



# ZCC America

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**2024 VERSION**

## CARBIDE RODS FOR CUTTING TOOLS



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# ABOUT ZCC



Zhuzhou Cemented Carbide Group Corporation Ltd. ZCC was one of the 156 major projects that China built in 1954 in its "First Five-Year Plan" , and was known as "the cradle of China's cemented carbide industry" . It is China's largest enterprise specialized in the production,scientific research, sales and export of cemented carbide.

ZCC's main products fall into 6 major categories: metal cutting tools, mining and oil drilling tools, hard materials, tungsten and molybdenum products, tantalum and niobium products, rare metals powder.

They are widely used in industries of metallurgy, machinery, geology, coal, oil and gas, petrochemical, electronics, textile and national defense, etc.

ZCC has established Sales Branches in Germany, USA, India and other countries, and its "Diamond Brand" and "ZCC" trademark has been registered in more than 60 countries and regions, such as Britain, Denmark, South Korea, Australia, Canada, and the products are sold to more than 70 countries and regions in the world.

## 1954

**FOUNDATION**

One of the 156 major projects that China constructed in 1954 in its "First Five-Year Plan"

## 1958

**THE FIRST ROD**

China's 1st piece of ROD was born in ZCC

## 2001

**THE FITST ROD WITH COOLANT HOLES**

China's 1st piece of ROD with coolant holes was born in ZCC

## 2009

**RODS & BARS DIVISION BUILT**

Isolated division for rods only in order to avoid cross contamination

## 2018

**NEW DRILL BLANKS**

New production line and have sold one million pieces

## 2021

**NEWLY BUILT PLANT OF RODS AND BARS DIVISION**

The World's leading manufacturing center for rods and bars

# PRODUCTION CAPACITY

At present, ZCC has 5 professional product divisions, 1 manufacturing plants, 3 research and development centers, 1 analysis and testing center, 5 holding subsidiaries, with all kinds of production and testing equipments. It has the production capacity of the entire cemented carbide system from raw materials powder production, to the finished carbide products production, and then to post production processing, and it is capable of producing and processing various types and shapes of cemented carbide. The annual output of cemented carbide products ranks the first in China.

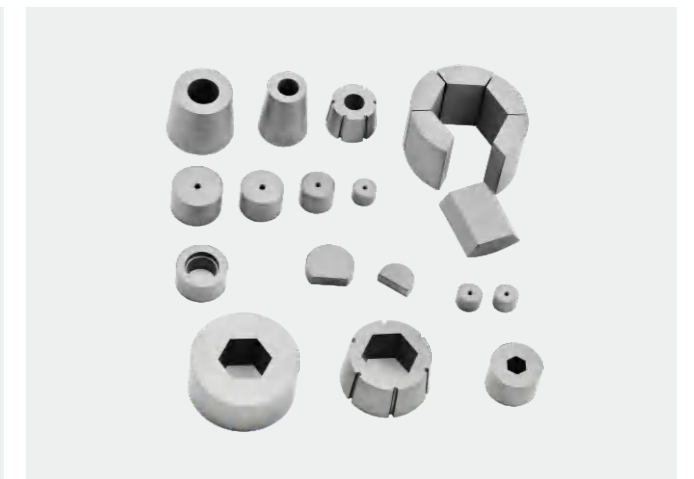
5 PROFESSIONAL PRODUCT DIVISIONS

1 MANUFACTURING PLANTS

3 RESEARCH AND DEVELOPMENT CENTERS

1 ANALYSIS AND TESTING CENTER

5 HOLDING SUBSIDIARIES



# R&D



ZCC adheres to the strategy of "revitalizing enterprise through science and education" and constantly improves its independent innovation ability.

Its hard material R&D center, cutting tool R&D center and micro bit R&D center is of the highest level in China. Since the "11th Five-Year Plan", ZCC has invested nearly 100 million yuan in scientific research every year, and has undertaken more than 20 major scientific and technological projects including national "863" and "973" projects, national innovation capacity construction projects, and national science and technology support projects. With a number of scientific research achievements reaching the international advanced level, ZCC has won more than 40 honors and awards at the provincial level and above. It has nearly 10 national strategic innovative products and key new product projects.

More than 830 authorized patents have been granted, and over 180 national and industrial standards have been established and revised.



ZCC is the presidium unit of China Tungsten Industry Association and the chairman unit of cemented carbide branch. It is the organizer and administrator of the national academic journal **CEMENTED CARBIDE** with great influence and authority in the field of cemented carbide and super hard materials in China, leading the development of cemented carbide industry in China.

ZCC has State Key Laboratory for Cemented Carbide, Nationally Recognized Enterprise Technology Center, Industrial Product Quality Control and Technical Evaluation Laboratory, and Cemented Carbide Quality Inspection Station of China Non-ferrous Metals Industry. It was identified as the national technology innovation demonstration enterprise and the national intellectual property advantage enterprise with the first post-doctoral research station in Hunan province.

# QUALITY ASSURANCE

ZCC always adheres to the quality policy of "Emphasizing Technology, Strict Management, Quality First, and Diamond Brand Products Fully Satisfying Customers' Needs". It has passed the certification in quality, occupational health and safety and environment management. ZCC always adheres to the idea of "Everything for Customer Service", closely focusing on customer needs, constantly expanding technical service efforts, and striving to improve the market service support capabilities.



# THE RODS FACTORY



## Rods & Bars Branch

Rods & Bars Branch is a specialized production unit of cemented carbide rods and bars authorized by ZCC on Nov 12th, 2010. It is a base of ultra-fine cemented carbide that brings together R&D, production, and sales. It has world top technologies regarding cemented carbide and ultra-fine cemented carbide including TAP molding, isostatic pressing and extrusion molding, pressure sintering, etc., as well as high precision extrusion "near net shaping" technique, and complex helical groove shape preforming technique.

Rods and Bars Branch has relatively complete product variety and is able to produce cemented carbide products of nanocrystalline, ultra-fine, submicron crystalline, fine crystalline, etc. Rods and Bars Branch is a stable supplier of PCB rods, solid tool bars, rods with coolant holes, flat bars, among other mainstream products of the industry, and can meet market demand of multiple fields including electronic information, automobile, aerospace, molds, etc. It has been awarded "Science and Technology Prize of China Nonferrous Industry", "National Scientific and Technological Advancement Prize" among other national and provincial awards.

Currently, with 300 professional employees and three specialized workshops, ZCC's rod & bar division is producing about 2000 tons of rods annually and more than one-third are exported to worldwide-famous cutting tool manufacturers.

## New factory founded in Jan. 2021

3000 tons per year capacity (designed)

Semi-automatic production

Stable quality

Automatic storage / pickup warehouse

## 2021 Improvement Data

Production capacity increased 22%

Labor reduced 10%

Customer complaint reduced 30%

WIP reduced 25%

Productivity improved 35%





# GRADE OVERVIEW

Grade	ISO Grade	Cobalt content	Grain size	Density	Hardness		Fracture toughness	TRS
		wt.%	μm	g/cm3	HV30	HRA	MPa.m <sup>1/2</sup>	N/mm <sup>2</sup>
XT40S	K20-K40	13.0	0.4	14.00	1600	91.8	12.5	5000
XT30S	K20-K40	12.0	0.6	14.10	1580	91.7	12.0	4800
XF30S	K20-K40	12.0	0.6	14.12	1680	92.2	10.5	4500
XF30	K20-K40	12.0	0.6	14.15	1650	92.0	9.8	4000
XU30	K20-K40	12.0	0.4	14.10	1700	92.3	10.0	4200
XF20S	K20-K40	10.3	0.6	14.42	1650	92.0	11.5	4500
YL10.2S	K20-K40	10.0	0.7	14.45	1630	91.9	10.5	4200
YL10.2	K20-K40	10.0	0.8	14.45	1600	91.8	10.1	4000
XL18	K20-K40	10.0	0.8	14.45	1580	91.7	9.5	3800
XU09S	K05-K10	9.0	0.4	14.40	1950	93.8	8.8	4000
YF06	K05-K10	6.0	0.6	14.90	1860	93.3	9.0	3800
YL06C	K05-K10	6.0	1.5	14.92	1620	91.9	9.7	3600
XL06H	K05-K10	6.0	1.5	14.90	1700	92.3	9.6	3500

mm

# APPLICATION

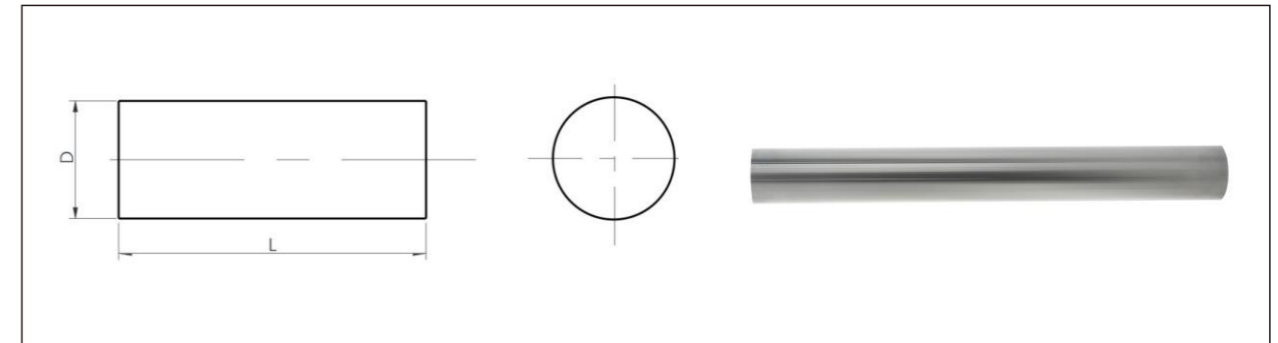
Grade	Application
XT40S	Submicron material, excellent high-temperature performance, suitable for rough and fine integrated machining of titanium alloys, recommended for processing high-temperature alloys.
XT30S	Suitable for the rough milling of stainless steel and titanium alloy.
XF30S	Suitable for the machining of common steel, cast iron, mold steel with HRC≤45, Recommended to make drills, end mills, reamers.
XF30	Suitable for processing non-ferrous metals, cast iron, and steel materials (HRC≤45).
XU30	Suitable for the machining of composite materials, such as stainless steel, high temperature alloy, mold steel (especially for heat-treated steel with hardness HRC 40~60), glass fiber reinforced plastics. Recommended to make end mills,reamers, graves and screw taps, etc.
XF20S	Suitable for cutting alloy steel, stainless steel, non-ferrous metal, high temperature alloy and so on.
YL10.2S	Classical grade for general applications.Suitable for the machining of general materials such as common steel, cast iron, non-ferrous metal Recommended to make conventional tools such as twist drills, end mills, screw taps, etc.
YL10.2	Classical grade for general applications. Suitable for the machining of general materials such as common steel, cast iron, non-ferrous metal Recommended to make conventional tools such as twist drills, end mills, screw taps, etc.
XL18	Suitable for cutting alloy steel, stainless steel, non-ferrous metal, high temperature alloy and so on.
XU09S	For high speed cutting and dry cutting hardened steel, cast iron, graphite, aluminum alloys, etc.
YF06	Classical grade for rods.Suitable for the machining of composite materials such as aluminum-magnesium alloy, plastic, reinforced plastic and carbon fiber, iron-based alloys etc. Recommended for the drilling and milling of aluminum-magnesium alloys.
YL06C	Diamond-coated substrate, after coating can be used for processing graphite, composite materials and ceramic processing.
XL06H	High-performance grade of gun drill, suitable for processing difficult-to-process materials such as high-temperature alloys, titanium alloys, and stainless steel.

