CB-CERATIZIT

RODS & PREFORMS

Tungsten Carbide Rods
For Precision Tool

TOOLING THE FUTURE

EN

Catalogue

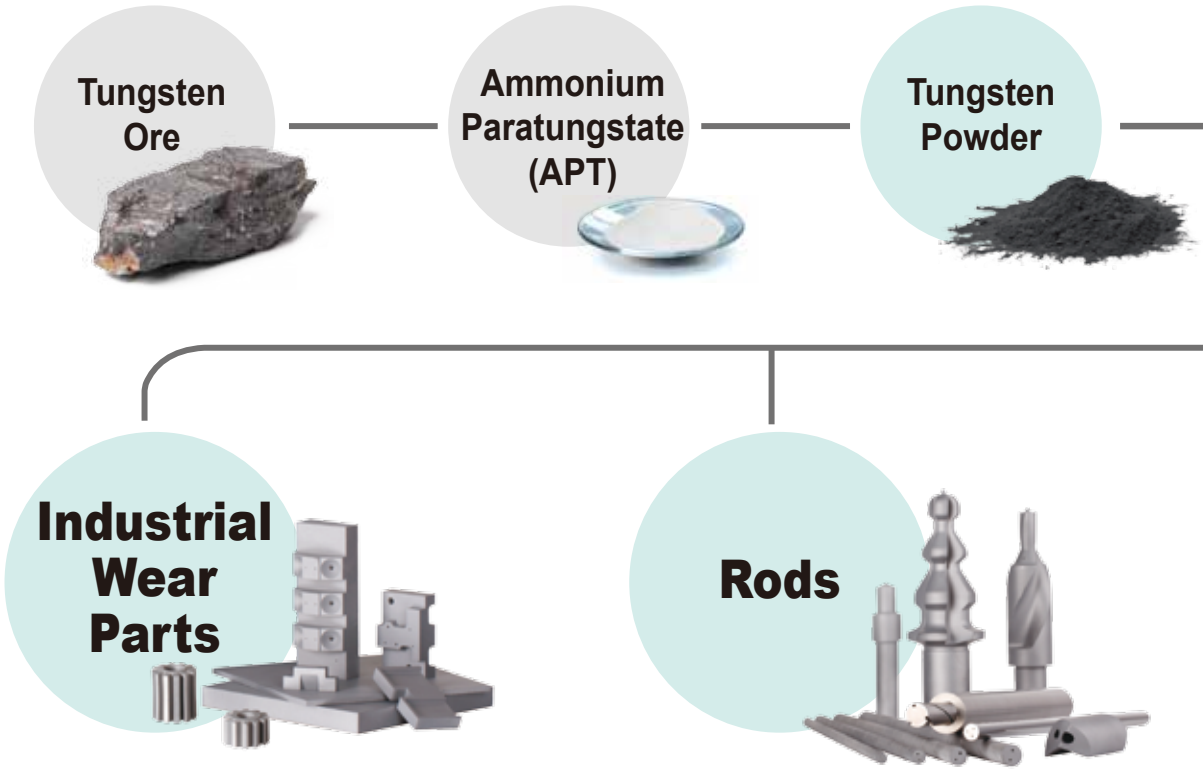
About CB-CERATIZIT

CB-CERATIZIT is the Asian market leader in carbide rod blanks, industrial wear parts, wood & stone applications, and specific cutting tool segments through quality products, fast delivery, and responsive customer service.

CB-CERATIZIT offers global production and technological supports as well as localised services.

CB-CERATIZIT combined has more than 130 years of tungsten carbide industry experience. We are confident CB-CERATIZIT is the best partner for our growth oriented customers by providing carbide solutions.

CB-CERATIZIT Industry Chain

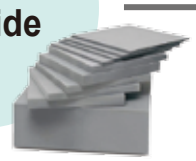


Sales offices and Production sites worldwide

● CERATIZIT ● CB-CERATIZIT

Ready to Press Powder

Tungsten Carbide



Wood and Stone

Cutting Tools

CB-CERATIZIT

We value customer feedback
We help to shape the industry trend
We improve continuously
We are CB-CERATIZIT

1 Customer Service
Grade Selection
Guide our customer to apply best solution for success.

2 Breakthrough
Achieve Outperformance
Enable our customer to achieve outperformance is our key objective.

3 Competitiveness
Enhance Competitiveness
Strengthen the competitiveness of our customer is our long term goal.

4 Training
Continuous Learning
Nurturing talents for sustainable long term growth.

Core Competency

Professional, Dedication, Tailor-made service

Our Promises:

1 **Customer Focus**
To relentlessly work to provide better solutions for our customers.

2 **Stable Quality**
To keep stable quality contributes to our customer's brand reputation.

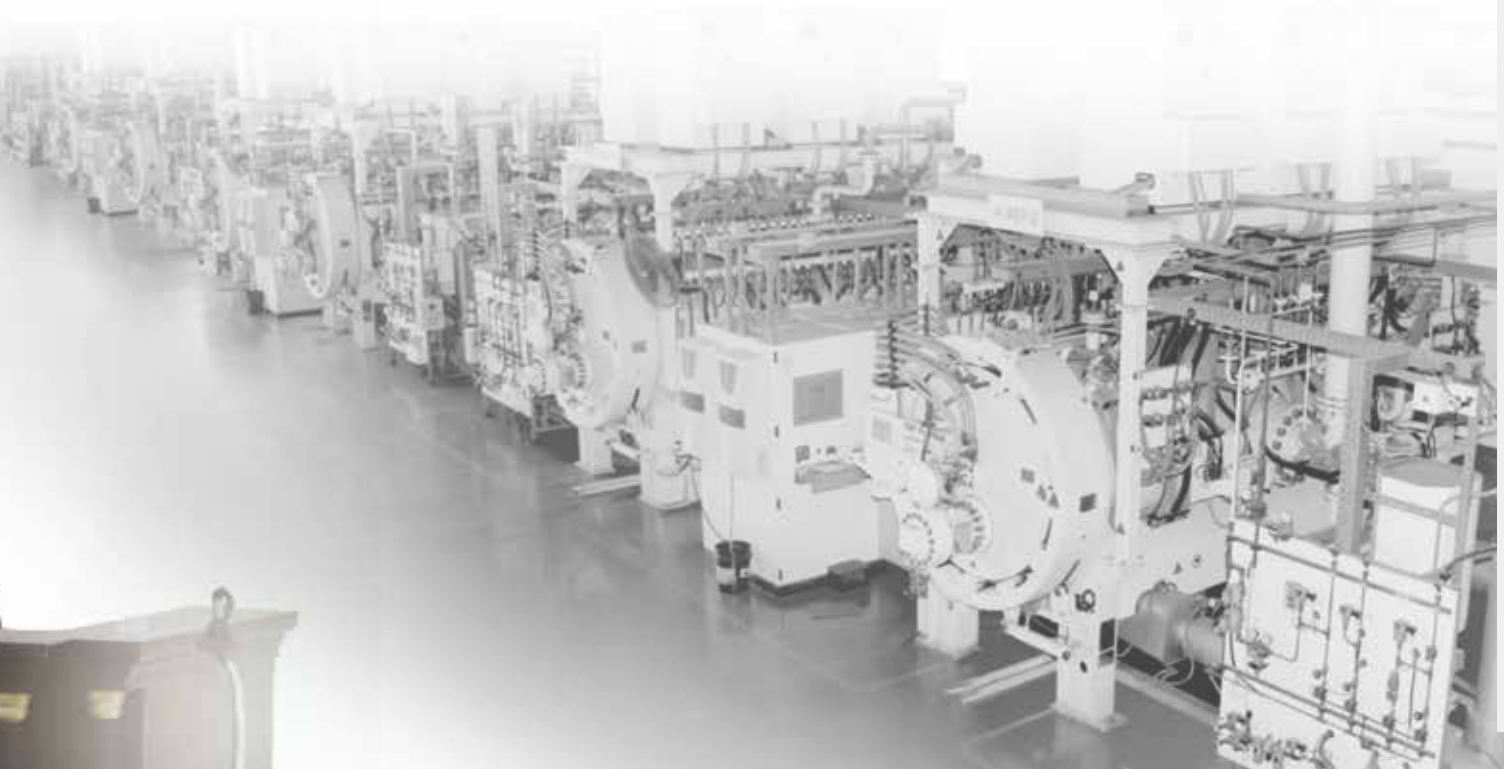
3 **On-time Delivery**
To provide lean production for our customers.

