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株洲欧科亿数控精密刀具股份有限公司

OKE Precision Cutting Tools Co., Ltd.

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WSF ISO9001

OKE 欧科亿

股票代码：688308

硬质合金圆棒

CEMENTED CARBIDE RODS

株洲欧科亿数控精密刀具股份有限公司

OKE Precision Cutting Tools Co., Ltd.

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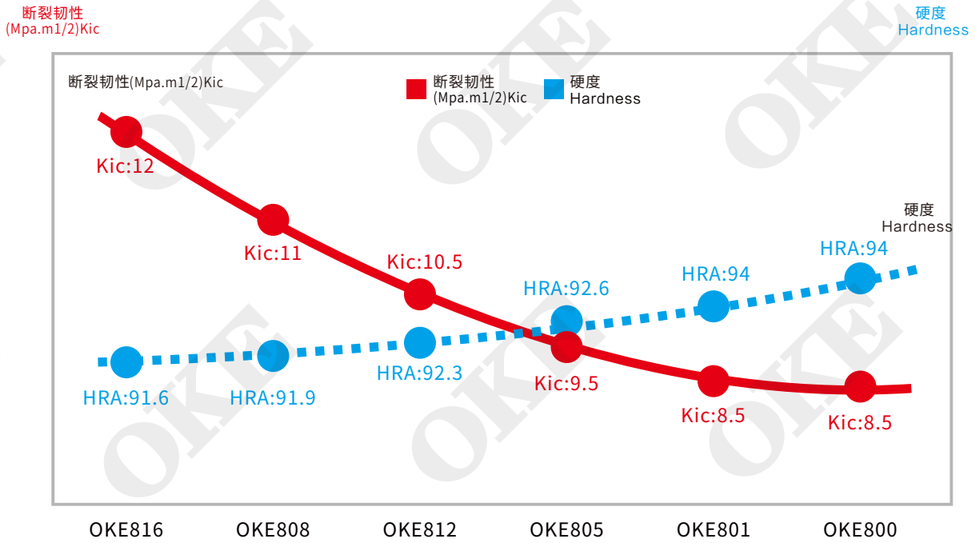
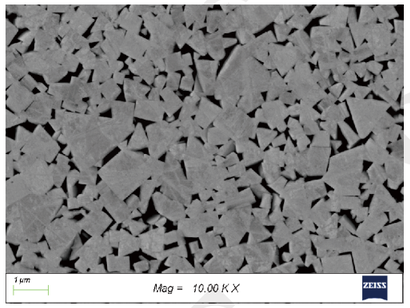
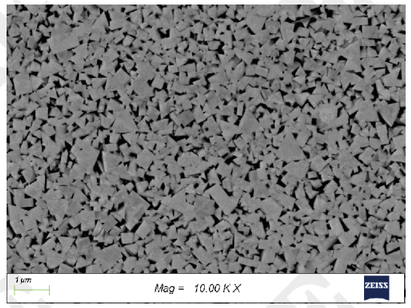
牌号性能对比
Grade performance comparison





dwc晶粒度0.8微米合金电镜照片
DWC grain size 0.8 μm electron microscope photo



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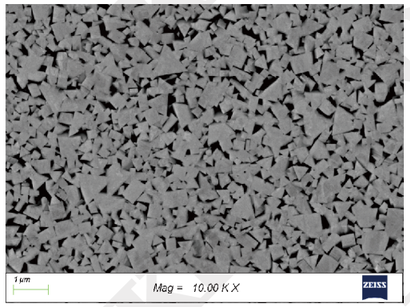
DWC grain size 0.6 μm electron microscope photo



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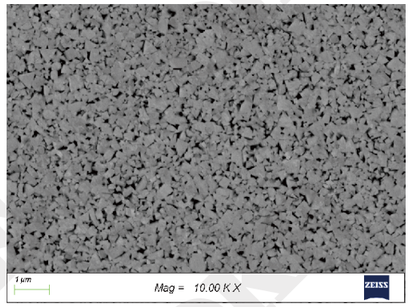
DWC grain size 0.4 μm electron microscope photo