mm

# SOLID RODS

# SOLID RODS

## UNGROUND RODS



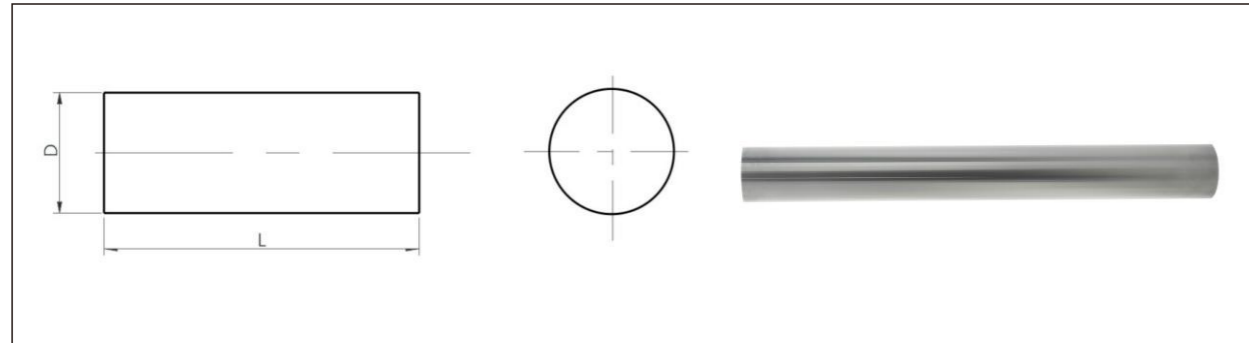
Diameter		Length		
D	Tol.	L		Tol.
0.5	+0.1/+0.2	310	330	0/+10
1.0	+0.1/+0.2	310	330	0/+10
2.0	+0.1/+0.25	310	330	0/+10
3.0	+0.1/+0.3	310	330	0/+10
4.0	+0.2/+0.5	310	330	0/+10
5.0	+0.2/+0.5	310	330	0/+10
6.0	+0.2/+0.5	310	330	0/+10
7.0	+0.2/+0.5	310	330	0/+10
8.0	+0.2/+0.5	310	330	0/+10
9.0	+0.2/+0.5	310	330	0/+10
10.0	+0.2/+0.5	310	330	0/+10
11.0	+0.2/+0.5	310	330	0/+10
12.0	+0.2/+0.6	310	330	0/+10
13.0	+0.2/+0.6	310	330	0/+10
14.0	+0.2/+0.6	310	330	0/+10
15.0	+0.2/+0.6	310	330	0/+10
16.0	+0.2/+0.6	310	330	0/+10
17.0	+0.2/+0.6	310	330	0/+10

mm

We provide customized solid rod blanks with diameters  $\geq \Phi 35.0\text{mm}$   
More types are available on request

# SOLID RODS

## UNGROUND RODS



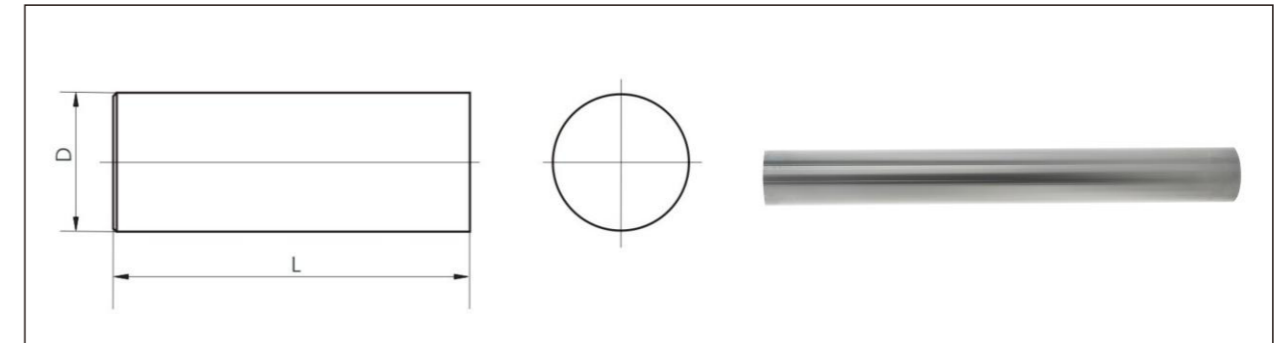
Diameter		Length		
D	Tol.	L		Tol.
18	+0.2/+0.6	310	330	0/+10
19	+0.2/+0.6	310	330	0/+10
20	+0.2/+0.6	310	330	0/+10
21	+0.25/+0.65	310	330	0/+10
22	+0.25/+0.65	310	330	0/+10
23	+0.25/+0.65	310	330	0/+10
24	+0.25/+0.65	310	330	0/+10
25	+0.25/+0.65	310	330	0/+10
26	+0.25/+0.65	310	330	0/+10
27	+0.25/+0.65	310	330	0/+10
28	+0.25/+0.65	310	330	0/+10
29	+0.25/+0.65	310	330	0/+10
30	+0.25/+0.65	310	330	0/+10
31	+0.25/+0.65	310	330	0/+10
32	+0.25/+0.65	310	330	0/+10
33	+0.25/+0.65	310	330	0/+10
34	+0.25/+0.65	310	330	0/+10
35	+0.25/+0.65	310	330	0/+10

mm

We provide customized solid rod blanks with diameters  $\geq \Phi 35.0\text{mm}$   
More types are available on request

# SOLID RODS

## GROUND RODS



### GROUND RODS PRODUCT LENGTH $\leq 260\text{mm}$

D	h6	h5	R	CHAMFER SIZE	LENGTH TOLERANCE
$1.0 \leq D \leq 3.0$	-0.001/-0.006	-0.001/-0.004	45°	0.3	0/+1.0
$3.0 \leq D \leq 6.0$	-0.001/-0.008	-0.001/-0.005	45°	0.4	0/+1.0
$6.0 \leq D \leq 10.0$	-0.001/-0.009	-0.001/-0.006	45°	0.6	0/+1.0
$10.0 \leq D \leq 18.0$	-0.001/-0.011	-0.001/-0.008	45°	0.8	0/+1.0
$18.0 \leq D \leq 30.0$	-0.001/-0.013	-0.001/-0.009	45°	1	0/+1.0

mm

### GROUND RODS PRODUCT LENGTH $< 260\text{mm} \leq 330\text{mm}$

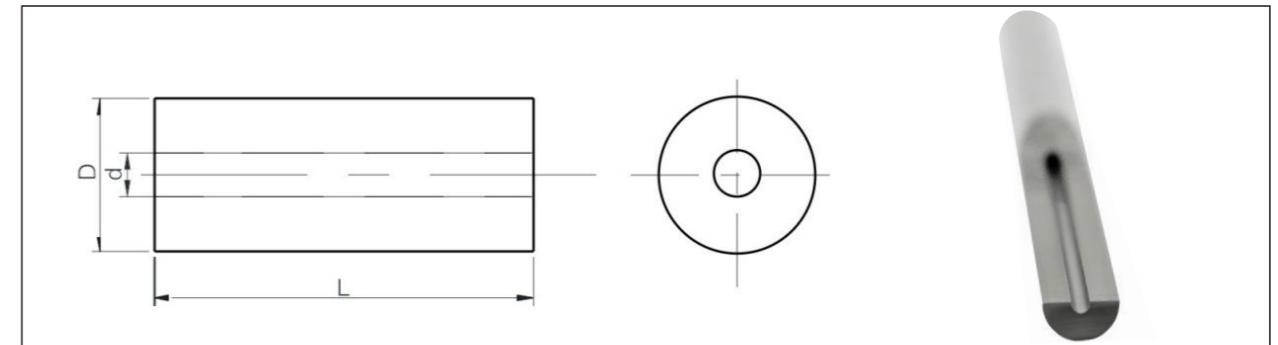
D	h6	h5	LENGTH TOLERANCE
$1.0 \leq D \leq 3.0$	-0.001/-0.006	-0.001/-0.004	0/+1.0
$3.0 \leq D \leq 6.0$	-0.001/-0.008	-0.001/-0.005	0/+1.0
$6.0 \leq D \leq 10.0$	-0.001/-0.009	-0.001/-0.006	0/+1.0
$10.0 \leq D \leq 18.0$	-0.001/-0.011	-0.001/-0.008	0/+1.0
$18.0 \leq D \leq 30.0$	-0.001/-0.013	-0.001/-0.009	0/+1.0
$30.0 \leq D \leq 40.0$	-0.001/-0.016	-0.001/-0.011	0/+1.0

mm

# RODS WITH COOLANT HOLES

# RODS WITH COOLANT HOLES

## RODS WITH 1 STRAIGHT HOLE

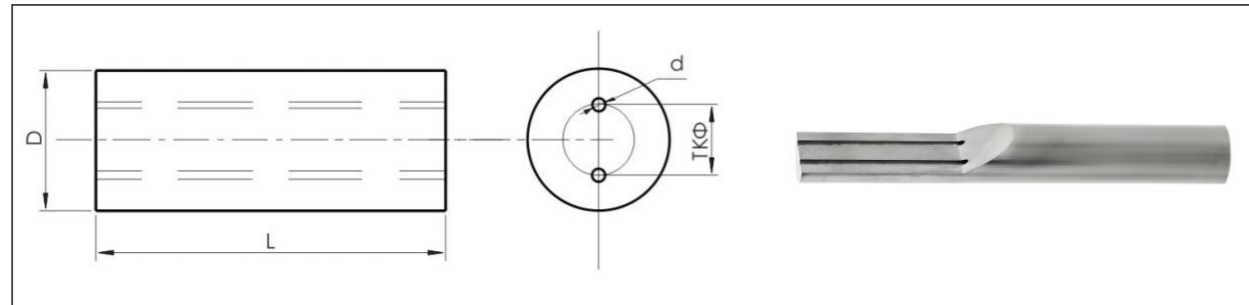


Diameter		Coolant hole Dia		CO(≤)	Length	
D	Tol.	d	Tol.		L	Tol.
3.0	+0.2/+0.5	0.5	±0.1	0.20	330	0/+10
4.0	+0.2/+0.6	1.0	±0.15	0.20	330	0/+10
5.0	+0.2/+0.6	1.0	±0.15	0.20	330	0/+10
5.0	+0.2/+0.6	1.5	±0.15	0.20	330	0/+10
6.0	+0.2/+0.6	1.0	±0.15	0.20	330	0/+10
6.0	+0.2/+0.6	1.5	±0.15	0.20	330	0/+10
8.0	+0.2/+0.6	1.0	±0.15	0.20	330	0/+10
8.0	+0.2/+0.6	1.5	±0.15	0.20	330	0/+10
9.0	+0.2/+0.6	1.0	±0.15	0.25	330	0/+10
10.0	+0.3/+0.7	1.0	±0.15	0.25	330	0/+10
10.0	+0.3/+0.7	2.0	±0.2	0.25	330	0/+10
11.0	+0.3/+0.7	1.0	±0.15	0.25	330	0/+10
12.0	+0.3/+0.7	1.0	±0.15	0.25	330	0/+10
12.0	+0.3/+0.7	2.0	±0.2	0.25	330	0/+10
14.0	+0.3/+0.7	2.0	±0.2	0.25	330	0/+10
16.0	+0.3/+0.7	2.0	±0.2	0.25	330	0/+10
16.0	+0.3/+0.7	3.0	±0.25	0.25	330	0/+10
18.0	+0.4/+0.8	3.0	±0.25	0.30	330	0/+10
20.0	+0.4/+0.8	3.0	±0.25	0.30	330	0/+10
22.0	+0.4/+0.8	3.0	±0.25	0.30	330	0/+10
24.0	+0.4/+0.8	3.0	±0.25	0.30	330	0/+10
25.0	+0.4/+0.8	4.0	±0.25	0.30	330	0/+10

mm

# RODS WITH COOLANT HOLES

## RODS WITH 2 STRAIGHT HOLES



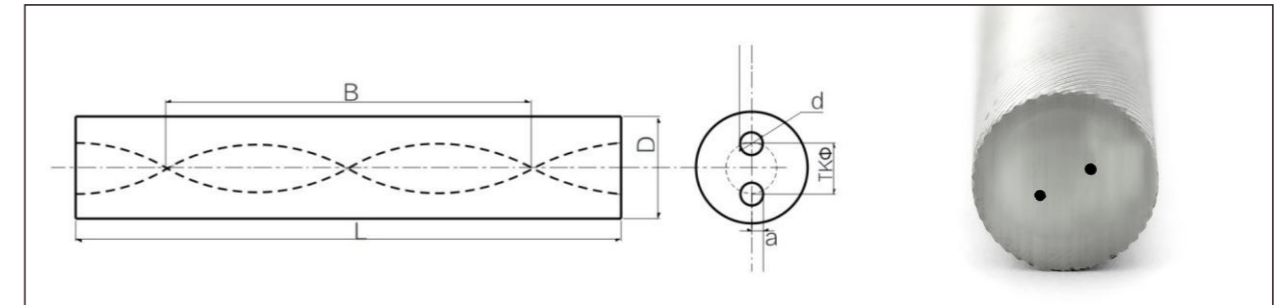
Diameter		TK	d	TK		E	Length	
D	Tol.			d	Tol.		L	Tol.
4.3	0/+0.3	1.8	-0.4/0	0.8	±0.10	0.10	330	0/+10
5.3	0/+0.3	2.0	-0.4/0	0.8	±0.10	0.13	330	0/+10
6.3	0/+0.3	3.0	-0.5/0	1.0	±0.15	0.15	330	0/+10
7.3	0/+0.3	3.5	-0.5/0	1.0	±0.15	0.15	330	0/+10
8.3	0/+0.3	4.0	-0.6/0	1.0	±0.15	0.15	330	0/+10
9.3	0/+0.3	4.0	-0.6/0	1.4	±0.15	0.20	330	0/+10
10.3	0/+0.3	5.0	-0.6/0	1.4	±0.15	0.28	330	0/+10
11.3	0/+0.4	5.0	-0.6/0	1.4	±0.15	0.30	330	0/+10
12.3	0/+0.4	6.0	-0.6/0	1.75	±0.15	0.30	330	0/+10
13.3	0/+0.4	6.0	-0.6/0	1.75	±0.15	0.34	330	0/+10
14.3	0/+0.4	7.0	-0.6/0	1.75	±0.15	0.37	330	0/+10
15.3	0/+0.4	7.0	-0.6/0	2.0	±0.20	0.40	330	0/+10
16.3	0/+0.4	8.0	-0.6/0	2.0	±0.20	0.40	330	0/+10
17.3	0/+0.5	8.0	-0.6/0	2.0	±0.20	0.47	330	0/+10
18.3	0/+0.5	9.0	-0.6/0	2.0	±0.20	0.50	330	0/+10
19.3	0/+0.5	9.0	-0.6/0	2.0	±0.20	0.50	330	0/+10
20.3	0/+0.5	10.0	-0.8/0	2.5	±0.25	0.50	330	0/+10
22.4	0/+0.5	11	-0.8/0	2.5	±0.25	0.50	330	0/+10
23.4	0/+0.5	11	-0.8/0	2.5	±0.25	0.50	330	0/+10
25.4	0/+0.5	12	-0.8/0	3.0	±0.25	0.50	330	0/+10

mm

We provide customized non-standard cemented carbide two-hole straight rods with diameter ≤ Φ25.0mm