4 **Stock Availability**
To find solution for each and every customer's grade requirements.

5 **Comprehensive Specification**
To work with customers for tailor-made products.

6 **Sustainable Capacity**
To grow together with our customers.

7 **Continuous Research and Development**
To provide leadership for industry specific solutions.



Rods Production Centre

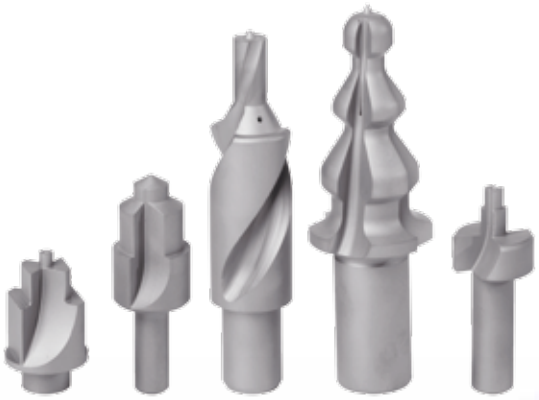
Established in 2003, CB-CERATIZIT Xiamen Rods Production Centre has grown to become the leading production plant in Asia.

Our Rods Centre of Excellence production is technologically and capably equipped to support new Rods grade innovation and dynamic customer demands.
We stand by our production and inspection procedures that upkeep strictly to ISO international standard.

Customized Rods Production Centre

Established in 1999, CB-CERATIZIT Xiamen Industrial Wear Parts Production Centre is capable to produce wide range Customised Rods: Preform Rods, PCD Boring Bar, Anti-Vibration Boring Bar, Gun Drill, and T Cutter blanks. Step-down Rods, Internal Duct, Center Hole, Thread, and Chip Flutes are available upon customer requests.

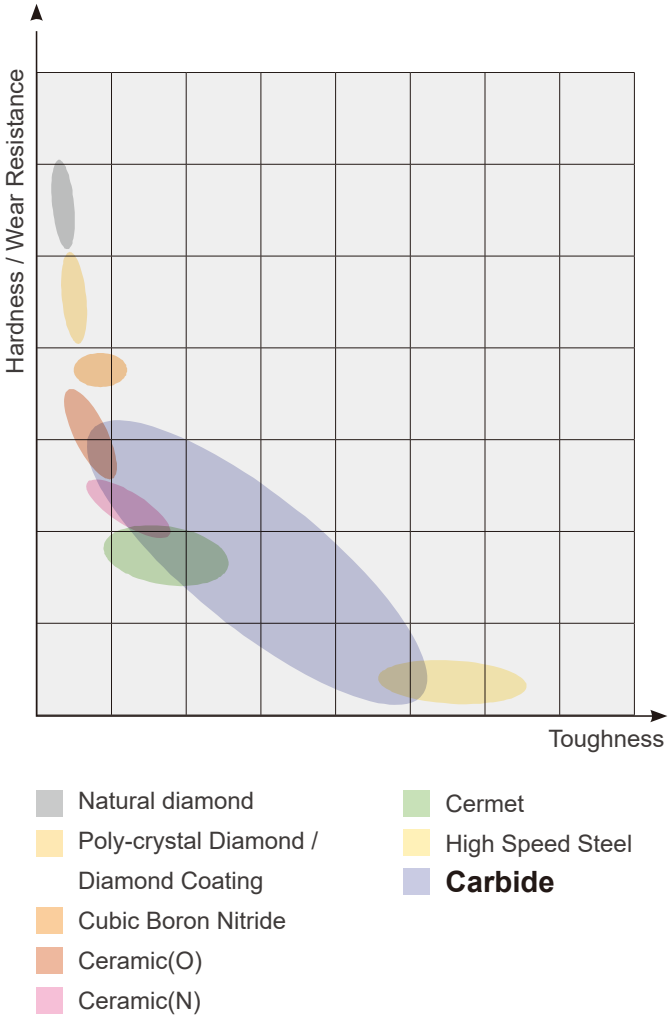
CB-CERATIZIT is able to utilise our wide production capabilities to improve competitiveness for our customers



Professional R&D Team – Tianjin Tooling Academy

Established in 2011, CB-CERATIZIT Tianjin Tooling Academy, replicates the success of CERATIZIT Reutte Tooling Academy for Cutting Tools and Rods product development and application training in Asia.

The establishment of this platform aims to gather information from cutting tool industry and strengthen CB-CERATIZIT ability to deliver vertical integrated knowledge services.



The mechanical property of carbide can be altered by changing grain size and constitute to cope with wide range of tool performance demand. Consequently, features of CB-CERATIZIT grade can also be modified in accordance with different machining methodology. CB-CERATIZIT can offer best-fit solutions for special work piece metals such as harden material with high wear resistance, Nicochrome which can withstand high temperature, and Composite material with complicated mechanical properties.

Criteria relevant for application

- ○ Wear resistance, Hardness
- ○ Compressive strength
- ○ Impact strength
- ○ Transverse rupture strength
- ○ Tribological properties
- ○ Specific weight
- ○ Magnetic properties
- ○ Modulus of elasticity, Rigidity
- ○ Thermal properties
- ○ Corrosion resistance, Resistance to oxidation
- ○ Toughness

CB-CERATIZIT

Grade Property & Recommendation

Composition & Property

	Grade	ISO Code	Co (±0.5%)	Density (g/cm³)	Hardness		TRS		Fracture Toughness
					HRA	HV30	kgf/mm²	MPa	K_{IC}
Ultrafine	K180	K05	9.0	14.34	93.8	1960	360	3550	8.3
	K160	K05	8.0	14.48	93.5	1900	380	3500	9.0
	TF25+	K10-K20	11.0	14.15	92.3	1660	380	3800	10.0
	WF25	K10-K20	11.5	14.15	92.2	1640	380	3750	9.8
Submicron	WF15	K20-K40	10	14.35	91.8	1580	380	3750	10.7
	K200	K20-K40	10	14.40	91.3	1510	400	4000	10.5
Fine	K100L	K10	6.0	14.83	92.2	1650	300	3000	9.2
	KR10	K10	5.8	14.80	92.2	1640	300	2950	10.0

* Please contact our representative if additional grade requirement is needed.

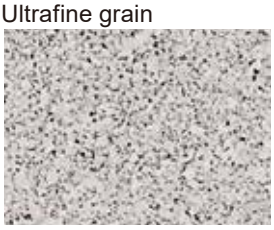
Grade Recommendation

	Work Material	K180	K160	TF25+	WF25	WF15	K200	K100L	KR10
P	Non Alloy Steel			○	○	●	●		
	Low / Medium Alloy Steel	●	●	○	○	●	●		●
	High Alloy Steel			●	●	●	○		
	Ferritic Stainless Steel			●	●	○	●		
	Martensitic Stainless Steel			●	●	○	●		
M	Austenitic Stainless Steel			●	●	○	●		
	Duplex Stainless Steel			●	○	○	●		
K	Grey Cast Iron	●	●		○	●	●	○	●
	Nodular Cast Iron	●	●		○	●	●	○	●
	Ductile Cast Iron	●	●		○	●	●	○	●
N	Plastic	●	●	○	○	○	○	●	●
	Composite Material	●	●					●	
	Aluminium Alloy (Si<12%)	●	●	○	○	○	○	●	
	Copper Based Alloy	●	●			○	○	○	○
S	Super Alloy			●	●	○	○		
	Titanium Alloy			●	○	○	●		
H	Harden Steel	●	●	●	●	○	○		

* Grade recommendation sheet is for reference only. Actual performance of cutting tool will be affected by different geometry and coating, please select appropriate grade according to individual property

● Best ○ Fit

Ultrafine grain



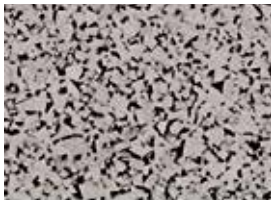
K180 : Ultrafine carbide grade for HSC machining. Excellent performance on machining heat-treated steel (>60 HRC). It is also good for machining Aluminum alloy, Non-ferrous metal, and CFRP.