dwc晶粒度0.2微米合金电镜照片
DWC grain size 0.2 μm electron microscope photo

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牌号介绍
Grade Introduction

牌号 Grade	ISO牌号 ISO	晶粒度 GrainSize (μm)	钴含量 Cobalt Content (%)	硬度 Hardness (HRA)	硬度 Hardness (HV30)	密度 Density (g/cm^3)	抗弯强度 T.R.S (N/mm^2)	推荐应用 Recommended Cutting Applications
OKE800	K05-K10	0.2	9.0	94	2050	14.4	4200	纳米晶粒，推荐加工高硬材料（HRC大于58）精加工，适合材料表面高光处理。 Nanometer grain size, recommended to process high hardness material (HRC > 58) finishing, suitable for material surface high gloss treatment.
OKE801	K05-K10	0.4	6.3	94	2050	14.7	3800	超细晶粒，具有优良的耐磨性，推荐用于制作具有高耐磨性要求的铣刀,雕刻刀，适用于加工PCB,复合材料 Ultrafine grain size,with excellent wear resistance. High wear resistance endmill and engraving tools are recommended. Suitable for cutting PCB and composite material.
OKE805	K20-K30	0.4	12.0	92.6	1750	14.1	4200	超细晶粒，兼容了良好的硬度和韧性，适用于制作立铣刀和铰刀，特别适用于精加工以及加工合金钢（HRC：45-55）,铝合金，钛合金等 Ultrafine grain size,higher Co Content;with excellent hardness and toughness. Endmill and reamer are recommended. Especially suitable for finish machining and steel (HRC:45-55),Al alloy and Ti alloy cutting.
OKE816	K30-K40	0.6	12.0	91.6	1600	14.1	4200	用于制作通用加工钻头，立铣刀，特别适用于不锈钢，耐热合金，铸铁等 Common-use drill and endmill are recommended. Especially suitable for cutting stainless, heat-resistant alloy,cast iron.
OKE812	K30-K40	0.6	10.0	92.3	1700	14.4	4000	用于制作立铣刀，特别适用于不锈钢，耐热合金，铸铁等 Used to make vertical milling cutter, especially suitable for stainless steel, heat-resistant alloy, cast iron, etc
OKE808	K30-K40	0.7	10	91.9	1650	14.45	4000	用于制作钻头，立铣刀，适用于普通合金钢（HRC<48）,灰口铸铁，不锈钢和耐热合金 Drill and endmill are recommended. Suitable for cutting general steel(HRC<48),grey cast iron, stainless steel and heat-resistant alloy.
OKE810	K10-K20	1	6.0	92.5	1750	14.9	2800	用于制作钻头，立铣刀和旋转锉刀，特别适用于加工有色金属和石墨制品（需涂层） Drill， endmill and burr are recommended. Especially suitable for cutting non-ferrous metal and graphite(coating is necessary).

牌号推荐
Grade Selection Guide

加工材料 Workpiece		刀具类别 Type of Cutting Tools		OKE800	OKE801	OKE805	OKE816	OKE812	OKE808	OKE810
P	钢 Steel	钻头 Drill						★	★ ★	
		立铣刀 Endmill	粗加工Roughing						★ ★	
			精加工Finishing			★ ★		★ ★	★	
M	不锈钢 Stainless Steel	钻头 Drill					★ ★	★	★ ★	
		立铣刀 Endmill	粗加工Roughing				★ ★		★	
			精加工Finishing	★			★	★ ★		
K	铸铁 Cast Iron	钻头 Drill						★	★ ★	
		立铣刀 Endmill	粗加工Roughing						★ ★	
			精加工Finishing					★	★	★ ★
N	有色金属 Nonferrous Material	钻头 Drill							★ ★	●
		立铣刀 Endmill	粗加工Roughing						★ ★	
			精加工Finishing			★ ★				●
S	耐热合金 Heat Resistance Material	钻头 Drill						★	★ ★	
		立铣刀 Endmill	粗加工Roughing					★	★	
			精加工Finishing			★ ★		★	★	
H	高硬材料 Hardened Material	钻头 Drill			★ ★			★		
		立铣刀 Endmill	粗加工Roughing	★	★					
			精加工Finishing	★ ★	★	★				
Others	复合材料 Composite Material	钻头 Drill			★ ★			★		
		立铣刀 Endmill	粗加工Roughing	★	★ ★					
			精加工Finishing	★	★	★				

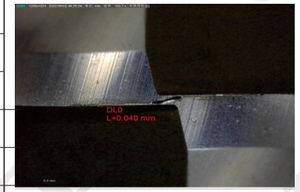
推荐图例Notes　可用Acceptable★ 优选Good★ ★涂层Coating●

硬质合金圆棒应用案例：
Carbide rods Application cases:

