB	h8	0/-0.01mm
10WHNSB	shown as following caution and table	h6
15WHNSB	shown as following caution and table	h6
20WHNSB	shown as following caution and table	h6
25WHNSB	h8	h6
30WHNSB	shown as following caution and table	h6

Table of Tolerance on tool Diameter – 10WHNSB			
h8 for diameters of 2.0 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 and 9.0 mm For other items, the diameter tolerance will be as in the table below.			
10WHNSB [mm]			
	3.0<D<6.0	6.0<D≤10.0	10.0<D≤13.0
max	-0.020 mm	-0.024	-0.030
min	-0.036 mm	-0.045	-0.053

Table of Tolerance on tool Diameter – 15WHNSB			
h8 for diameters of 2.0 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 mm. For other items, the diameter tolerance will be as in the table below.			
15WHNSB [mm]			
	3.0<D<6.0	6.0<D<10.0	10.0<D≤13.0
max	-0.020	-0.024	-0.030
min	-0.036	-0.045	-0.053

Table of Tolerance on tool Diameter – 20WHNSB			
h8 for diameters of 2.0 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 and 9.0 mm. For other items, the diameter tolerance will be as in the table below.			
20WHNSB [mm]			
	3.0<D<6.0	6.0<D≤10.0	10.0<D≤12.0
max	-0.020	-0.024	-0.030
min	-0.036	-0.045	-0.053

Table of Tolerance on tool Diameter – 30WHNSB		
h8 for diameters of 2.0 to 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 and 6.0 mm. For other items, the diameter tolerance will be as in the table below.		
30WHNSB [mm]		
	3.0<D<6.0	6.0<D≤9.0
max	-0.020	-0.024
min	-0.036	-0.045

**Always up to date: Please check our P50 QuickFinder**



### **Attentions on Safety**

#### **1. Cautions regarding handling**

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

#### **2. Cautions regarding mounting**

- (1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
- (2) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

#### **3. Cautions during use**

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

#### **4. Cautions regarding regrinding**

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

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