K160 : Ultrafine carbide grade for HSC machining. For hard machining of materials >60 HRC.

TF25+ : For HSC of harden material up to HRC 59 and stainless steel. Special ultrafine carbide grade was selected to increase wear resistance and achieve enhanced tool life.

WF25 : For HSC harden material up to HRC 45 and stainless steel. It is a well-balanced high performance stable grade.

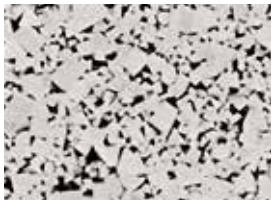
Submicron grain



WF15 : For stainless steel, tool steel and non-ferrous metal machining. Use in top preference for coolant hole rod, especially drilling application.

K200 : For stainless steel, super alloy machining under low cutting speed and high feed rate. Selective submicron carbide grade for optimum tool toughness.

Fine grain



K100L : Certified fine carbide grade for diamond coating tool. For machining graphite, composite material, and high-silicon aluminium alloy.

KR10 : Fine grain grade specially design for machining Non-ferrous metal, Cast Iron, and Plastic.

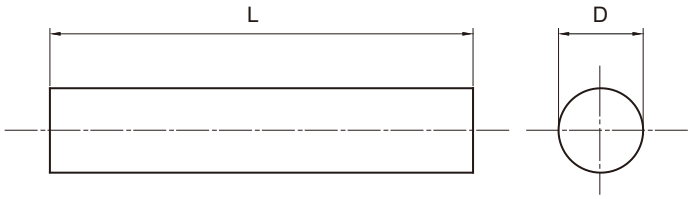
Tungsten carbide grain size (μm)	Classification
0.2-0.5	Ultrafine
0.5-0.8	Submicron
0.8-1.3	Fine
1.3-2.5	Medium
2.5-6.0	Coarse

* The classification of carbides according to grain size corresponds to the recommendations of the Powder Metallurgy Association.

CB-CERATIZIT

Solid Rods

Sintered Solid Rods (Metric)



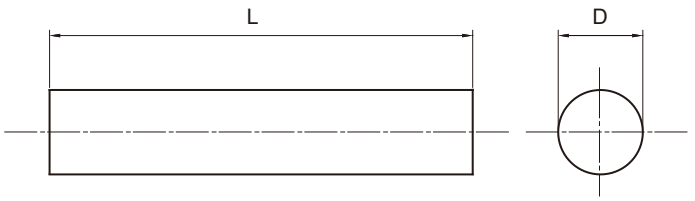
Sintered Solid Rods (Metric)									
D	L	Grade							
mm	mm	K180	K160	TF25+	WF25	WF15	K200	K100L	KR10
2.0	330			●	●	●			
3.0	330	●	●	●	●	●	●	●	●
3.5	330				●	●	●		
4.0	330	●	●	●	●	●	●	●	●
4.5	330				●	●	●		
5.0	330			●	●	●	●	●	
5.5	330				●	●	●	●	●
6.0	330	●	●	●	●	●	●		
6.5	330				●	●	●	●	●
7.0	330				●	●	●		
7.5	330				●	●	●		
8.0	330	●	●	●	●	●	●	●	●
8.5	330				●	●	●		
9.0	330				●	●	●		
9.5	330				●	●	●		
10.0	330	●	●	●	●	●	●	●	●
10.5	330				●	●	●		
11.0	330				●	●	●		
11.5	330				●	●	●		
12.0	330	●	●	●	●	●	●	●	●
12.5	330				●	●	●		
13.0	330				●	●	●		
14.0	330			●	●	●	●		
15.0	330				●	●	●		
16.0	330	●	●	●	●	●	●	●	●
17.0	330				●	●	●		
18.0	330			●	●	●	●	●	●
19.0	330				●	●	●		
20.0	330	●	●	●	●	●	●	●	●
24.0	330					●			
25.0	330					●			
32.0	330					●			

1. Production Range: Ø1~Ø80. Other dimensions are upon request

2. Standard Length: 310mm, 330mm

●=Standard Stock

We offer below post-processing services:



Sintered Solid Rods (Inch)				
D		L		Grade
inch	mm	inch	mm	K200
1/16	1.59	13	330	○
1/8	3.18	13	330	○
3/16	4.76	13	330	○
1/4	6.35	13	330	○
5/16	7.94	13	330	○
3/8	9.53	13	330	○
7/16	11.11	13	330	○
1/2	12.70	13	330	○
9/16	14.29	13	330	○
5/8	15.88	13	330	○
11/16	17.46	13	330	○
3/4	19.05	13	330	○
13/16	20.64	13	330	○
7/8	22.23	13	330	○
15/16	23.81	13	330	○
1	25.40	13	330	○

1. Production Range: Ø1/16"~Ø1". Other dimensions are upon request
2. Standard Length: 13"

○ = Make-to-Order

We offer below post-processing services:

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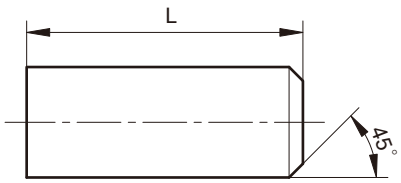
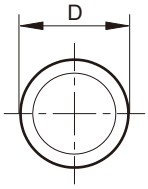
Solid Rods

Ground Solid Rods - Cut to Length (Metric)



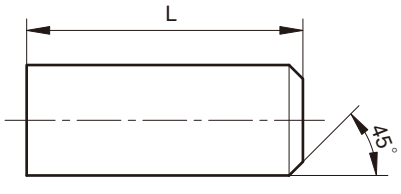


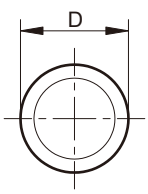
Ground Solid Rods - Cut to Length (Metric)				
D	**h5 D Tol.**	**h6 D Tol.**	**L**	Grade
mm	mm	mm	mm	**WF15**
3.0	-0/-0.004	-0/-0.006	39	●
4.0	-0/-0.005	-0/-0.008	51	●
5.0	-0/-0.005	-0/-0.008	51	●
6.0	-0/-0.005	-0/-0.008	51	●
6.0	-0/-0.005	-0/-0.008	55	●
6.0	-0/-0.005	-0/-0.008	58	●
8.0	-0/-0.006	-0/-0.009	59	●
8.0	-0/-0.006	-0/-0.009	64	●
10.0	-0/-0.006	-0/-0.009	67	●
10.0	-0/-0.006	-0/-0.009	73	●
12.0	-0/-0.008	-0/-0.011	74	●
12.0	-0/-0.008	-0/-0.011	84	●
14.0	-0/-0.008	-0/-0.011	76	●
14.0	-0/-0.008	-0/-0.011	84	●
16.0	-0/-0.008	-0/-0.011	83	●
16.0	-0/-0.008	-0/-0.011	93	●
18.0	-0/-0.008	-0/-0.011	93	●
20.0	-0/-0.011	-0/-0.013	93	●
20.0	-0/-0.011	-0/-0.013	105	●

1. Standard Length: DIN Standard. Other dimensions are upon request.

●=Standard Stock

We offer below post-processing services:



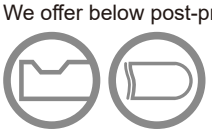


Ground Solid Rods - Cut to Length (Inch)					
D		D Tol.	L		Grade
inch	mm	mm	inch	mm	K200
1/8	3.18	-0/-0.008	1 1/2	38.10	●
1/8	3.18	-0/-0.008	2	50.80	○
1/8	3.18	-0/-0.008	2 1/2	63.50	●
3/16	4.76	-0/-0.008	2	50.80	●
3/16	4.76	-0/-0.008	2 1/2	63.50	○
3/16	4.76	-0/-0.008	3	76.20	●
1/4	6.35	-0/-0.009	2	50.80	○
1/4	6.35	-0/-0.009	2 1/2	63.50	●
1/4	6.35	-0/-0.009	3	76.20	●
5/16	7.94	-0/-0.009	2 1/2	63.50	●
5/16	7.94	-0/-0.009	3	76.20	○
5/16	7.94	-0/-0.009	3 1/2	88.90	○
5/16	7.94	-0/-0.009	4	101.60	●
3/8	9.53	-0/-0.009	2 1/2	63.50	●
3/8	9.53	-0/-0.009	3	76.20	●
3/8	9.53	-0/-0.009	3 1/2	88.90	○
3/8	9.53	-0/-0.009	4	101.60	●
7/16	11.11	-0/-0.011	2 3/4	69.85	●
1/2	12.70	-0/-0.011	3	76.20	●
1/2	12.70	-0/-0.011	3 1/2	88.90	○
1/2	12.70	-0/-0.011	4	101.60	●
1/2	12.70	-0/-0.011	5	127.00	○
5/8	15.88	-0/-0.011	3 1/2	88.90	●
5/8	15.88	-0/-0.011	4	101.60	○
5/8	15.88	-0/-0.011	5	127.00	○
5/8	15.88	-0/-0.011	6	152.40	○
3/4	19.05	-0/-0.013	4	101.60	●
3/4	19.05	-0/-0.013	5	127.00	●
3/4	19.05	-0/-0.013	6	152.40	○
3/4	19.05	-0/-0.013	7	177.80	○
1	25.40	-0/-0.013	4	101.60	●
1	25.40	-0/-0.013	5	127.00	○
1	25.40	-0/-0.013	6	152.40	●
1	25.40	-0/-0.013	7	177.80	○
1	25.40	-0/-0.013	8	203.20	○

1. Standard Length: Imperial Standard. Other dimensions are upon request

● = Standard Stock
○ = Make-to-Order

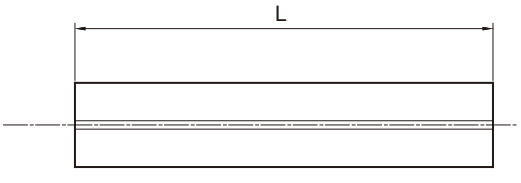
We offer below post-processing services:

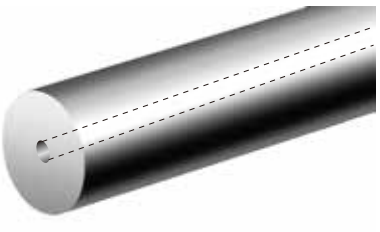


CB-CERATIZIT

Coolant Hole Rods

Sintered Central Coolant Hole Rods



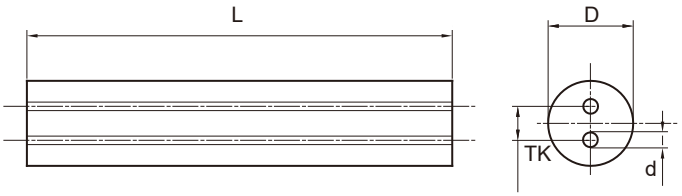


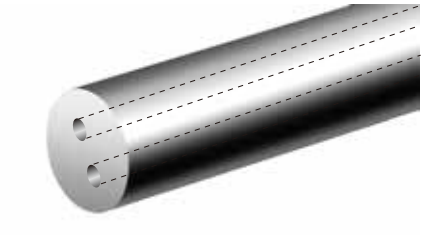
Sintered Central Coolant Hole Rods			
D	L	d	Grade
mm	mm	mm	WF15
3.0	330	0.3	○
4.0	330	0.3	○
4.0	330	0.8	●
5.0	330	0.5	○
6.0	330	1.0	●
7.0	330	1.0	●
8.0	330	1.2	●
8.0	330	1.5	●
9.0	330	1.5	○
10.0	330	2.0	●
11.0	330	2.0	○
12.0	330	2.0	●
13.0	330	2.0	○
14.0	330	2.0	●
15.0	330	1.5	○
16.0	330	2.0	●
17.0	330	3.0	○
18.0	330	3.0	●
20.0	330	3.0	●
22.0	330	3.0	○
24.0	330	4.0	○
25.0	330	3.0	○
25.0	330	4.0	●
26.0	330	4.0	○
28.0	330	4.0	○
32.0	330	6.0	○

1. Other dimensions are upon request
2. Standard Length: 330mm

●=Standard Stock
○=Make-to-Order

We offer below post-processing services:





Sintered Parallel Coolant Hole Rods				
D	L	d	TK	Grade
mm	mm	mm	mm	WF15
4.0	330	0.8	1.8	○
5.0	330	0.5	2.6	○
6.0	330	0.8	1.6	○
6.0	330	0.9	3.0	○
6.0	330	1.0	3.0	○
7.0	330	0.8	1.6	○
8.0	330	0.8	1.6	○
8.0	330	0.8	2.6	○
8.0	330	1.2	3.5	○
9.0	330	1.0	2.6	○
10.0	330	1.0	2.6	○
10.0	330	1.0	3.0	○
10.0	330	1.2	3.5	○
10.0	330	1.6	4.3	○
11.0	330	0.8	2.6	○
12.0	330	1.2	3.35	○
12.0	330	1.2	3.5	○
12.0	330	1.8	5.0	○
12.0	330	1.2	6.2	○
13.0	330	1.8	5.5	○
14.0	330	1.8	5.5	○
15.0	330	1.8	5.5	○
16.0	330	1.2	5.0	○
16.0	330	2.0	5.0	○
16.0	330	1.8	5.5	○
18.0	330	2.0	6.0	○
18.0	330	2.0	8.85	○
20.0	330	2.0	6.0	○
25.0	330	2.0	7.5	○

1. Other dimensions are upon request
2. Standard Length: 330mm

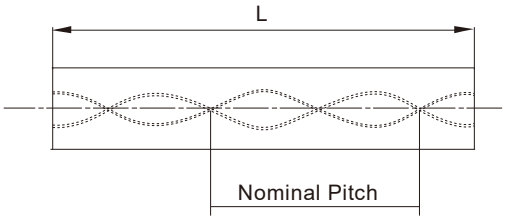
●=Standard Stock
○=Make-to-Order

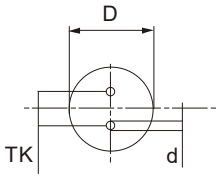
We offer below post-processing services:

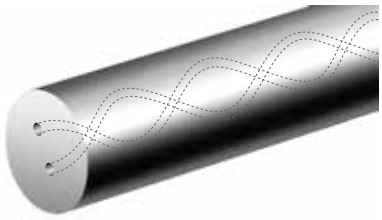
CB-CERATIZIT

Coolant Hole Rods

Sintered Two Helical Coolant Hole Rods (30°)