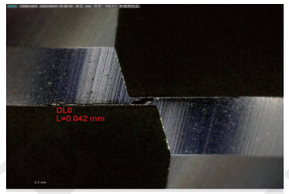
新能源汽车灯模球刀仿形加工
New energy vehicle lamp mold Ball nose profiling

圆棒牌号：Carbide rods grade	OKE800
刀具规格：Tool specification	R4两刃球刀 R4_H12_d8_L75_2T R4 Two-flute ball nose end mill
工件信息：work piece	718(40°_HRC)
切削参数：Cutting parameter	n:8000r/min
	Vf:3000mm/min
	Ap:0.1mm
	Ae:0.2mm
切削方式：Cutting method	3D仿形加工，分中对切 3D profiling processing, center to cut
冷却方式：cooling method	水冷/外冷 Water cooling
工装机台：Tooling machine	台湾快捷 M-1612 TAIWANG KUAIJIE M-1612
应用结论：Application conclusion	OKE800制作R4球刀，应用终端加工寿命及效果达到国外进口同档材质水平。 R4 ball nose end mill made of OKE800, The processing life and effect of the application terminal reach the same level as those imported from abroad

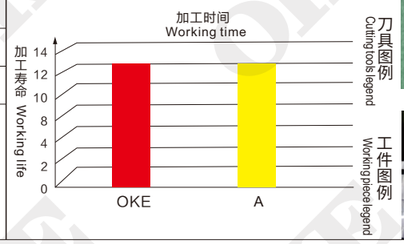
12小时后球头刃口处磨损状态
Ball nose cutting edge abrasion status after 12 hours



OKE800

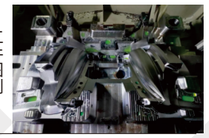


国外进口同档材质A
The same material A imported from abroad



刀具图例 Cutting tools legend

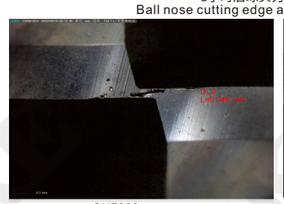
工件图例 Working piece legend



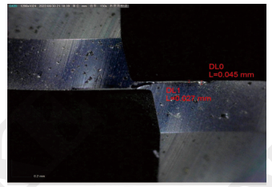
R4球刀纯平面走刀尖精铣测试
R4 ball nose end mill straight flat surface finishing milling test

圆棒牌号：Carbide rods grade	OKE800
刀具规格：Tool specification	R4两刃球刀 R4_H12_d8_L75_2T R4 Two-flute ball nose end mill
工件信息：work piece	718(42°_HRC)
切削参数：Cutting parameter	n:8000r/min
	Vf:3000mm/min
	Ap:0.07mm
	Ae:0.2mm
切削方式：Cutting method	纯平面走刀尖往复式铣削 Straight flat surface reciprocating milling
冷却方式：cooling method	水冷/外冷 Water cooling
工装机台：Tooling machine	牧野_MAKINO_F5 MUYE_MAKINO_F5
应用结论：Application conclusion	OKE800与国外进口同档材质制作R4球刀，纯平面走刀尖精铣，8小时候VB值相当。 OKE800 and foreign imported same material to produce R4 ball nose end mill, pure flat surface to finish milling, 8 hours VB value is equivalent

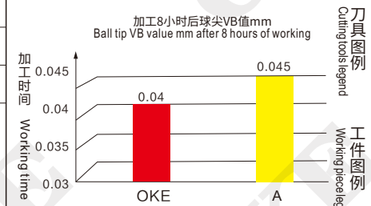
8小时后球头刃口处磨损状态
Ball nose cutting edge abrasion status after 8 hours



OKE800



国外进口同档材质A
The same material A imported from abroad



刀具图例 Cutting tools legend

工件图例 Working piece legend

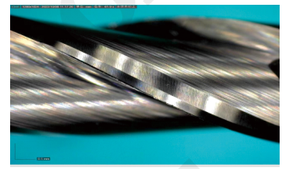
硬质合金圆棒（整硬刀具）应用案例：
carbide rod (Solid carbide) Application cases:

纺织行业零件加工
Parts processing for textile industry

圆棒牌号： Carbide rods grade	OKE805
刀具规格： Tool specification	三刃平底刀 D4_H10_d6_L50_3T(光刀) Three-flute square head endmill D4_H10_d6_L50_3T(without coating)
工件信息： work piece	SKD11(火前＜30°HRC) SKD11(pre-heat treatment＜30°HRC)
切削参数： Cutting parameter	n:4200r/min
	Vf:220mm/min
	Ap:7.3mm
	Ae:0.02-0.05mm
切削方式： Cutting method	轮廓环切，顺铣，精加工 Contour loop milling, climb milling, finishing milling
冷却方式： cooling method	油冷/外冷 Oil cooling/External cooling
工装机台： Tooling machine	亚威AWEA_AV-610 YAWEI AWEA_AV-610
应用结论： Application conclusion	OKE805制作刀具切削寿命达到进口同档材质水平。 Tool life of cutting tools made of grade OKE805 reach the same level of imported materials

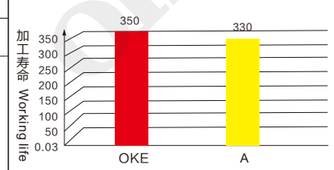
12小时后球头刃口处磨损状态
Ball nose cutting edge abrasion status after 12 hours

OKE800



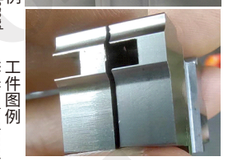
国外进口同档材质A
The same material A imported from abroad

加工标准寿命320件
Standard tool life 320 pieces



刀具图例
Cutting tools legend

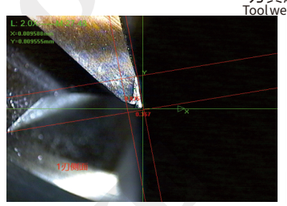
工件图例
Working piece legend



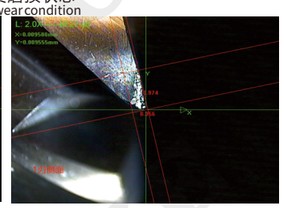
自动化零部件精密加工
Precision machining of automatic parts

圆棒牌号： Carbide rods grade	OKE805
刀具规格： Tool specification	四刃平底刀 D8_H20_d8_L60_4T Four-flute square head endmill D8_H20_d8_L60_4T
工件信息： work piece	S136H(42°HRC)
切削参数： Cutting parameter	n:4500r/min
	Vf:1000mm/min
	Ap:6.4mm
	Ae:0.05-0.1mm
切削方式： Cutting method	侧铣，端铣，精加工 Side milling End milling finishing milling
冷却方式： cooling method	油冷/外冷 Oil cooling/External cooling
工装机台： Tooling machine	北京精雕carver400TE-AUH carver400TE-AUH
应用结论： Application conclusion	OKE805制作刀具切削寿命达到进口同档材质水平。 Tool life of cutting tools made of grade OKE805 reach the same level of imported materials

刀具磨损状态
Tool wear condition

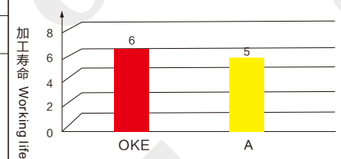


OKE800



国外进口同档材质A
The same material A imported from abroad

加工标准寿命4件
Standard tool life 4 pieces



刀具图例
Cutting tools legend

工件图例
Working piece legend

微小径棒材
Micro diameter rods

规格（mm）		长度L （公差TOl./0,+10）
ΦD	直径毛坯公差	
0.6	+0.1~+0.3	310/330
0.8	+0.1~+0.3	310/330
1	+0.15~+0.3	310/330
1.2	+0.15~+0.3	310/330
1.5	+0.15~+0.3	310/330
1.65	+0.15~+0.3	310/330
1.8	+0.15~+0.3	310/330

公制长棒

Solid Rods-Metric

毛坯 Unground

精磨 Ground

直径ΦD	长度L	OKE808 /OKE805	OKE812
2	330	●	○
3	310	●	●
3	330	●	●
4	310	●	●
4	330	●	●
5	310	●	●
5	330	●	●
6	310	●	●
6	330	●	●
7	330	●	○
8	310	●	●
8	330	●	●
9	330	●	○

直径ΦD	长度L	OKE808 /OKE805	OKE812
10	310	●	●
10	330	●	●
11	330	●	●
12	310	●	●
12	330	●	●
13	330	●	○
14	310	●	●
14	330	●	●
15	330	●	○
16	310	●	●
16	330	●	●
17	330	●	○
18	330	●	●

● 有库存 Stock ○ 需订货 Order 单位unit(mm)