# RODS WITH COOLANT HOLES

## RODS WITH 2 HELICAL HOLES (30°)



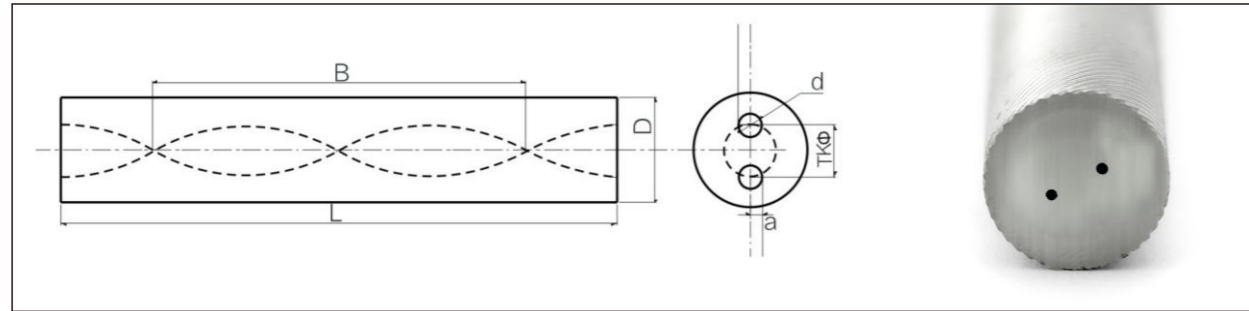
Diameter		d	d	TK		E	P			
D	Tol.			Tol.	TK		Tol.	P1	P2	P3
3.3	+0.7/+0.3	0.4	±0.10	1.7	+0/-0.3	≤0.04	15.89	16.32	16.77	±0.23
4.3	+0.7/+0.3	0.6	±0.15	2.2	+0/-0.3	≤0.05	21.19	21.77	22.36	±0.31
5.3	+0.8/+0.3	0.7	±0.15	2.6	+0/-0.4	≤0.10	26.49	27.21	27.95	±0.38
6.3	+1.0/+0.4	0.7	±0.15	2.6	+0/-0.4	≤0.10	31.79	32.65	33.54	±0.46
7.3	+1.0/+0.4	1.0	±0.15	3.7	+0/-0.4	≤0.10	37.09	38.09	39.13	±0.54
8.3	+1.0/+0.4	1.0	±0.15	4.0	+0/-0.4	≤0.10	42.38	43.53	44.73	±0.62
9.3	+1.0/+0.4	1.4	±0.15	4.8	+0/-0.6	≤0.15	47.68	48.97	50.32	±0.69
10.3	+1.1/+0.4	1.4	±0.15	4.8	+0/-0.6	≤0.15	52.98	54.41	55.91	±0.77
11.3	+1.1/+0.4	1.4	±0.15	5.3	+0/-0.8	≤0.18	58.28	59.86	61.50	±0.85
12.3	+1.1/+0.4	1.4	±0.15	6.25	+0/-0.8	≤0.18	63.58	65.30	67.09	±0.92
13.3	+1.2/+0.4	1.75	±0.20	6.5	+0/-0.8	≤0.18	68.87	70.74	72.68	±1.00
14.3	+1.4/+0.4	1.75	±0.20	7.1	+0/-0.8	≤0.18	74.17	76.18	78.27	±1.08
15.3	+1.4/+0.4	1.75	±0.20	7.7	+0/-0.8	≤0.20	79.47	81.62	83.86	±1.15
16.3	+1.4/+0.4	1.75	±0.20	8.3	+0/-0.8	≤0.20	84.77	87.06	89.45	±1.23
17.3	+1.4/+0.4	1.75	±0.20	8.9	+0/-0.8	≤0.20	90.07	92.50	95.04	±1.31
18.3	+1.4/+0.4	2.00	±0.25	9.55	+0/-0.8	≤0.20	95.36	97.95	100.63	±1.38
19.3	+1.4/+0.4	2.00	±0.25	10.0	+0/-0.8	≤0.20	100.66	103.39	106.22	±1.46
20.3	+1.4/+0.4	2.00	±0.25	10.4	+0/-1.0	≤0.20	105.96	108.83	111.81	±1.54
21.3	+1.4/+0.4	2.00	±0.25	11.15	+0/-1.0	≤0.20	111.26	114.27	117.40	±1.60
22.3	+1.4/+0.4	2.00	±0.25	11.6	+0/-1.0	≤0.20	116.56	119.71	123.00	±1.69
23.3	+1.4/+0.4	2.00	±0.25	12.2	+0/-1.0	≤0.20	121.85	125.15	128.59	±1.77
24.3	+1.4/+0.4	2.00	±0.25	12.8	+0/-1.0	≤0.20	127.15	130.59	134.18	±1.85
25.3	+1.4/+0.4	2.00	±0.25	13.3	+0/-1.0	≤0.20	132.45	136.03	139.77	±1.92
26.3	+1.4/+0.4	2.00	±0.25	13.8	+0/-1.0	≤0.20	137.75	141.48	145.36	±2.00
27.3	+1.4/+0.4	2.50	±0.30	14.3	+0/-1.2	≤0.20	143.05	146.92	150.95	±2.08
28.3	+1.4/+0.4	2.50	±0.30	14.8	+0/-1.2	≤0.20	148.34	152.36	156.54	±2.15

mm

D < 18.3, L > 100, Tol. 0 ~ +7; L < 100, Tol. 0 ~ +5. D ≥ 18.3, Tol. +3 ~ +10.

# RODS WITH COOLANT HOLES

## RODS WITH 2 HELICAL HOLES (30°)



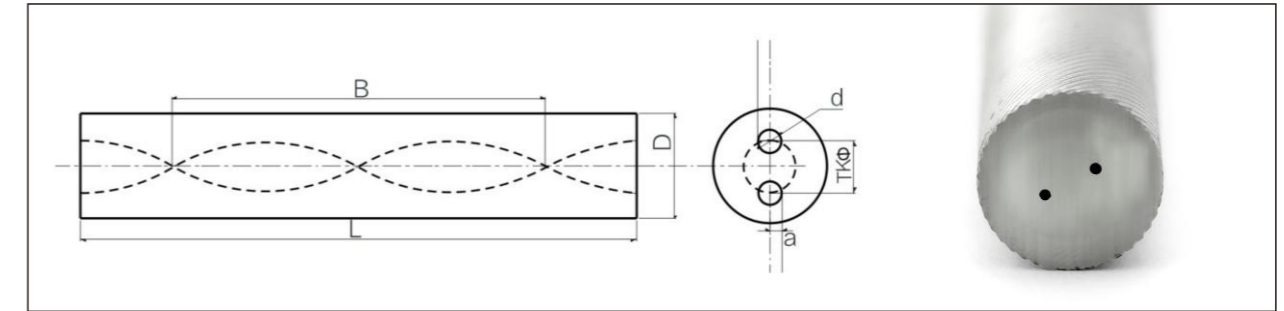
Diameter		d		TK		E	P			
D	Tol.	d	Tol.	TK	Tol.	e	P1	P2	P3	Tol.
6.3	+1.0/+0.4	0.3	±0.10	1.4	±0.15	≤0.10	31.79	32.65	33.54	±0.46
6.3	+1.0/+0.4	1.0	±0.15	2.6	+0/-0.4	≤0.10	31.79	32.65	33.54	±0.46
8.3	+1.0/+0.4	0.6	±0.15	2.8	+0/-0.4	≤0.10	42.38	43.53	44.73	±0.62
8.3	+1.0/+0.4	1.0	±0.15	3.5	+0/-0.4	≤0.10	42.38	43.53	44.73	±0.62
9.3	+1.0/+0.4	1.0	±0.15	4.0	+0/-0.4	≤0.15	47.68	48.97	50.32	±0.69
10.3	+1.1/+0.4	0.7	±0.15	2.6	+0/-0.4	≤0.15	52.98	54.41	55.91	±0.77
10.3	+1.1/+0.4	1.0	±0.15	3.0	+0/-0.4	≤0.15	52.98	54.41	55.91	±0.77
10.3	+1.1/+0.4	1.0	±0.15	3.8	+0/-0.4	≤0.15	52.98	54.41	55.91	±0.77
10.3	+1.1/+0.4	1.4	±0.15	5.0	+0/-0.6	≤0.15	52.98	54.41	55.91	±0.77
11.3	+1.1/+0.4	0.9	±0.15	3.0	+0/-0.4	≤0.18	58.28	59.86	61.50	±0.85
12.3	+1.1/+0.4	1.75	±0.20	6.0	+0/-0.8	≤0.18	63.58	65.30	67.09	±0.92
12.3	+1.1/+0.4	0.9	±0.15	4.2	+0/-0.6	≤0.18	63.58	65.30	67.09	±0.92
12.3	+1.1/+0.4	1.4	±0.15	3.8	±0.20	≤0.18	63.58	65.30	67.09	±0.92
12.3	+1.1/+0.4	1.75	±0.20	4.5	±0.30	≤0.18	63.58	65.30	67.09	±0.92
13.3	+1.2/+0.4	1.0	±0.15	4.4	+0/-0.6	≤0.18	68.87	70.74	72.68	±1.00
14.3	+1.4/+0.4	0.8	±0.15	3.5	+0/-0.4	≤0.18	74.17	76.18	78.27	±1.08
14.3	+1.4/+0.4	1.0	±0.15	4.7	+0/-0.6	≤0.18	74.17	76.18	78.27	±1.08
14.3	+1.4/+0.4	1.4	±0.15	4.5	+0/-0.6	≤0.18	74.17	76.18	78.27	±1.08
16.3	+1.4/+0.4	2.0	±0.20	8.0	+0/-0.6	≤0.20	84.77	87.06	89.45	±1.23
16.3	+1.4/+0.4	2.2	±0.20	8.2	+0/-0.8	≤0.20	84.77	87.06	89.45	±1.23
16.3	+1.4/+0.4	1.2	±0.15	5.5	+0/-0.8	≤0.20	84.77	87.06	89.45	±1.23
18.3	+1.4/+0.4	1.75	±0.20	9.15	+0/-0.8	≤0.20	95.36	97.95	100.63	±1.38
18.3	+1.4/+0.4	1.4	±0.15	6.3	+0/-0.8	≤0.20	95.36	97.95	100.63	±1.38
20.3	+1.4/+0.4	1.5	±0.15	7.1	+0/-0.8	≤0.20	105.96	108.83	111.81	±1.54
21.3	+1.4/+0.4	1.4	±0.15	7.1	+0/-0.8	≤0.20	111.26	114.27	117.40	±1.60
22.3	+1.4/+0.4	2.0	±0.25	10.7	+0/-1.0	≤0.20	116.56	119.71	123.00	±1.69

mm

D < 18.3, L > 100, Tol. 0 ~ +7; L < 100, Tol. 0 ~ +5. D ≥ 18.3, Tol. +3 ~ +10.