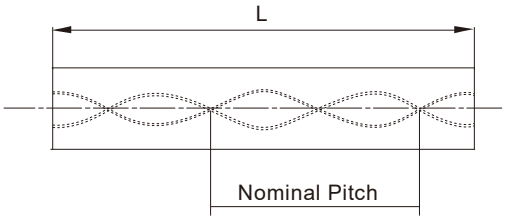


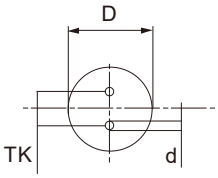
30° Two Helical Coolant Hole Rods								
D	L	d	TK	Grade	Range of Drill Diameter	Nominal Pitch Reference		
mm	mm	mm	mm	WF15		Blue	White	Yellow
3.0	330	0.40	1.20	●	2.5~3.0	15.89	16.32	16.77
3.0	330	0.40	1.60	○	2.9~3.0	15.89	16.32	16.77
4.0	330	0.60	2.10	●	3.8~4.0	21.19	21.77	22.36
5.0	330	0.70	2.40	●	4.5~5.0	26.49	27.21	27.95
6.0	330	0.40	1.60	●	3.6~6.0	31.79	32.65	33.54
6.0	330	0.60	2.10	●	4.3~6.0	31.79	32.65	33.54
6.0	330	0.70	2.40	●	4.7~6.0	31.79	32.65	33.54
7.0	330	1.00	3.50	●	6.3~7.0	37.09	38.09	39.13
8.0	330	0.59	2.00	●	4.6~8.0	42.38	43.53	44.73
8.0	330	0.60	2.80	●	5.4~8.0	42.38	43.53	44.73
8.0	330	1.00	3.80	●	6.8~8.0	42.38	43.53	44.73
9.0	330	1.40	4.50	●	8.2~9.0	47.68	48.97	50.32
10.0	330	1.00	3.50	●	7.0~10.0	52.98	54.41	55.91
10.0	330	1.40	4.50	●	8.4~10.0	52.98	54.41	55.91
11.0	330	1.40	4.90	●	9.0~11.0	58.28	59.86	61.50
12.0	330	1.40	5.85	●	10.2~12.0	63.58	65.30	67.09
12.0	330	1.40	6.25	○	10.8~12.0	63.58	65.30	67.09
13.0	330	1.75	6.10	●	11.1~13.0	68.87	70.74	72.68
14.0	330	1.75	6.70	●	11.9~14.0	74.17	76.18	78.27
14.0	330	2.00	6.70	○	12.1~14.0	74.17	76.18	78.27
15.0	330	1.75	7.10	●	12.5~15.0	79.47	81.62	83.86
16.0	330	1.40	7.90	○	13.1~16.0	84.77	87.06	89.45
16.0	330	1.75	7.90	●	13.5~16.0	84.77	87.06	89.45
16.0	330	2.00	7.90	○	13.7~16.0	84.77	87.06	89.45
17.0	330	1.75	8.00	●	13.8~17.0	90.07	92.50	95.04
18.0	330	1.75	9.15	○	15.2~18.0	95.37	97.95	100.63
18.0	330	2.00	9.15	●	15.4~18.0	95.37	97.95	100.63
19.0	330	2.00	9.70	●	16.2~19.0	100.66	103.39	106.22
20.0	330	1.40	9.90	○	16.1~20.0	105.96	108.83	111.81
20.0	330	2.00	9.90	●	16.7~20.0	105.96	108.83	111.81
20.0	330	2.50	9.90	○	17.2~20.0	105.96	108.83	111.81
21.0	330	2.00	10.50	●	17.5~21.0	111.26	114.27	117.40
22.0	330	2.00	11.10	●	18.3~22.0	116.56	119.71	122.99
23.0	330	2.50	11.70	●	19.6~23.0	121.86	125.15	128.58

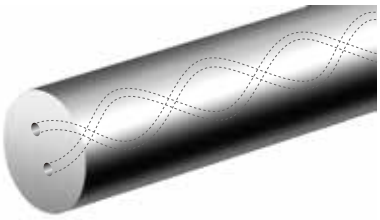
1. Nominal Pitch: Categorise in 3 regions. The nominal pitch number is the reference for drill up to 12XD
2. Above 12XD Drill: Nominal pitch marked at the end of rods is the reference for drill over 12XD

● =Standard Stock
○ =Make-to-Order

We offer below post-processing services:







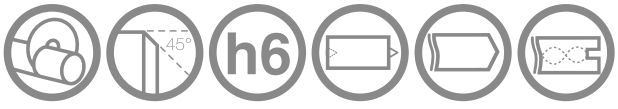
30° Two Helical Coolant Hole Rods								
D	L	d	TK	Grade	Range of Drill Diameter	Nominal Pitch Reference		
mm	mm	mm	mm	WF15		Blue	White	Yellow
24.0	330	2.00	12.30	●	19.9~24.0	127.15	130.59	134.18
25.0	330	2.00	12.80	●	20.6~25.0	132.45	136.03	139.77
27.0	330	2.00	13.70	●	21.9~27.0	143.05	146.92	150.95
28.0	330	2.00	14.10	●	22.5~28.0	148.35	152.36	156.54
32.0	330	3.00	17.00	●	26.4~32.0	169.54	174.12	178.90

40° Two Helical Coolant Hole Rods								
D	L	d	TK	Grade	Range of Drill Diameter	Nominal Pitch Reference		
mm	mm	mm	mm	WF15		Blue	White	Yellow
6.0	330	0.70	1.90	○	4.2~6.0	21.68	22.46	23.28
6.0	330	0.48	2.01	●	4.1~6.0	21.68	22.46	23.28
7.0	330	0.65	2.40	●	4.8~7.0	25.30	26.21	27.16
8.0	330	0.65	2.40	●	5.0~8.0	28.91	29.95	31.04
8.0	330	0.65	2.80	○	5.4~8.0	28.91	29.95	31.04
9.0	330	0.70	3.00	●	6.0~9.0	32.53	33.70	34.92
10.0	330	1.00	3.20	●	6.7~10.0	36.14	37.44	38.80
12.0	330	1.20	3.80	●	8.0~12.0	43.37	44.93	46.55
14.0	330	1.20	4.30	●	8.9~14.0	50.60	52.42	54.31
16.0	330	1.30	5.10	●	10.2~16.0	57.82	59.90	62.07
18.0	330	1.40	5.90	●	11.6~18.0	65.05	67.39	69.83
18.0	330	2.50	5.90	○	12.7~18.0	65.05	67.39	69.83
20.0	330	1.50	6.60	●	12.9~20.0	72.28	74.88	77.59
25.0	330	1.75	7.60	●	15.1~25.0	90.35	93.60	96.99

1. Nominal Pitch: Categorise in 3 regions. The nominal pitch number is the reference for drill up to 12XD
2. Above 12XD Drill: Nominal pitch marked at the end of rods is the reference for drill over 12XD

● = Standard Stock
○ = Make-to-Order

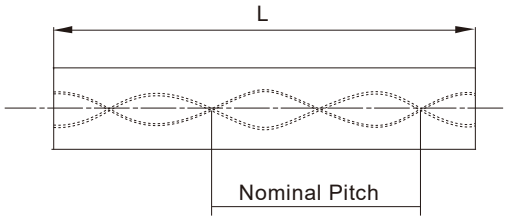
We offer below post-processing services:

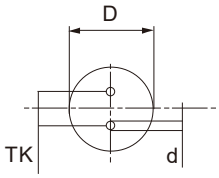


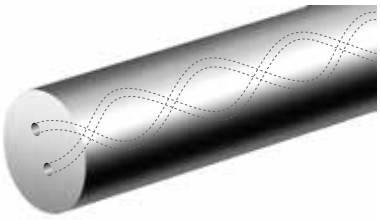
CB-CERATIZIT

Coolant Hole Rods

Sintered Two Helical Coolant Hole Rods (15° & Special Angle)







15° Two Helical Coolant Hole Rods								
D	L	d	TK	Grade	Range of Drill Diameter	Nominal Pitch Reference		
mm	mm	mm	mm	WF15		Blue	White	Yellow
6.0	330	0.70	2.60	○	4.9~6.0	68.75	70.35	72.02
8.0	330	1.25	3.60	○	7.0~8.0	91.66	93.80	96.03
10.0	330	1.40	4.80	○	8.7~10.0	114.58	117.25	120.03
12.0	330	1.55	6.25	○	10.8~12.0	137.49	140.70	144.04
14.0	330	1.40	6.70	○	11.5~14.0	160.41	164.14	168.05
14.0	330	1.75	6.70	○	11.9~14.0	160.41	164.14	168.05
14.0	330	1.90	6.70	○	12.0~14.0	160.41	164.14	168.05
14.0	330	2.00	6.70	○	12.1~14.0	160.41	164.14	168.05
16.0	330	1.40	8.00	○	13.2~16.0	183.32	187.59	192.06
16.0	330	1.75	8.00	○	13.6~16.0	183.32	187.59	192.06
16.0	330	2.00	8.00	○	13.8~16.0	183.32	187.59	192.06
16.0	330	2.10	8.00	○	13.9~16.0	183.32	187.59	192.06
16.0	330	2.50	8.00	○	14.3~16.0	183.32	187.59	192.06
18.0	330	2.00	9.00	○	15.3~18.0	206.24	211.04	216.06
18.0	330	2.30	9.00	○	15.6~18.0	206.24	211.04	216.06
20.0	330	2.00	10.00	○	16.7~20.0	229.15	234.49	240.07
20.0	330	2.50	10.00	○	17.2~20.0	229.15	234.49	240.07