毛坯Unground ΦD(mm)		精磨Ground ΦD(mm)		长度L(mm)
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)	公差(Tol.)
2≤ΦD<3	+0.15，+0.30	2≤ΦD≤42	h5/h6	0,+5
3≤ΦD≤6	+0.30，+0.50			
6<ΦD≤12	+0.30，+0.60			
12<ΦD≤16	+0.30，+0.70			
16<ΦD≤42	+0.30，+0.80			

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公制长棒

Solid Rods-Metric

毛坯 Unground

精磨 Ground

直径ΦD	长度L	OKE808 /OKE805	OKE812
19	330	●	○
20	310	●	○
20	330	●	●
21	330	○	○
22	330	○	○
23	330	○	○
24	330	○	○
25	330	●	○
26	330	○	○
27	330	○	○
28	330	○	○
29	330	○	○
30	330	○	○

直径ΦD	长度L	OKE808 /OKE805	OKE812
31	330	○	○
32	330	○	○
33	330	○	○
34	330	○	○
35	330	○	○
36	330	○	○
37	330	○	○
38	330	○	○
39	330	○	○
40	330	○	○
41	330	○	○
42	330	○	○

● 有库存 Stock ○ 需订货 Order 单位unit(mm)

毛坯Unground ΦD(mm)		精磨Ground ΦD(mm)		长度L(mm)
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)	公差(Tol.)
2≤ΦD<3	+0.15，+0.30	2≤ΦD≤42	h5/h6	0,+5
3≤ΦD≤6	+0.30，+0.50			
6<ΦD≤12	+0.30，+0.60			
12<ΦD≤16	+0.30，+0.70			
16<ΦD≤42	+0.30，+0.80			

英制长棒
Solid Rods-Inch

毛坯 Unground

精磨 Ground

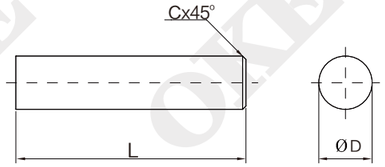
直径ΦD	长度L	OKE808 /OKE805	OKE812
0.1250	13-1/8	○	○
0.1406	13-1/8	○	○
0.1563	13-1/8	○	○
0.1719	13-1/8	○	○
0.1875	13-1/8	○	○
0.2188	13-1/8	○	○
0.2344	13-1/8	○	○
0.2500	13-1/8	○	○
0.2813	12-1/8	○	○
0.2969	12-1/8	○	○
0.3125	12-1/8	○	○
0.3281	12-1/8	○	○
0.3438	12-1/8	○	○
0.3594	12-1/8	○	○
0.3750	12-1/8	○	○
0.3906	12-1/8	○	○

直径ΦD	长度L	OKE808 /OKE805	OKE812
0.4063	12-1/8	○	○
0.4219	12-1/8	○	○
0.4375	12-1/8	○	○
0.4531	12-1/8	○	○
0.4688	12-1/8	○	○
0.4844	12-1/8	○	○
0.5000	12-1/8	○	○
0.5313	12-1/8	○	○
0.5625	12-1/8	○	○
0.6250	12-1/8	○	○
0.6875	12-1/8	○	○
0.7500	12-1/8	○	○
0.8125	12-1/8	○	○
0.8750	12-1/8	○	○
0.9375	12-1/8	○	○
1.0000	12-1/8	○	○

● 有库存 Stock　○ 需订货 Order　　单位unit(mm)

毛坯Unground ΦD(mm)		精磨Ground ΦD(mm)		长度L(mm)
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)	公差(Tol.)
1/8≤ΦD≤1/4	+0.012,+0.020	1/8≤ΦD≤1	h5/h6	+1/8,+3/8
1/4<ΦD≤31/64	+0.012,+0.024			
31/64<ΦD≤5/8	+0.012,+0.028			
5/8<ΦD≤1	+0.012,+0.032			

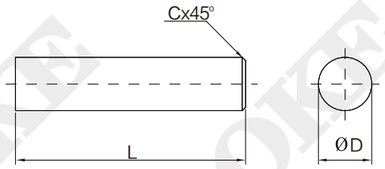
精磨倒角短棒（公制）
Ground Rods with Chamfer-Metric