# RODS WITH COOLANT HOLES

## RODS WITH 2 HELICAL HOLES (40°/ 45°)



### TWO COOLANT HOLES, 40° HELIX

Diameter		d		TK		E	P			
D	Tol.	d	Tol.	TK	Tol.	e	P1	P2	P3	Tol.
6.3	+1.0/+0.4	0.5	±0.15	2.2	+0/-0.4	≤0.15	21.68	22.46	23.28	±0.42
6.3	+1.0/+0.4	0.65	±0.15	2.7	+0/-0.6	≤0.15	28.91	29.95	31.04	±0.56
10.3	+1.1/+0.4	0.8	±0.15	3.5	+0/-0.8	≤0.20	36.14	37.44	38.8	±0.70
12.3	+1.1/+0.4	0.9	±0.15	4.2	+0/-0.8	≤0.30	43.37	44.93	46.55	±0.84
14.3	+1.4/+0.4	1.0	±0.20	4.7	+0/-0.8	≤0.37	50.6	52.42	54.31	±0.98
16.3	+1.4/+0.4	1.2	±0.20	5.5	+0/-0.8	≤0.40	57.82	59.9	62.07	±1.12
18.3	+1.4/+0.4	1.4	±0.20	6.3	+0/-0.8	≤0.50	65.05	67.39	69.83	±1.26
20.3	+1.4/+0.4	1.5	±0.20	7.1	+0/-1.0	≤0.50	72.28	74.88	77.59	±1.40

mm

### TWO COOLANT HOLES, 45° HELIX

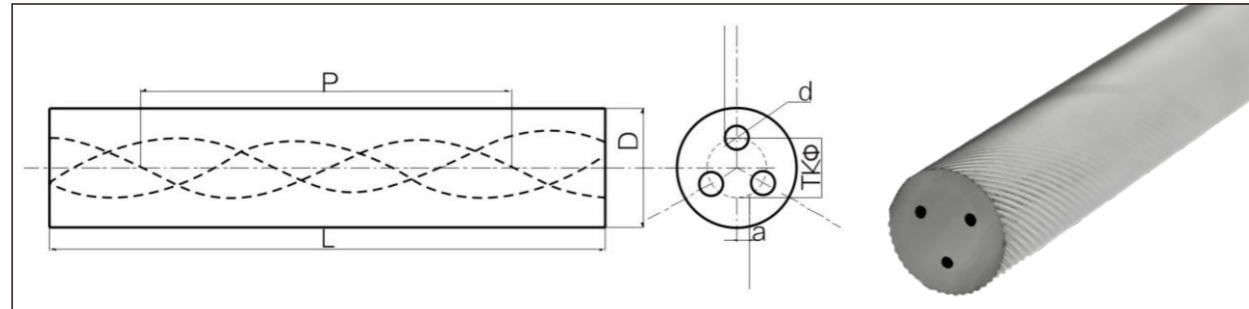
Diameter		d		TK		E	P			
D	Tol.	d	Tol.	TK	Tol.	e	P1	P2	P3	Tol.
6.3	+1.0/+0.4	0.6	±0.15	1.9	+0/-0.4	≤0.15	18.2	18.85	19.52	±0.34

mm

More types are available on request

# RODS WITH COOLANT HOLES

## RODS WITH 3 HELICAL HOLES (30°)



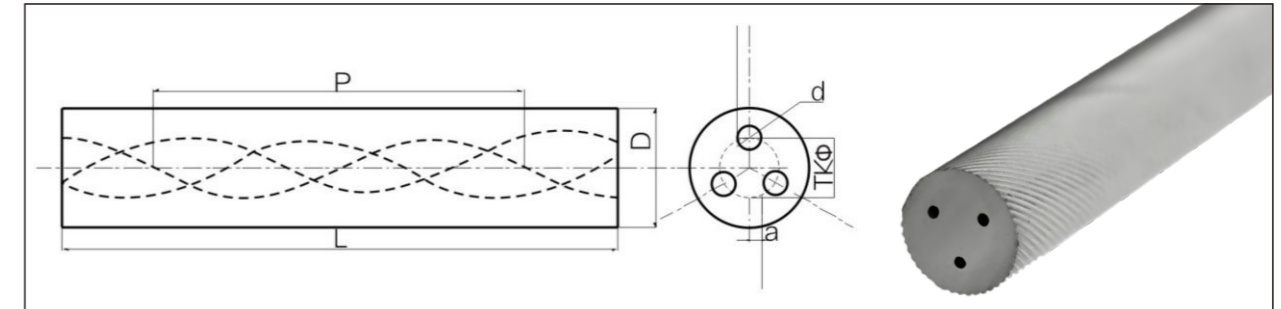
Diameter		d		TK		E	P			
D	Tol.	d	Tol.	TK	Tol.	e	P1	P2	P3	Tol.
6.3	+1.0/+0.4	0.5	±0.15	2.9	+0/-0.4	±4°	31.79	32.65	33.54	±0.46
8.3	+1.0/+0.4	0.7	±0.15	4.0	+0/-0.4	±4°	42.38	43.53	44.73	±0.62
9.3	+1.0/+0.4	0.85	±0.15	5.1	+0/-0.5	±4°	47.68	48.97	50.32	±0.69
10.3	+1.1/+0.4	0.85	±0.15	5.1	+0/-0.4	±4°	52.98	54.41	55.91	±0.77
12.3	+1.1/+0.4	1.1	±0.15	6.3	+0/-0.6	±4°	63.58	65.30	67.09	±0.92
14.3	+1.4/+0.4	1.4	±0.20	7.3	+0/-0.8	±4°	74.17	76.18	78.27	±1.08
15.3	+1.4/+0.4	1.4	±0.20	7.8	+0/-0.8	±4°	79.47	81.62	83.86	±1.15
16.3	+1.4/+0.4	1.6	±0.20	8.3	+0/-0.8	±4°	84.77	87.06	89.45	±1.23
18.3	+1.4/+0.4	1.7	±0.20	9.5	+0/-0.8	±4	95.36	97.95	100.63	±1.38
20.3	+1.4/+0.4	1.9	±0.25	10.2	+0/-0.8	±4°	105.96	108.83	111.81	±1.54
22.3	+1.4/+0.4	2.0	±0.25	11.5	+0/-0.8	±4°	116.56	119.71	123.00	±1.69
22.3	+1.4/+0.4	2.0	±0.25	10.7	+0/-1.0	±4°	116.56	119.71	123.00	±1.69
24.3	+1.4/+0.4	2.0	±0.25	12.5	+0/-0.8	±4°	127.15	130.59	134.18	±1.85
25.3	+1.4/+0.4	2.0	±0.25	12.5	+0/-0.8	±4°	132.45	136.03	139.77	±1.92

mm

D < 18.3, L > 100, Tol. 0 ~ +7; L < 100, Tol. 0 ~ +5. D ≥ 18.3, Tol. +3 ~ +10.

# RODS WITH COOLANT HOLES

## RODS WITH 3 HELICAL HOLES ( 40°)



Diameter		d		TK		E	P			
D	Tol.	d	Tol.	TK	Tol.	e	P1	P2	P3	Tol.
6.3	+1.0/+0.4	0.5	±0.15	2.2	+0/-0.4	≤0.15	21.68	22.46	23.28	±0.42
8.3	+1.0/+0.4	0.65	±0.15	2.7	+0/-0.4	≤0.15	28.91	29.95	31.04	±0.56
10.3	+1.1/+0.4	0.8	±0.15	3.5	+0/-0.4	≤0.20	36.14	37.44	38.8	±0.70
12.3	+1.1/+0.4	0.9	±0.15	4.2	+0/-0.6	≤0.30	43.37	44.93	46.55	±0.84
14.3	+1.4/+0.4	1.0	±0.20	4.7	+0/-0.6	≤0.37	50.6	52.42	54.31	±0.98
16.3	+1.4/+0.4	1.2	±0.20	5.5	+0/-0.8	≤0.40	57.82	59.90	62.07	±1.12
18.3	+1.4/+0.4	1.4	±0.20	6.3	+0/-0.8	≤0.50	65.05	67.39	69.83	±1.26
20.3	+1.4/+0.4	1.5	±0.20	7.1	+0/-0.8	≤0.50	72.28	74.88	77.59	±1.40

mm

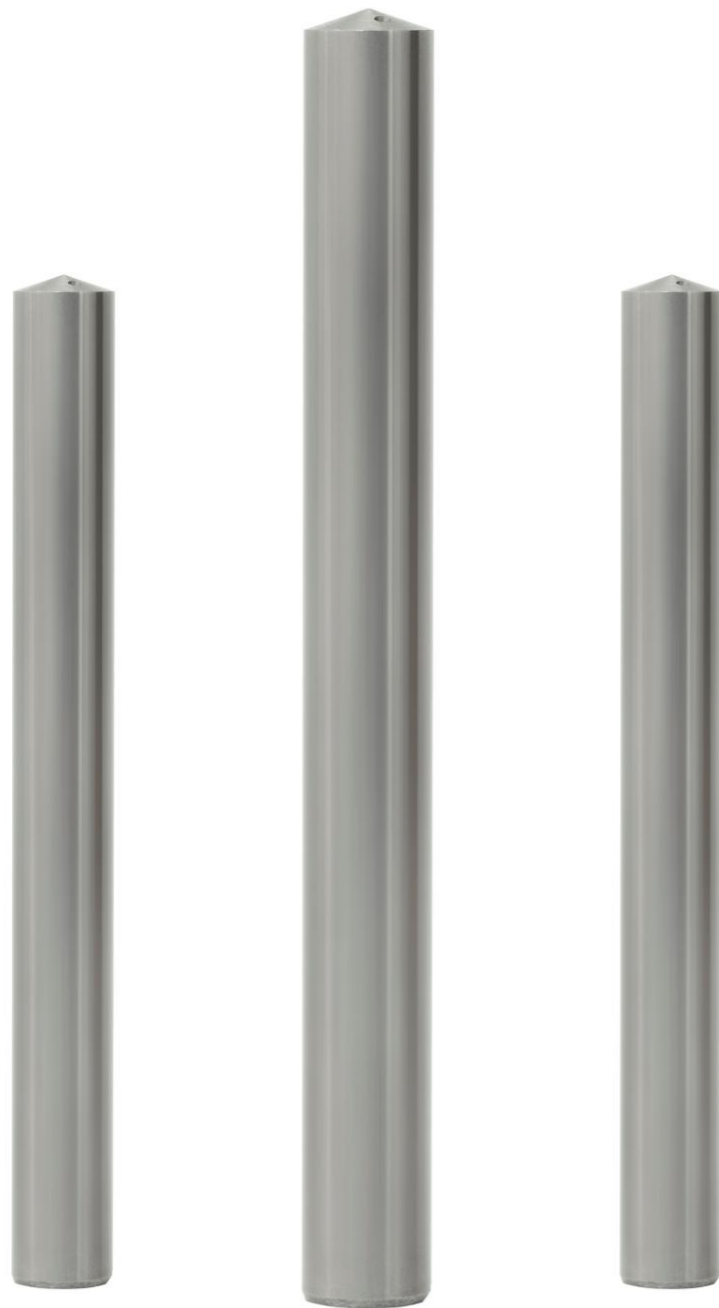
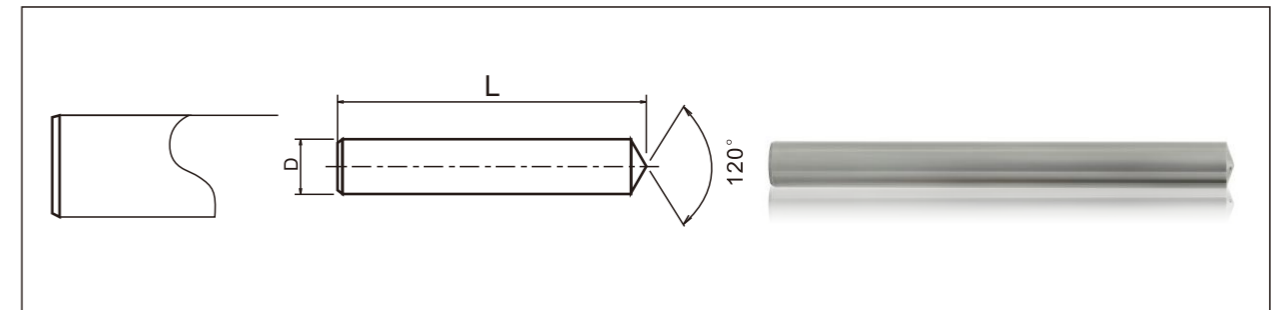
More types are available on request



# GROUND DRILL BLANKS

# GROUND DRILL BLANKS

WITH CONE



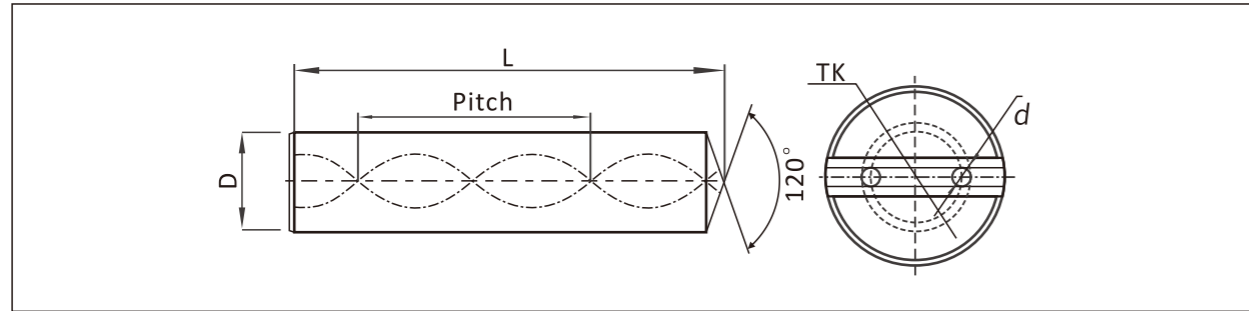
TYPE	D (mm)	L (mm)	TYPE	D (mm)	L (mm)
ZY05063GD	5	63	ZY18124GD	18	124
ZY06067GD	6	67	ZY19128GD	19	128
ZY07075GD	7	75	ZY20132GD	20	132
ZY08080GD	8	80	ZY21137GD	21	137
ZY09085GD	9	85	ZY22142GD	22	142
ZY10090GD	10	90	ZY23147GD	23	147
ZY11096GD	11	96	ZY24152GD	24	152
ZY12103GD	12	103	ZY25152GD	25	152
ZY13103GD	13	103	ZY26157GD	26	157
ZY14108GD	14	108	ZY27163GD	27	163
ZY15112GD	15	112	ZY28163GD	28	163
ZY16116GD	16	116	ZY29169GD	29	169
ZY17120GD	17	120	ZY30169GD	30	169