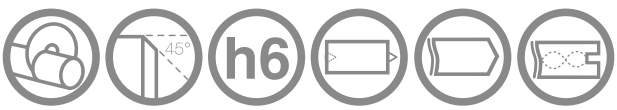
Special angle Two Helical Coolant Hole Rods									
Angle	D	L	d	TK	Grade	Range of Drill Diameter	Nominal Pitch Reference		
°	mm	mm	mm	mm	WF15		Blue	White	Yellow
45.5	6.0	330	0.70	2.40	○	4.7~6.0	17.89	18.52	19.18
42.7	6.0	330	0.40	1.70	○	3.7~6.0	19.70	20.41	21.13
38.1	6.0	330	0.70	2.40	○	4.7~6.0	23.19	24.04	24.92
36.1	6.0	330	0.70	2.40	○	4.7~6.0	25.07	25.85	26.66
34.7	6.0	330	0.75	2.25	○	4.7~6.0	26.39	27.22	28.09
33.0	6.0	330	0.70	2.40	○	4.7~6.0	28.30	29.03	29.78
37.6	8.0	330	0.75	2.85	○	5.5~8.0	31.51	32.66	33.87
35.8	10.0	330	1.00	3.80	○	7.3~10.0	42.25	43.56	44.92
33.6	10.0	330	1.20	4.00	○	7.7~10.0	45.88	47.34	48.87
32.5	14.0	330	1.30	5.60	○	10.3~14.0	67.37	69.12	70.93
30.7	15.0	330	1.40	7.35	○	12.4~15.0	77.38	79.45	81.62

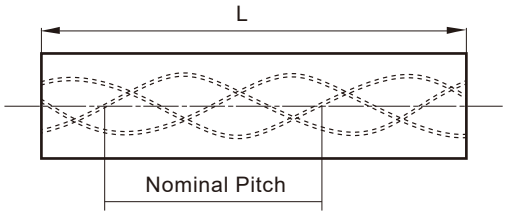
1. Nominal Pitch: Categorise in 3 regions. The nominal pitch number is the reference for drill up to 12XD

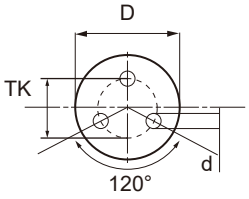
2. Above 12XD Drill: Nominal pitch marked at the end of rods is the reference for drill over 12XD

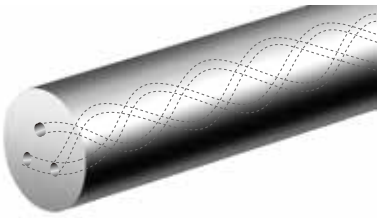
○=Make-to-Order

We offer below post-processing services:









30° Three Helical Coolant Hole Rods								
D	L	d	TK	Grade	Range of Drill Diameter	Nominal Pitch Reference		
mm	mm	mm	mm	WF15		Blue	White	Yellow
6.0	330	0.70	2.30	●	4.6~6.0	31.79	32.65	33.54
6.0	330	0.60	3.00	●	5.2~6.0	31.79	32.65	33.54
8.0	330	0.75	4.00	●	6.7~8.0	42.38	43.53	44.73
10.0	330	1.00	4.90	●	8.4~10.0	52.98	54.41	55.91
12.0	330	1.10	6.00	●	10.1~12.0	63.58	65.30	67.09
14.0	330	1.30	7.10	●	11.8~14.0	74.17	76.18	78.27
16.0	330	1.50	8.30	●	13.6~16.0	84.77	87.06	89.45
18.0	330	1.70	9.70	●	15.7~18.0	95.37	97.95	100.63
20.0	330	2.00	10.40	●	17.2~20.0	105.96	108.83	111.81
25.0	330	2.00	12.80	●	20.6~25.0	132.45	136.03	139.77
33.0	330	2.70	12.50	●	22.6~33.0	174.84	179.57	184.49

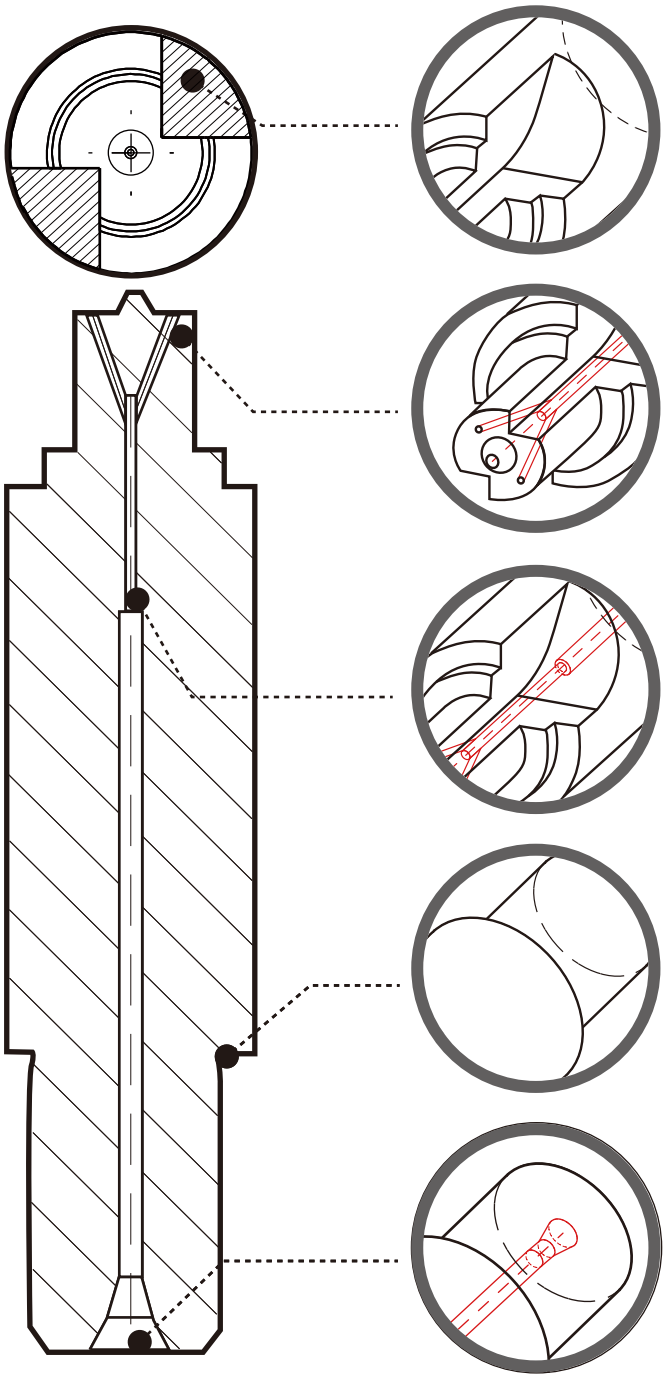
1. Nominal Pitch: Categorise in 3 regions. The nominal pitch number is the reference for drill up to 12XD
2. Above 12XD Drill: Nominal pitch marked at the end of rods is the reference for drill over 12XD

● =Standard Stock

We offer below post-processing services:

Preforms

In addition to standard rods, CB-CERATIZIT also offers a comprehensive selection near-net-shape preforms to cope with multiple demands in industrial applications. From semi-finished cutting tool, boring bar, to PCD tool matrix material, we havee the ability to produce complex geometries on custom design tool with minimum lead time.



Chip Flute

- With pre-machined straight or helical flutes, customers will be benefited from the reduction tool grinding time and cost.

Y-Exit Coolant Hole

- Y-Exit holes with various angle, hole diamter, & length are produced under automatic processing, which will significantly drive down finish tool production lead time.

Blind / Through Coolant Hole

- According to customers' drawings, both of blind holes or through holes within our standard tolerances can be formed integrally during machining process.

Diameter Step

- To improve the diversification of our services, we are able to produce diameter step including prependicular, sloped, and R angle steps.

Center Hole

- As part of preforms geometry, we are able to produce female and male centers based on international standard.

Apart from standard programme

Based on CB-CERATIZIT comprehensive production capability, we are able to meet the most demanding requirements from customers, such as special coolant hole profiles, external helical grooves, and other non-standard designs. With our state-of-the-art manufacturing facility, complex geometries can be formed based on customers' demand.