GROUND D (mm)		L (mm)
Range	Tol.	Tol.
0.5 ≤ D ≤ 30	h5/h6	0/+2.00

mm

# GROUND DRILL BLANKS

WITH CONE, SLOT AND HELICAL COOLANT HOLES



TYPE	D (mm)	L (mm)	d (mm)	TK (mm)	PITCH (mm)			
					P1	P2	P3	Tol.
ZY305030530400170GD	3	53	0.40	1.70	15.89	16.32	16.77	±0.23
ZY305040590600220GD	4	59	0.60	2.20	21.19	21.77	22.36	±0.31
ZY305050630700260GD	5	63	0.70	2.60	26.49	27.21	27.95	±0.38
ZY305060670700260GD	6	67	0.70	2.60	31.79	32.65	33.54	±0.46
ZY305070751000370GD	7	75	1.00	3.70	37.09	38.09	39.13	±0.54
ZY305080801000400GD	8	80.5	1.00	4.00	42.38	43.53	44.73	±0.62
ZY305090851400480GD	9	85	1.40	4.80	47.68	48.97	50.32	±0.69
ZY305100901400480GD	10	90.5	1.40	4.80	52.98	54.41	55.91	±0.77
ZY305110981100530GD	11	98	1.10	5.30	58.28	59.86	61.50	±0.85
ZY305121041400625GD	12	104	1.40	6.25	63.58	65.30	67.09	±0.92
ZY305131061750650GD	13	106.5	1.75	6.50	68.87	70.74	72.68	±1.00
ZY305141091750710GD	14	109	1.75	7.10	74.17	76.18	78.27	±1.08
ZY305151131750770GD	15	113	1.75	7.70	79.47	81.62	83.86	±1.15
ZY305161171750830GD	16	117.5	1.75	8.30	84.77	87.06	89.45	±1.23
ZY305171211750890GD	17	121	1.75	8.90	90.07	92.50	95.04	±1.31
ZY305181252000955GD	18	125.5	2.00	9.55	95.36	97.95	100.63	±1.38
ZY305191302001010GD	19	130	2.00	10.10	100.66	103.39	106.22	±1.46
ZY305201342001040GD	20	134	2.00	10.40	105.96	108.83	111.81	±1.54

mm



GROUND D (mm)		L (mm)	
Range	Tol.	Range	Tol.
3 ≤ D ≤ 20	h5/h6	L > 100	0/+2.00
		L ≤ 100	0/+1.50

mm

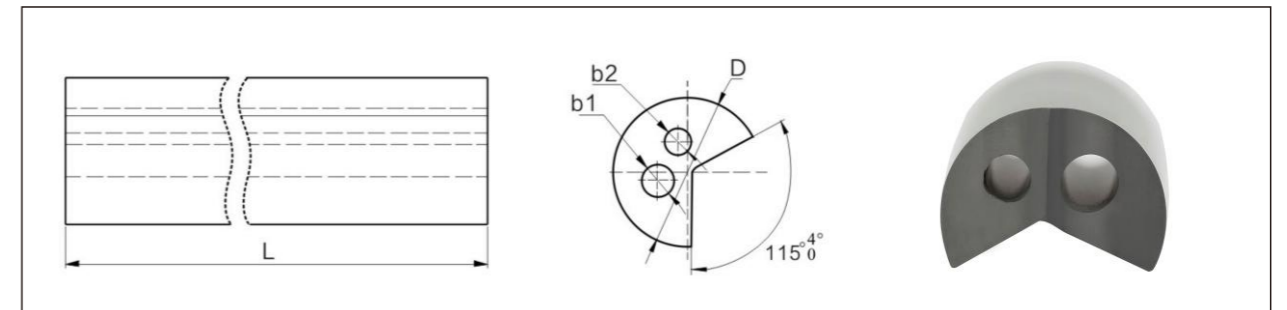
d (mm)		TK (mm)	
Range	Tol.	Range	Tol.
d ≤ 0.4	±0.10	d ≤ 4.3	0/+0.3
0.4 < d ≤ 1.4	±0.15	4.3 < d ≤ 8.3	0/+0.4
1.4 < d ≤ 1.75	±0.20	8.3 < d ≤ 10.3	0/+0.6
1.75 < d ≤ 2.0	±0.25	10.3 < d ≤ 19.3	0/+0.8
		d = 20.3	0/+1.0

mm

# GUN DRILL BLANKS

# RODS BLANKS FOR GUN DRILLS

RODS WITH 2 COOLANT HOLES, 115°

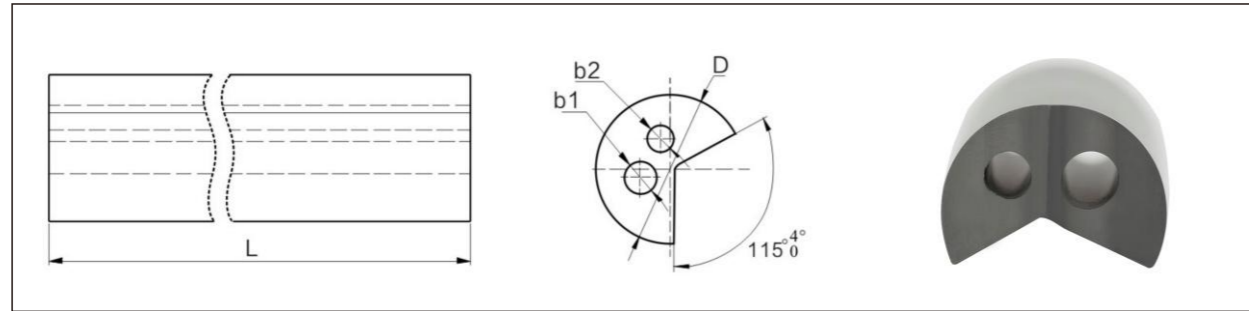


Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ8.0*Φ1.8*Φ1.5*340(QZI)	+0.45~+0.7	±0.15	±0.15	0/+6
BΦ8.5*Φ1.9*Φ1.5*340(QZI)	+0.35~+0.6	±0.15	±0.15	0/+6
BΦ9.0*Φ2.1*Φ1.65*340(QZI)	+0.45~+0.7	±0.15	±0.15	0/+6
BΦ9.5*Φ2.1*Φ1.65*340(QZI)	+0.35~+0.6	±0.15	±0.15	0/+6
BΦ10.0*Φ2.3*Φ1.9*340(QZI)	+0.45~+0.7	±0.2	±0.2	0/+6
BΦ10.5*Φ2.3*Φ1.9*340(QZI)	+0.35~+0.65	±0.2	±0.2	0/+6
BΦ11.0*Φ2.4*Φ2.0*340(QZI)	+0.45~+0.75	±0.2	±0.2	0/+6
BΦ11.5*Φ2.4*Φ2.0*340(QZI)	+0.35~+0.65	±0.2	±0.2	0/+6
BΦ12.0*Φ2.5*Φ2.2*340(QZI)	+0.45~+0.75	±0.2	±0.2	0/+6
BΦ12.5*Φ2.5*Φ2.2*340(QZI)	+0.35~+0.65	±0.2	±0.2	0/+6
BΦ13.0*Φ3.2*Φ2.6*340(QZI)	+0.45~+0.8	±0.2	±0.2	0/+6
BΦ13.5*Φ3.2*Φ2.6*340(QZI)	+0.35~+0.7	±0.2	±0.2	0/+6
BΦ14.0*Φ3.5*Φ2.8*340(QZI)	+0.45~+0.8	±0.25	±0.25	0/+6
BΦ14.5*Φ3.5*Φ2.8*340(QZI)	+0.35~+0.7	±0.25	±0.25	0/+6
BΦ15.0*Φ3.8*Φ3.0*340(QZI)	+0.45~+0.8	±0.25	±0.25	0/+6
BΦ15.5*Φ3.8*Φ3.0*340(QZI)	+0.35~+0.7	±0.25	±0.25	0/+6
BΦ16.0*Φ4.0*Φ3.2*340(QZI)	+0.45~+0.8	±0.25	±0.25	0/+6
BΦ16.5*Φ4.0*Φ3.2*340(QZI)	+0.35~+0.7	±0.25	±0.25	0/+6
BΦ17.0*Φ4.2*Φ3.4*340(QZI)	+0.45~+0.8	±0.25	±0.25	0/+6
BΦ17.5*Φ4.2*Φ3.4*340(QZI)	+0.35~+0.7	±0.25	±0.25	0/+6
BΦ18.0*Φ4.5*Φ3.6*340(QZI)	+0.45~+0.8	±0.25	±0.25	0/+6
BΦ18.5*Φ4.5*Φ3.6*340(QZI)	+0.35~+0.7	±0.25	±0.25	0/+6
BΦ19.0*Φ4.8*Φ3.8*340(QZI)	+0.45~+0.8	±0.25	±0.25	0/+6
BΦ19.5*Φ4.8*Φ3.8*340(QZI)	+0.35~+0.7	±0.25	±0.25	0/+6
BΦ20.0*Φ5.0*Φ4.0*340(QZI)	+0.45~+0.8	±0.3	±0.3	0/+6
BΦ20.5*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ21.0*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ21.5*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ22.0*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6

mm

# RODS BLANKS FOR GUN DRILLS

RODS WITH 2 COOLANT HOLES, 115°

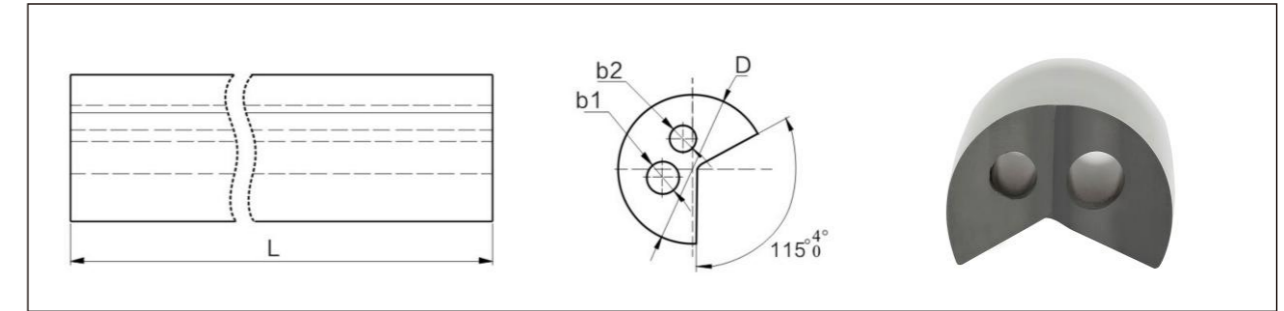


Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ22.5*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ23.0*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ23.5*Φ5.0*Φ4.0*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ24.0*Φ5.2*Φ4.2*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ24.5*Φ5.2*Φ4.2*340(QZI)	+0.5~+0.9	±0.3	±0.3	0/+6
BΦ25.0*Φ5.5*Φ4.4*340(QZI)	+0.5~+0.9	±0.35	±0.35	0/+6
BΦ25.5*Φ5.5*Φ4.4*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ26.0*Φ5.8*Φ4.5*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ26.5*Φ5.8*Φ4.5*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ27.0*Φ6.0*Φ4.8*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ27.5*Φ6.0*Φ4.8*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ28.0*Φ6.5*Φ5.0*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ28.5*Φ6.5*Φ5.0*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ29.0*Φ6.8*Φ5.5*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ23.5*Φ5.0*Φ4.0*340(QZI)	+0.5~+1.0	±0.35	±0.35	0/+6
BΦ30.0*Φ7.0*Φ5.5*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ30.5*Φ7.0*Φ5.5*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ31.0*Φ7.1*Φ5.8*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ31.5*Φ7.1*Φ5.8*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ32.0*Φ7.2*Φ5.8*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ32.5*Φ7.2*Φ5.8*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ33.0*Φ7.2*Φ5.8*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ33.5*Φ7.2*Φ5.8*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ34.0*Φ7.5*Φ6.0*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ34.5*Φ7.5*Φ6.0*340(QZI)	+0.5~+1.1	±0.35	±0.35	0/+6
BΦ35.0*Φ7.5*Φ6.0*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ35.5*Φ7.5*Φ6.0*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ36.0*Φ7.5*Φ6.0*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ36.5*Φ7.5*Φ6.0*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6

mm

# RODS BLANKS FOR GUN DRILLS

RODS WITH 2 COOLANT HOLES, 115°

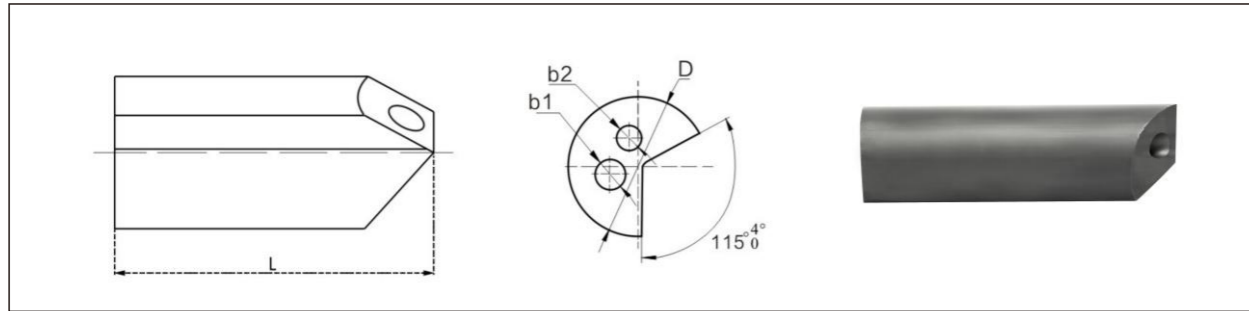


Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ37.0*Φ7.5*Φ6.2*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ38.0*Φ7.6*Φ6.5*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ39.0*Φ8.0*Φ6.8*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ40.0*Φ8.5*Φ7.0*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ41.0*Φ8.6*Φ7.1*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ42.0*Φ8.8*Φ7.2*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ43.0*Φ9.0*Φ7.3*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ44.0*Φ9.2*Φ7.4*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6
BΦ45.0*Φ9.5*Φ7.5*340(QZI)	+0.5~+1.2	±0.35	±0.35	0/+6

mm

# RODS BLANKS FOR GUN DRILLS

RODS WITH 2 COOLANT HOLES, 115°

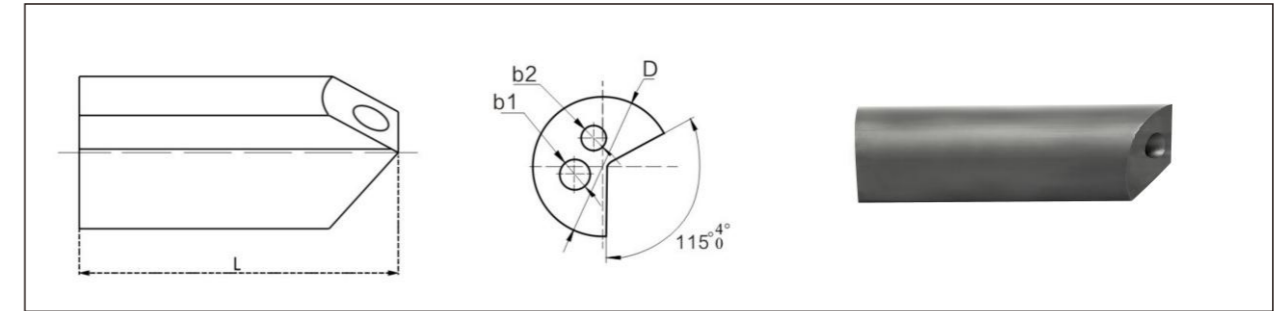


Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ8.0*Φ1.8*Φ1.5*35(QZI)	+0.45~+0.7	±0.15	±0.15	0/+3
BΦ8.5*Φ1.9*Φ1.5*35(QZI)	+0.35~+0.6	±0.15	±0.15	0/+3
BΦ9.0*Φ2.1*Φ1.65*35(QZI)	+0.45~+0.7	±0.15	±0.15	0/+3
BΦ9.5*Φ2.1*Φ1.65*35(QZI)	+0.35~+0.6	±0.15	±0.15	0/+3
BΦ10.0*Φ2.3*Φ1.9*40(QZI)	+0.45~+0.7	±0.2	±0.2	0/+3
BΦ10.5*Φ2.3*Φ1.9*40(QZI)	+0.35~+0.65	±0.2	±0.2	0/+3
BΦ11.0*Φ2.4*Φ2.0*40(QZI)	+0.45~+0.75	±0.2	±0.2	0/+3
BΦ11.5*Φ2.4*Φ2.0*40(QZI)	+0.35~+0.65	±0.2	±0.2	0/+3
BΦ12.0*Φ2.5*Φ2.2*40(QZI)	+0.45~+0.75	±0.2	±0.2	0/+3

mm

# RODS BLANKS FOR GUN DRILLS

RODS WITH 2 COOLANT HOLES, 115°

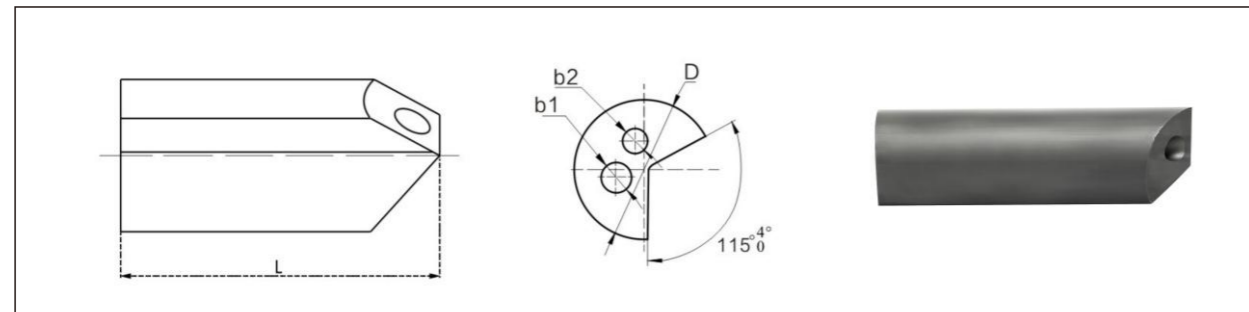


Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ12.5*Φ2.5*Φ2.2*40(QZI)	+0.35~+0.65	±0.2	±0.2	0/+3
BΦ13.0*Φ3.2*Φ2.6*40(QZI)	+0.45~+0.8	±0.2	±0.2	0/+3
BΦ13.5*Φ3.2*Φ2.6*40(QZI)	+0.35~+0.7	±0.2	±0.2	0/+3
BΦ14.0*Φ3.5*Φ2.8*40(QZI)	+0.45~+0.8	±0.25	±0.25	0/+3
BΦ14.5*Φ3.5*Φ2.8*40(QZI)	+0.35~+0.7	±0.25	±0.25	0/+3
BΦ15.0*Φ3.8*Φ3.0*40(QZI)	+0.45~+0.8	±0.25	±0.25	0/+3
BΦ15.5*Φ3.8*Φ3.0*40(QZI)	+0.35~+0.7	±0.25	±0.25	0/+3
BΦ16.0*Φ4.0*Φ3.2*42(QZI)	+0.45~+0.8	±0.25	±0.25	0/+3
BΦ16.5*Φ4.0*Φ3.2*42(QZI)	+0.35~+0.7	±0.25	±0.25	0/+3
BΦ17.0*Φ4.2*Φ3.4*42(QZI)	+0.45~+0.8	±0.25	±0.25	0/+3
BΦ17.5*Φ4.2*Φ3.4*42(QZI)	+0.35~+0.7	±0.25	±0.25	0/+3
BΦ18.0*Φ4.5*Φ3.6*48(QZI)	+0.45~+0.8	±0.25	±0.25	0/+3
BΦ18.5*Φ4.5*Φ3.6*48(QZI)	+0.35~+0.7	±0.25	±0.25	0/+3
BΦ19.0*Φ4.8*Φ3.8*48(QZI)	+0.45~+0.8	±0.25	±0.25	0/+3
BΦ19.5*Φ4.8*Φ3.8*48(QZI)	+0.35~+0.7	±0.25	±0.25	0/+3
BΦ20.0*Φ5.0*Φ4.0*50(QZI)	+0.45~+0.8	±0.3	±0.3	0/+3
BΦ20.5*Φ5.0*Φ4.0*50(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ21.0*Φ5.0*Φ4.0*50(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ21.5*Φ5.0*Φ4.0*50(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ22.0*Φ5.0*Φ4.0*55(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ22.5*Φ5.0*Φ4.0*55(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ23.0*Φ5.0*Φ4.0*55(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ23.5*Φ5.0*Φ4.0*55(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ24.0*Φ5.2*Φ4.2*55(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ24.5*Φ5.2*Φ4.2*55(QZI)	+0.5~+0.9	±0.3	±0.3	0/+3
BΦ25.0*Φ5.5*Φ4.4*60(QZI)	+0.5~+0.9	±0.35	±0.35	0/+3
BΦ25.5*Φ5.5*Φ4.4*60(QZI)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ26.0*Φ5.8*Φ4.5*60(QZI)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ26.5*Φ5.8*Φ4.5*60(QZI)	+0.5~+1.0	±0.35	±0.35	0/+3

mm

# RODS BLANKS FOR GUN DRILLS

RODS WITH 2 COOLANT HOLES, 115°



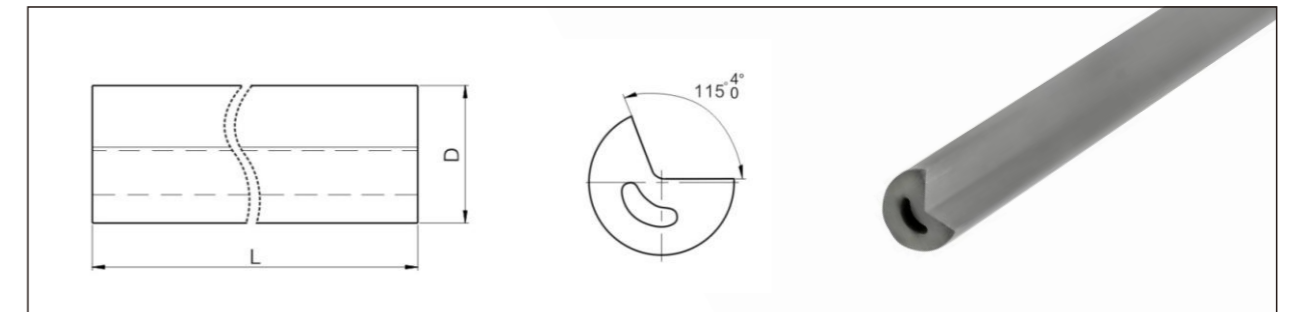
Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ27.0*Φ6.0*Φ4.8*60(QZ1)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ27.5*Φ6.0*Φ4.8*60(QZ1)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ28.0*Φ6.5*Φ5.0*65(QZ1)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ28.5*Φ6.5*Φ5.0*65(QZ1)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ29.0*Φ6.8*Φ5.5*65(QZ1)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ29.5*Φ6.8*Φ5.5*65(QZ1)	+0.5~+1.0	±0.35	±0.35	0/+3
BΦ30.0*Φ7.0*Φ5.5*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ30.5*Φ7.0*Φ5.5*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ31.0*Φ7.1*Φ5.8*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ31.5*Φ7.1*Φ5.8*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ32.0*Φ7.2*Φ5.8*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ32.5*Φ7.2*Φ5.8*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ33.0*Φ7.2*Φ5.8*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ33.5*Φ7.2*Φ5.8*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ34.0*Φ7.5*Φ6.0*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ34.5*Φ7.5*Φ6.0*65(QZ1)	+0.5~+1.1	±0.35	±0.35	0/+3
BΦ35.0*Φ7.5*Φ6.0*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ35.5*Φ7.5*Φ6.0*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ36.0*Φ7.5*Φ6.0*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ36.5*Φ7.5*Φ6.0*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ37.0*Φ7.5*Φ6.2*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ38.0*Φ7.6*Φ6.5*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ39.0*Φ8.0*Φ6.8*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ40.0*Φ8.5*Φ7.0*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ41.0*Φ8.6*Φ7.1*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ42.0*Φ8.8*Φ7.2*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ43.0*Φ9.0*Φ7.3*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ44.0*Φ9.2*Φ7.4*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3
BΦ45.0*Φ9.5*Φ7.5*65(QZ1)	+0.5~+1.2	±0.35	±0.35	0/+3