- Rods Length from 35 mm to 1000 mm

- Rods Diameter from 1 mm to 80 mm

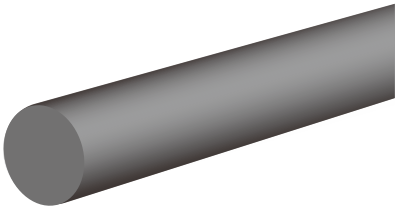
- Ground Semi-Finished Articles

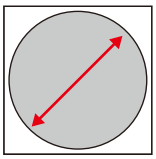
- Y-Exit Coolant Hole Rods

- Ball-Nose Rods

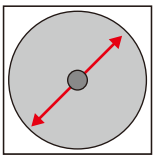
- Coolant Hole Drill Blanks (Groove / Point)

Sintered Rods

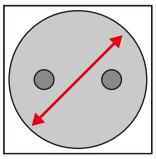




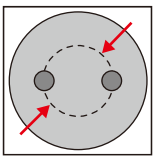
Outside Diameter (Sintered Solid Rods)	
D (mm)	**Tol.** (mm)
2.0 - 7.0	+0.2 / +0.4
7.5 - 11.5	+0.2 / +0.5
12.0 - 16.0	+0.3 / +0.6
16.5 - 22.0	+0.3 / +0.7
23.0 - 29.0	+0.4 / +0.8
> 30.0	+0.7 / +1.3



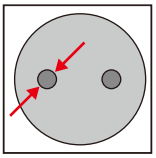
Outside Diameter (Sintered Straight Hole Rods)	
D (mm)	**Tol.** (mm)
3.0 - 5.0	+0.3 / +0.5
6.0 - 10.0	+0.3 / +0.6
11.0 - 19.0	+0.4 / +0.9
20.0 - 29.0	+0.4 / +0.8
> 30.0	+0.7 / +1.3



Outside Diameter (Sintered Helical Rods)	
D (mm)	**Tol.** (mm)
3.0 - 5.0	+0.2 / +0.6
6.0 - 11.0	+0.4 / +1.0
12.0 - 15.0	+0.4 / +1.2
16.0 - 28.0	+0.4 / +1.4

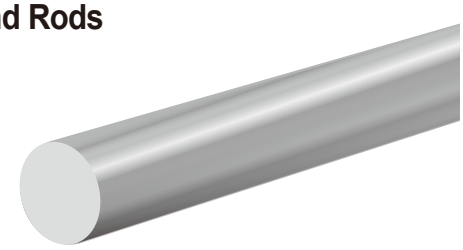


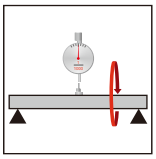
Pitch Circle Diameter	
TK (mm)	**Tol.** (mm)
1.0 - 3.0	± 0.30
3.1 - 5.0	± 0.40
> 5.1	± 0.50



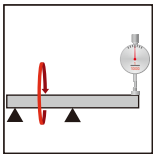
Hole Diameter	
d (mm)	**Tol.** (mm)
< 1.0	± 0.15
1.0 - 2.0	± 0.20
2.1 - 3.0	± 0.25

Ground Rods

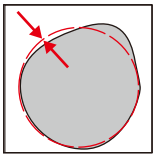




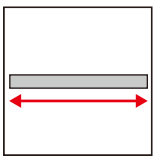
Straightness (Ground Rods)	
D (mm)	**Max. Straightness** (mm)
3.0-5.0	0.15
6.0-7.0	0.12
8.0-9.0	0.10
10.0-11.0	0.08
12.0-19.0	0.05
20.0-28.0	< 0.05



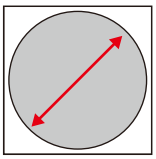
Circular Run-Out (Ground Rods)		
D (mm)	**L** (mm)	**Tol.** (mm)
3.0-7.0	30 - 50	0.01
	51 - 80	0.03
	81 - 110	0.05
	111 - 160	0.06
8.0-32.0	30 - 50	0.01
	51 - 80	0.02
	81 - 110	0.02
	111 - 160	0.04



Roundness (Ground Rods)	
D (mm)	**Tol.** (mm)
3.0 - 9.5	0.003
10.0 - 14.0	0.004
15.0 - 22.0	0.005
25.0 - 28.0	0.006

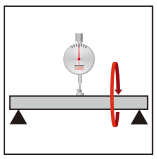


Length	
L (mm)	**Tol.** (mm)
310 / 330	+0 / +2.0
Cut-to-Length	+0.5 / +1.5



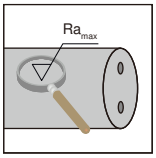
Outside Diameter

Measure the upper and lower limit of outside diameter of the round rods.



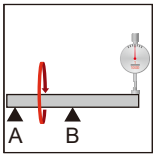
Straightness (Ground Rods)

Maximum deflection of a round rod which lies on two contact points, measured in the middle of the rod, The distance between two contact points is 300mm. When the rod is longer / shorter than 330mm, the contact width corresponds to the rod length minus 10mm.



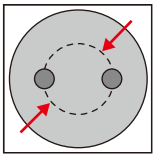
Surface Roughness

The surface quality of ground rods is indicated as maximum average roughness value Ra. (DIN EN ISO 4287: 1998)



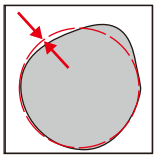
Circular Run-Out (Ground Rods)

Maximum deflection of a rod. Contact point A is 5mm before the chamfer. Contact point B is in the middle of the rod. The measurement is examed at 2mm from the end.



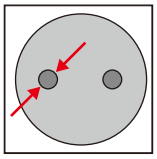
Pitch Circle Diameter

The pitch circle is defined as the circle which goes through two or three centre points of coolant holes. The diameter of this suppositional circle is "Pitch Circle Diameter" or "TK".



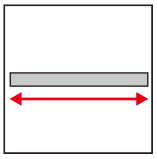
Roundness (Ground Rods)

Roundness is the radial distance of two concentric circles which include the circumference line of the round rod's section.



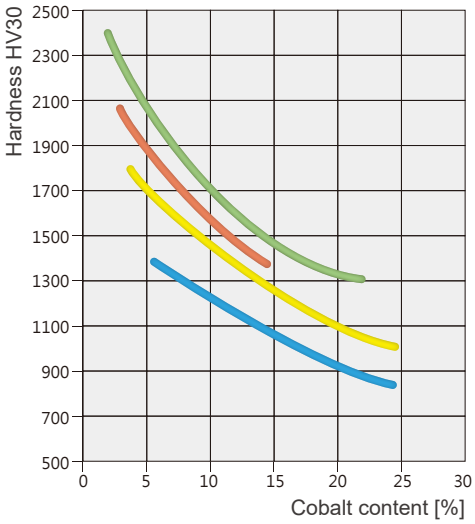
Hole Diameter

The hole diameter is the diameter of the coolant holes inside the rods.



Length

Measure the upper and lower limit of length of the round rods.

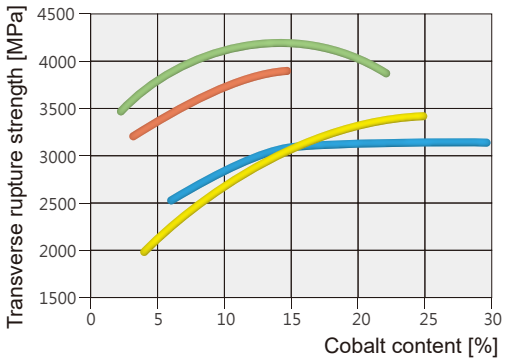


Hardness

Hardness is a material's mechanical resistance to another, harder, material which penetrates it. This value is usually measured by "Vickers Harndess Procedure" (ISO 3878) or "Rockwell Hardness Procedure" (ISO 3738). Like wear resistance, hardness also increases with a smaller grain size and lower cobalt content. Therefore, hardness is often used as a reference for wear resistance.