mm

More types are available on request

# RODS BLANKS FOR GUN DRILLS

RODS WITH KIDNEY-SHAPED COOLANT HOLE, 115°

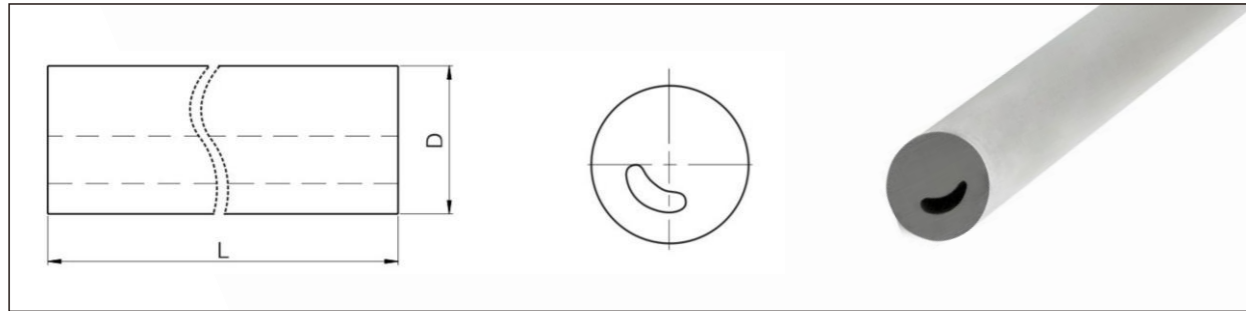


Grade	D Tol.	L Tol.
BΦ2.0*L(QZ1)	+0.4~+0.65	L ≤ 220, Tol. 0~+3mm L > 220, Tol. 0~+6mm
BΦ2.5*L(QZ1)	+0.4~+0.65	
BΦ2.75*L(QZ1)	+0.4~+0.65	
BΦ3.0*L(QZ1)	+0.4~+0.65	
BΦ3.5*L(QZ1)	+0.4~+0.65	
BΦ4.0*L(QZ1)	+0.4~+0.65	
BΦ4.5*L(QZ1)	+0.4~+0.65	
BΦ5.0*L(QZ1)	+0.4~+0.65	
BΦ5.5*L(QZ1)	+0.4~+0.65	
BΦ6.0*L(QZ1)	+0.4~+0.65	
BΦ6.5*L(QZ1)	+0.4~+0.65	
BΦ7.0*L(QZ1)	+0.4~+0.65	
BΦ7.5*L(QZ1)	+0.4~+0.65	
BΦ8.0*L(QZ1)	+0.45~+0.7	
BΦ8.5*L(QZ1)	+0.35~+0.6	

mm

# RODS BLANKS FOR GUN DRILLS

RODS WITH KIDNEY-SHAPED COOLANT HOLE



Grade	D Tol.	b1 Tol.	b2 Tol.	L Tol.
BΦ2.0*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ2.25*304(QD)	+0.4~+0.65	-	-	0/+6
BΦ2.5*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ2.75*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ3.0*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ3.5*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ4.0*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ4.5*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ5.0*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ5.5*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ6.0*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ6.5*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ7.0*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ7.5*340(QD)	+0.4~+0.65	-	-	0/+6
BΦ8.0*340(QD)	+0.45~+0.7	-	-	0/+6
BΦ8.0*Φ1.8*Φ1.5*340(QD)	+0.45~+0.7	±0.15	±0.15	0/+6
BΦ8.5*Φ1.9*Φ1.5*340(QD)	+0.35~+0.6	±0.15	±0.15	0/+6
BΦ9.0*Φ2.1*Φ1.65*340(QD)	+0.45~+0.7	±0.15	±0.15	0/+6
BΦ9.5*Φ2.1*Φ1.65*340(QD)	+0.35~+0.6	±0.15	±0.15	0/+6
BΦ10.0*Φ2.3*Φ1.9*340(QD)	+0.45~+0.7	±0.2	±0.2	0/+6
BΦ10.5*Φ2.3*Φ1.9*340(QD)	+0.35~+0.65	±0.2	±0.2	0/+6
BΦ11.0*Φ2.4*Φ2.0*340(QD)	+0.45~+0.75	±0.2	±0.2	0/+6
BΦ11.5*Φ2.4*Φ2.0*340(QD)	+0.35~+0.65	±0.2	±0.2	0/+6
BΦ12.0*Φ2.5*Φ2.2*340(QD)	+0.45~+0.75	±0.2	±0.2	0/+6
BΦ12.5*Φ2.5*Φ2.2*340(QD)	+0.35~+0.65	±0.2	±0.2	0/+6

mm

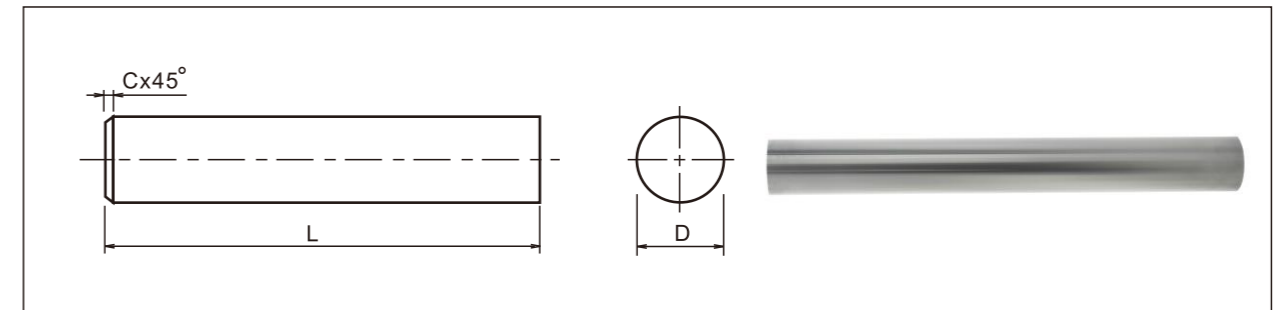


# INCH SIZES

# GROUND ROD, CUT TO LENGTH WITH CHAMFER

h6 tolerance

INCH SIZES 1/8" TO 3/8" DIAMETER



Type	Dia.	L	C
1/8 × 1-1/2	0.1250	1-1/2	0.016
1/8 × 2	0.1250	2	0.016
1/8 × 2-1/4	0.1250	2-1/4	0.016
1/8 × 2-1/2	0.1250	2-1/2	0.016
1/8 × 3	0.1250	3	0.016
1/8 × 4	0.1250	4	0.016
3/16 × 2	0.1875	2	0.020
3/16 × 2-1/2	0.1875	2-1/2	0.020
3/16 × 2-3/4	0.1875	2-3/4	0.020
3/16 × 3	0.1875	3	0.020
1/4 × 1-1/2	0.2500	1-1/2	0.024
1/4 × 2	0.2500	2	0.024
1/4 × 2-1/2	0.2500	2-1/2	0.024
1/4 × 3	0.2500	3	0.024
1/4 × 3-1/4	0.2500	3-1/4	0.024
1/4 × 3-1/2	0.2500	3-1/2	0.024
1/4 × 4	0.2500	4	0.024
1/4 × 6	0.2500	6	0.024
5/16 × 2	0.3125	2	0.024
5/16 × 2-1/2	0.3125	2-1/2	0.024
5/16 × 3	0.3125	3	0.024
5/16 × 4	0.3125	4	0.024
5/16 × 6	0.3125	6	0.024
3/8 × 2	0.3750	2	0.024
3/8 × 2-1/2	0.3750	2-1/2	0.024
3/8 × 3	0.3750	3	0.024
3/8 × 3-1/2	0.3750	3-1/2	0.024
3/8 × 4	0.3750	4	0.024
3/8 × 4-1/2	0.3750	4-1/2	0.024

TOL.		
Sizes, inch	D, h6	L
1/8 to 3/16	+0, -.00031	+ 1/16, -0
1/4 to 3/8	+0, -.00035	

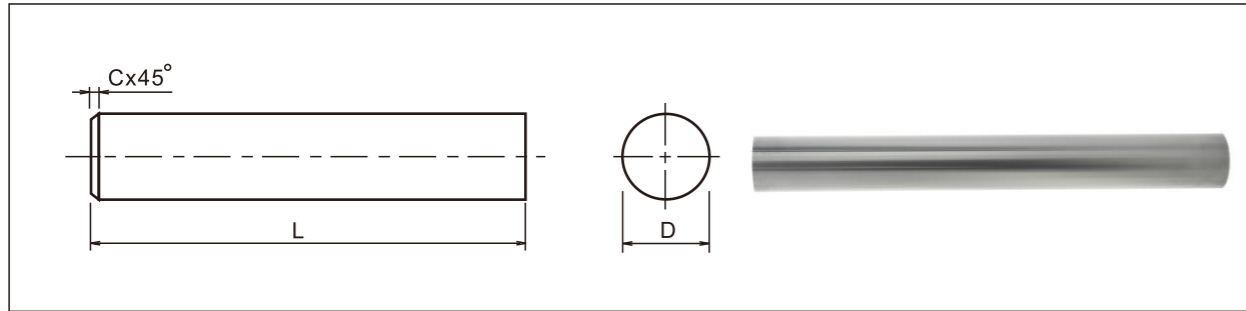
TOL.				
Sizes, inch	Straightness		Roundness	
	L≤5	L=6	L≤5	L=6
1/8 to 3/16	.0005 max	-	.0001 max	-
1/4 to 3/8		.006 max		.006 max



# GROUND ROD, CUT TO LENGTH WITH CHAMFER

INCH SIZES 3/8" TO 1/4" DIAMETER

h6 tolerance



Type	Dia.	L	C
3/8 × 5	0.3750	5	0.024
3/8 × 6	0.3750	6	0.024
7/16 × 2-1/2	0.4375	2-1/2	0.031
7/16 × 2-3/4	0.4375	2-3/4	0.031
7/16 × 4	0.4375	4	0.031
1/2 × 2-1/2	0.5000	2-1/2	0.031
1/2 × 3	0.5000	3	0.031
1/2 × 3-1/2	0.5000	3-1/2	0.031
1/2 × 4	0.5000	4	0.031
1/2 × 5	0.5000	5	0.031
1/2 × 6	0.5000	6	0.031
9/16 × 3-1/2	0.5625	3-1/2	0.031
5/8 × 3	0.6250	3	0.031
5/8 × 3-1/2	0.6250	3-1/2	0.031
5/8 × 4	0.6250	4	0.031
5/8 × 5	0.6250	5	0.031
5/8 × 6	0.6250	6	0.031
3/4 × 3	0.7500	3	0.040
3/4 × 4	0.7500	4	0.040
3/4 × 5	0.7500	5	0.040
3/4 × 6	0.7500	6	0.040
7/8 × 4	0.8750	4	0.040
1 × 3	1.0000	3	0.040
1 × 4	1.0000	4	0.040
1 × 4-1/2	1.0000	4-1/2	0.040
1 × 5	1.0000	5	0.040
1 × 6	1.0000	6	0.040
1-1/4 × 4-1/2	1.2500	4-1/2	0.040
1-1/4 × 6	1.2500	6	0.040

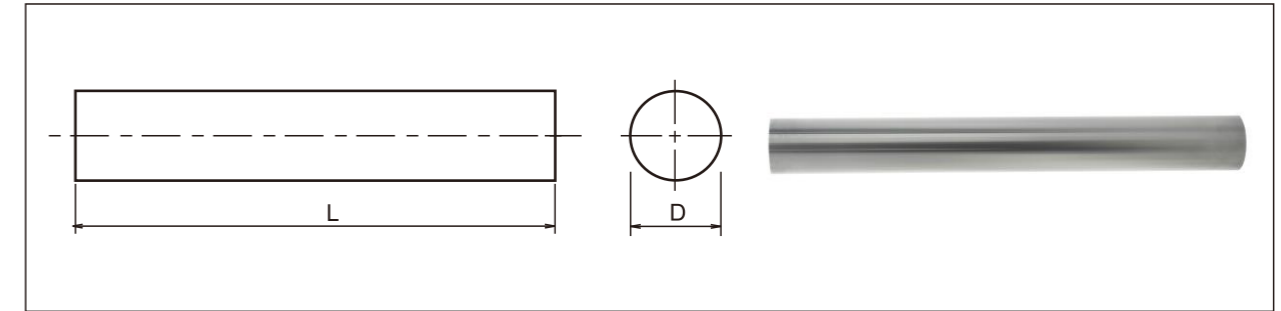
TOL.		
Sizes, inch	D, h6	L
3/8	+0, -.00035	+ 1/16, -0
7/16 to 5/8	+0, -.00043	
3/4 to 1	+0, -.00051	
1 - 1/4	+0, -.00063	

TOL.				
Sizes, inch	Straightness		Roundness	
	L≤5	L=6	L≤5	L=6
3/8		.006 max		-
7/16 to 1/2	.0005 max	.004 max	.0001 max	.00016 max
9/16 to 1-1/4		.003 max		