Ultrafine grades
Fine / Medium grades
Submicron grades
Coarse grades

Figure 1: Hardness in relation to the cobalt content and grain size

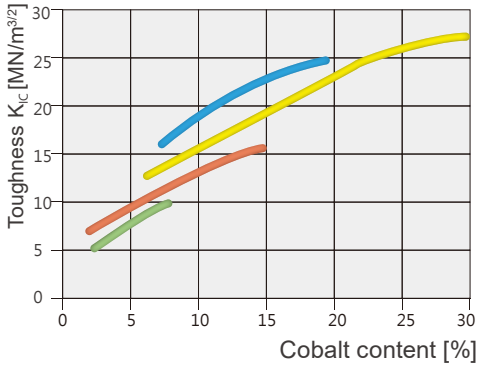


Transverse Rupture Strength

Testing "Transverse Rupture Strength" is a common procedure to analyse the mechanical property of carbide. Based on ISO 3327 standard, a material with fixed length is placed on two contact points and certain stress is given in the milddle until the material breaks. The average value of several tests is then determined as T.R.S. (Transverse Rupture Strength)

Ultrafine grades
Fine / Medium grades
Submicron grades
Coarse grades

Figure 2: Transverse rupture strength in relation to the grain size and thecobalt content

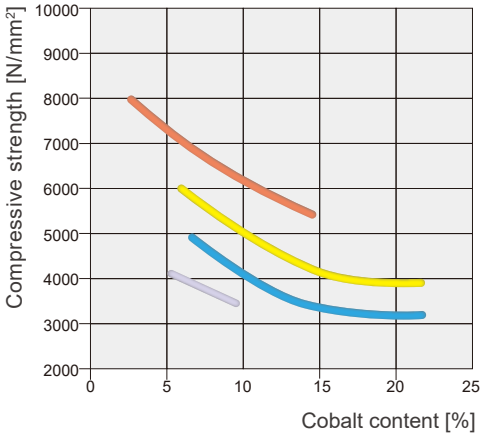


Fracture Toughness

When a material is exposed to external stress, this leads to mechanical tensions. Under this circumstances, both the strengh and ductility of the material indicate the basis for the concept of toughness. In other words, toughness is defined as the capacity to resist fracture or rupture growth. "Palmqvist Method" is frequently applied to determine the toughness value, K_{IC}.

Ultrafine grades
Fine / Medium grades
Submicron grades
Coarse grain grades

Figure 3: Fracture toughness in relation to the grain size and the cobalt content

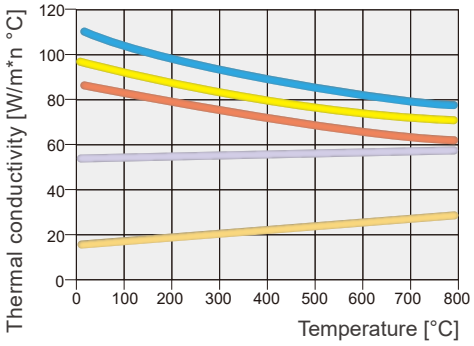


Compressive Strength

One of the most remarkable properties of carbide is the extremely high compressive strengh under uniaxial stress. This precious property is applied to almost all applications. When metal binder content decreases and the grain size decreases, the compressive strength increases. A small grain carbide with a low metal binder content typically has a compressive strength of almost 7,000 N/mm2. The compressive strength decreases when the temperature increases. The degree of plastic deformation increase notably with the temperature, so that the results are variable when temperatures are high.

Submicron grades
Coarse grades
Fine / Medium grades
Extra-coarse grades

Figure 4: Compressive strength in relation to the grain size and the cobalt content

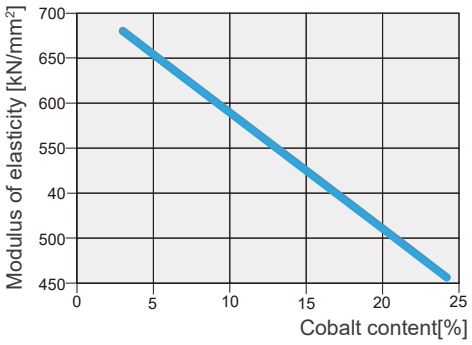


Thermal Conductivity

The thermal conductivity plays an important role in carbide applications, it determines the temperature in the wear areas and has a large influence on the carbide's thermal fatigure resistance and resistance to thermal fluctuations. The thermal conductivity of carbide is around twice as high as that of non-alloyed steel.

Submicron grades
Coarse grades
Fine / Medium grades
Low y-phase content
High y-phase content

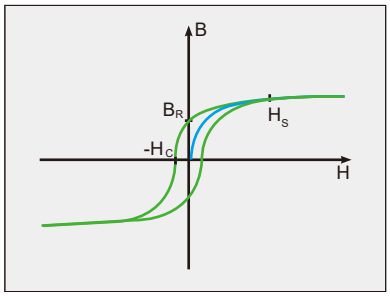
Figure 5: Thermal conductivity in relation to the temperature of various micro-structures and grain sizes



Modulus of Elasticity

The modulus of elasticity indicates the resistance of a material against elastic deformation. The modulus of elasticity for carbide is 2 to 3 times higher than in steel. It will increase linearly with decreaseing metal binder content.

Figure 6: Modulus of elasticity of WC-Co carbides



Magnetic Saturation

Carbides with cobalt as a metal binder are ferromagnetic. If a ferromagnetic material is exposed to a magnetic field strength H, the magnetic flux density B in this material increases (blue line). The flux density decreases when the field strength rises, until maximum saturation is achieved.

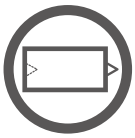
Coercive Force

Coercive Force is one of the property of magnetic material. The inverse field strength HC which is necessary to reduce the magnetic flux density to zero, or to 'de-magnetise' the material, is defined as coercive force. Coercive Force is usually measured in oersted (Oe) or ampere/meter (A/m) units and is denoted HC. It can be measured using a B-H analyzer or magnetometer.

Figure 7: Hysteresis curve of a ferromagnetic material

Post-Processing

In addition to manufacturing hard metal products, CB-CERATIZIT can offer wide variety of post-processing services to fulfill on-going changes and innovation in the cutting tool industry.
CB-CERATIZIT is able to quickly respond to market demand with our highly flexible production capability.

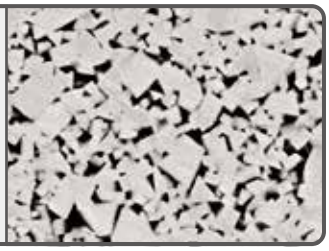
Symbol	Service	Description
	**Cutting**	Our cutting department can offer cutting services for standard or special length based on customers' demands.
	**Grind**	We are able to grind to h6 or h5 standard. Other tolerance is upon request.
	**Chamfer**	Our grinding shop can offer chamfering services.
	**Center Hole**	Standard centre hole (male or female hole), or centre hole based on drawings is applicable in our grinding shop.
	**Diameter Step**	Pre-machine services to shape various diameter step help customers to reduce working hours. (DIN 509)
	**Weldon Shank**	We are able to manufacture standard Weldon shank, such as DIN 6535HB or DIN 1835E.
	**Ball Nose**	We are able to produce ball nose according to customers' requests. The processing time will be reduced significantly.
	**Point**	We could produce either 120 degree or 140 degree point, based on customers' request.
	**Groove**	Pre-machined grooves allows customers to carry out.

The Pillars of Success

The development of machining process require optimal control in
Carbide / Cutting Tool / Coating / Conditions
and they need to work together in order to achieve successful process.

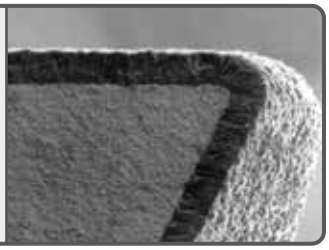
Successful Machining Process

Carbide
- Optimum grade for the particular application and type of tool
- Optimum blank execution

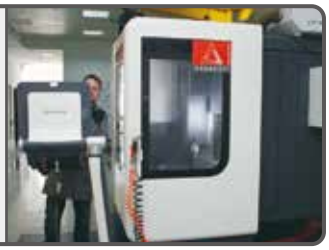


Cutting Tool
- Macro geometry
- Micro geometry
- Surface finish
- Precision

Coating
- Application oriented type of coating



Conditions
- Speeds & Feeds
- Machining strategy
- Rigidity of machine
- Cooling
- Clamping



* All parameters need to work together.

CB-CERATIZIT

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