# GROUND ROD RANDOM LENGTHS, GRR

h6 tolerance

INCH SIZES 1/16" TO 1-1/4" DIAMETER



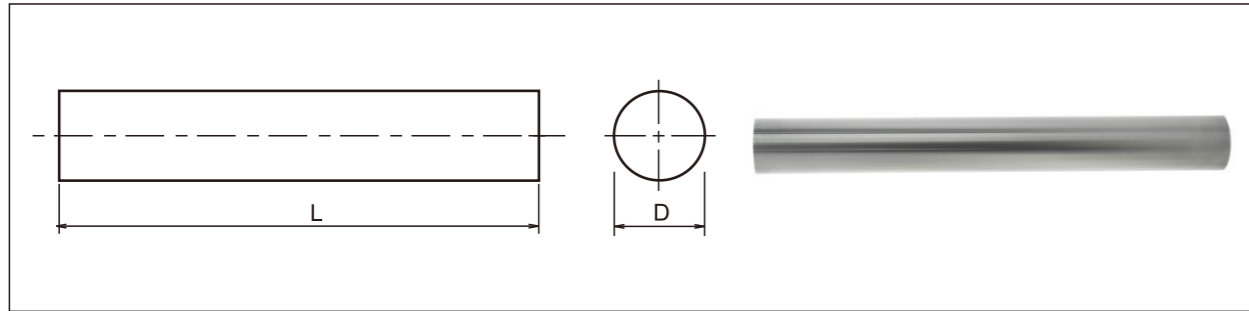
Type	Dia.	L
GRR-4 (.0625 × 13.25)	0.0625	13-1/4
GRR-6 (.09375 × 13.25)	0.0937	13-1/4
GRR-7 (.109375 × 13.25)	0.1093	13-1/4
GRR-8 (.125 × 13.25)	0.1250	13-1/4
GRR-9 (.140625 × 13.25)	0.1406	13-1/4
GRR-10 (.15625 × 13.25)	0.1562	13-1/4
GRR-11 (.171875 × 13.25)	0.1718	13-1/4
GRR-12 (.1875 × 13.25)	0.1875	13-1/4
GRR-13 (.203125 × 13.25)	0.2031	13-1/4
GRR-14 (.21875 × 13.25)	0.2187	13-1/4
GRR-16 (.250 × 13.25)	0.2500	13-1/4
GRR-20 (.3125 × 12.25)	0.3125	12-1/4
GRR-24 (.375 × 12.25)	0.3750	12-1/4
GRR-28 (.4375 × 12.25)	0.4375	12-1/4
GRR-32 (.500 × 12.25)	0.5000	12-1/4
GRR-36 (.5625 × 12.25)	0.5625	12-1/4
GRR-40 (.625 × 12.25)	0.6250	12-1/4
GRR-48 (.750 × 12.25)	0.7500	12-1/4
GRR-56 (.875 × 12.25)	0.8750	12-1/4
GRR-64 (1.000 × 12.25)	1.0000	12-1/4
GRR-80 (1.250 × 12.25)	1.2500	12-1/4

TOL.		
Sizes, inch	D, h6	L
1/16 to 7/64	+0, -.00024	+ 1/4, -0
1/8 to 7/32	+0, -.00031	
1/4 to 3/8	+0, -.00035	
7/16 to 5/8	+0, -.00043	
3/4 to 1	+0, -.00051	
1-1/4	+0, -.00063	

TOL.				
Sizes, inch	Straightness		Roundness	
	L≤5	L=6	L≤5	L=6
1/16 to 3-16	.006 max		.00008 max	
13/64 to 3/8	.006 max		.00016 max	
7/16 to 1/2	.004 max		.00016 max	
9/16 to 1-1/4	.003 max		.00016 max	

# UNGROUND ROD RANDOM LENGTHS, RR

INCH SIZES 1/16" TO 27/64" DIAMETER



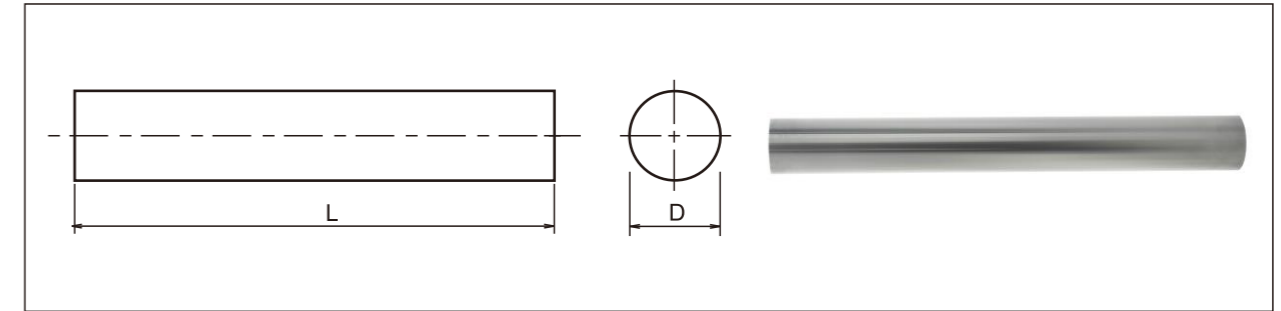
Type	Dia.	L
RR-4 (1/16 × 13.25)	0.073	13-1/4
RR5 (5/64 × 13.25)	0.088	13-1/4
RR-6 (3/32 × 13.25)	0.104	13-1/4
RR-7 (7/64 × 13.25)	0.119	13-1/4
RR-8 (1/8 × 13.25)	0.135	13-1/4
RR-9 (9/64 × 13.25)	0.151	13-1/4
RR-10 (5/32 × 13.25)	0.166	13-1/4
RR-11 (11/64 × 13.25)	0.182	13-1/4
RR-12 (3/16 × 13.25)	0.198	13-1/4
RR-13 (13/64 × 13.25)	0.213	13-1/4
RR-14 (7/32 × 13.25)	0.229	13-1/4
RR-15 (15/64 × 13.25)	0.244	13-1/4
RR-16 (1/4 × 13.25)	0.260	13-1/4
RR-17 (17/64 × 12.25)	0.276	12-1/4
RR-18 (9/32 × 12.25)	0.291	12-1/4
RR-19 (19/64 × 12.25)	0.307	12-1/4
RR-20 (5/16 × 12.25)	0.323	12-1/4
RR-21 (21/64 × 12.25)	0.338	12-1/4
RR-22 (11/32 × 12.25)	0.354	12-1/4
RR-23 (23/64 × 12.25)	0.369	12-1/4
RR-24 (3/8 × 12.25)	0.385	12-1/4
RR-25 (25/64 × 12.25)	0.401	12-1/4
RR-26 (13/32 × 12.25)	0.416	12-1/4
RR-27 (27/64 × 12.25)	0.432	12-1/4

TOL.		
Sizes, inch	D	L
ALL	+0.015, -0	+ 1/2, -0

TOL.		
Sizes, inch	Straightness	Roundness
1/16 to 7/32	.016 max	.004 max
15/64 to 27/64	.010 max	.004 max

# UNGROUND ROD RANDOM LENGTHS, RR

INCH SIZES 7/16" TO 1" DIAMETER



Type	Dia.	L
RR-28 (7/16 × 12.25)	0.448	12-1/4
RR-29 (29/64 × 12.25)	0.463	12-1/4
RR-30 (15/32 × 12.25)	0.479	12-1/4
RR-31 (31/64 × 12.25)	0.494	12-1/4
RR-32 (1/2 × 12.25)	0.510	12-1/4
RR-34 (17/32 × 12.25)	0.541	12-1/4
RR-36 (9/16 × 12.25)	0.573	12-1/4
RR-40 (5/8 × 12.25)	0.635	12-1/4
RR-44 (11/16 × 12.25)	0.698	12-1/4
RR-48 (3/4 × 12.25)	0.760	12-1/4
RR-52 (13/16 × 12.25)	0.823	12-1/4
RR-56 (7/8 × 12.25)	0.885	12-1/4
RR-64 (1 × 12.25)	1.010	12-1/4

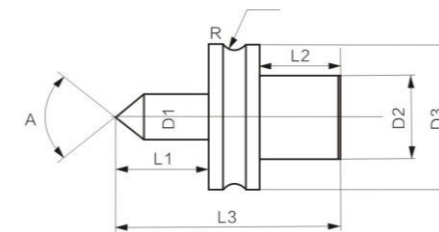
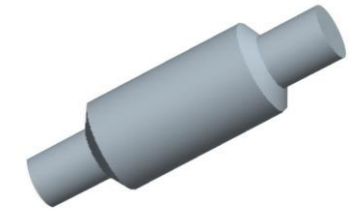
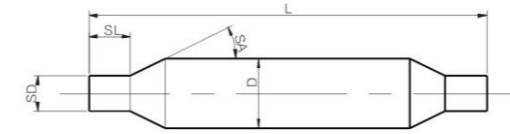
TOL.		
Sizes, inch	D	L
ALL	+0.015, -0	+ 1/2, -0

TOL.		
Sizes, inch	Straightness	Roundness
7/16 to 1	.010 max	.004 max

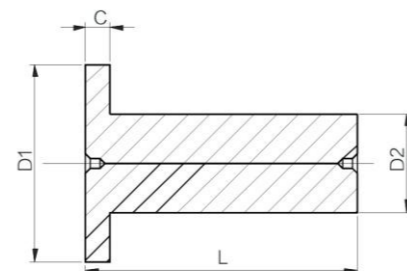
# NON-STANDARD AND CUSTOMIZED



## STEP RODS



## T-SLOT ENDMILL BLANKS



## ROD WITH TAPER END (WITH HOLE)



# APPENDIX

## MECHANICAL & PHYSICAL PROPERTIES OF CEMENTED CARBIDE

### 1. Hardness (ISO 3738 and ISO 3878)

The hardness of a material is its quality to withstand localized deformation. Rockwell hardness (unit: HRA) and Vickers hardness (unit: HV) tests are normally applied to cemented carbide. Due to different methods of measurement, the conversion of values from the above two tests should be based on the reference table of the tested materials.

### 2. Toughness / Fracture toughness

Toughness refers to the capacity of a material to resist fracture or crack propagation. Its depends on the composition, microstructure and other intrinsic factors of the material, and characterizes the comprehensive performance of a material.

### 3. Transverse rupture strength (ISO 3327)

Transverse rupture strength (TRS) is the ability of a material to resist bending. This value can be calculated with the Three Pin Fixture, used with a Hydraulic Press, to exert heavy pressure on a test piece. TRS is the average value of several tests. This value can vary considerably depending on the geometry and the surface condition of the specimen and the experimental equipment. In particular, this result is closely to surface smoothness, residual surface stress, surface corrosion and internal defects. It must be mentioned that the TRS value alone cannot be used as a criterion for grade selection.

### 4. Density (ISO 3369)

Density is commonly used in the cemented carbide industry to determine the accuracy of a grade's composition. The density of carbide is determined according to ISO 3369 and varies strongly depending on the composition of the carbide grade. The density of tungsten carbide (WC) is 15.7 g/cm<sup>3</sup> and the density of cobalt (Co) is 8.9 g/cm<sup>3</sup>. Therefore, for the WC-Co grade, the density decreases as the cobalt content increases.

### 5. Others

#### Straightness

Straightness indicates the condition where actual straight elements of a part lies in a ideal straight line. Straightness tolerance is the maximum deflection allowed for an actual line to an ideal straight line.

#### Roudness

Roundness is defined as the closeness of a cross-section through that part to an ideal circler. Roundness tolerance is the maximum deflection allowed for an actual circle to an ideal circle in the same cross-s ection.

#### Concentricity

Concentricity indicates the condition of how well the measured circle center conforms the reference circle center. Concentricity tolerance is the maximum deflection allowed for the measured actual circle center to the reference circle center.

#### Circular run-out

Circular run-out indicates how well a circular cross-section of a part stands in a fixed position with respect to the datum axis. Circular run-out tolerance is the maximum allowable deflection in a circular feature when the part rotates about the true datum axis.



# SOCIAL RESPONSIBILITY

Bearing in mind the 30·60 goal and dual circulation development paradigm, ZCC explores new standards, technologies, new energy, green and digital technologies, and other fields and makes multiple sectors go intelligent, efficient, green, and low carbon to create a better life and contribute to China's high quality and sustainable development.

Zhuzhou Cemented Carbide Group Co., Ltd. has been once again recognized as an environmental credit and integrity enterprise in Hunan Province.

In accordance with people-orientated management philosophy, ZCC empowers the staff, provides quality service for customers and makes contributions to building a harmonious society. ZCC is dedicated to the development of staff, enterprise and society.

Aimed at becoming an environmental-friendly enterprise, ZCC implemented clean production and promoted environmental protection by eliminating its energy-intensive production lines and introducing new technologies, new processes and new energy resources. In May 2011, the natural gas boiler system went into operation, and the last two chimneys were removed.

# WORLDWIDE SALES NETWORK



Zhuzhou Cemented Carbide Works Imp. & Exp. Co.(ZCCC) is the international trade organization under ZCC group. ZCCC has five overseas branches in USA, Europe, India, Japan, South Korea and HongKong China. In order to shorten delivery and facilitate customers at closer range, large volume of standardized rods are stocked in Ann Arbor, USA and Dusseldorf, Germany, enabling prompt order response and deliveries of most popular rods within 48 hours to our customers in North America and European countries.

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