直径ΦD	长度 L (公差Tol./0,+1)	倒角尺寸 C (公差Tol./±0.1)	倒角角度 Angle of Chamfer (公差Tol./±3°)
3	40	0.4	45°
3	50	0.4	45°
3	70	0.4	45°
3	100	0.4	45°
3	150	0.4	45°
4	40	0.4	45°
4	50	0.4	45°
4	75	0.4	45°
4	100	0.4	45°
4	150	0.4	45°
5	50	0.5	45°
5	55	0.5	45°
5	60	0.5	45°
5	70	0.5	45°
5	80	0.5	45°
5	100	0.5	45°
5	150	0.5	45°
6	50	0.5	45°
6	60	0.5	45°
6	75	0.5	45°
6	100	0.5	45°
6	150	0.5	45°
7	55	0.6	45°
7	60	0.6	45°
8	60	0.6	45°
8	75	0.6	45°

单位unit(mm)

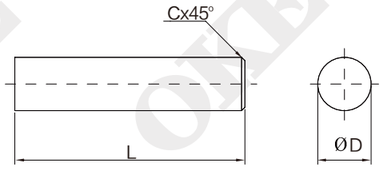
精磨倒角短棒（公制）
Ground Rods with Chamfer-Metric



直径ΦD	长度 L (公差Tol./0,+1)	倒角尺寸 C (公差Tol./±0.1)	倒角角度 Angle of Chamfer (公差Tol./±3°)
8	80	0.6	45°
8	90	0.6	45°
8	100	0.6	45°
8	150	0.6	45°
10	70	0.6	45°
10	75	0.6	45°
10	90	0.6	45°
10	100	0.6	45°
10	125	0.6	45°
11	110	0.8	45°
12	75	0.8	45°
12	90	0.8	45°
12	100	0.8	45°
12	120	0.8	45°
14	75	0.8	45°
14	110	0.8	45°
14	125	0.8	45°
16	100	0.8	45°
16	125	0.8	45°
18	100	0.8	45°
18	150	0.8	45°
20	100	1.0	45°
20	120	1.0	45°
20	150	1.0	45°
25	100	1.0	45°
25	150	1.0	45°

单位unit(mm)

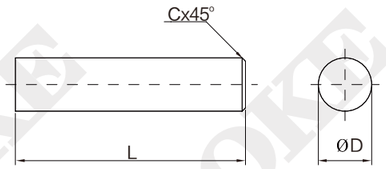
精磨倒角短棒（英制）
Ground Rods with Chamfer-Inch



直径ΦD	长度 L (公差Tol./0,+1/16)	倒角尺寸 C		倒角角度 Angle of Chamfer (公差Tol./±3°)
		C	公差Tol	
0.1250	1-1/2	0.015	±0.004	45°
0.1250	2	0.015	±0.004	45°
0.1250	2-1/2	0.015	±0.004	45°
0.1250	3	0.015	±0.004	45°
0.1875	2	0.015	±0.004	45°
0.1875	3	0.015	±0.004	45°
0.2500	2	0.015	±0.004	45°
0.2500	2-1/2	0.015	±0.004	45°
0.2500	3	0.015	±0.004	45°
0.2500	4	0.015	±0.004	45°
0.3125	2-1/2	0.015	±0.004	45°
0.3750	2-1/2	0.015	±0.004	45°
0.3750	3	0.015	±0.004	45°
0.5000	2-1/2	0.031	±0.008	45°
0.5000	3	0.031	±0.008	45°
0.5000	4	0.031	±0.008	45°
0.6250	3-1/2	0.031	±0.008	45°
0.7500	4	0.031	±0.008	45°
0.7500	5	0.031	±0.008	45°
1.0000	4	0.031	±0.008	45°

单位unit(inch)

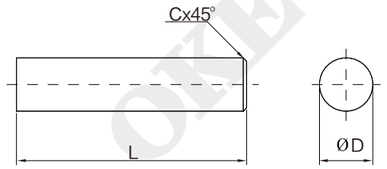
精磨倒角短棒（DIN）
Ground Rods with Chamfer-DIN



直径ΦD	长度 L (公差Tol./0,+1)	倒角尺寸 C (公差Tol./±0.1)	倒角角度 Angle of Chamfer (公差Tol./±3°)	标准 Standard
3	38	0.4	45°	D6527K/D6527L
3.5	50	0.4	45°	D6528
4	50	0.4	45°	D6528
4.5	50	0.5	45°	D6528
5	50	0.5	45°	D6528
5.5	57	0.5	45°	D6528
6	50	0.5	45°	D6527K
6	57	0.5	45°	D6527L/D6528
6	54	0.5	45°	D6527K
6.5	60	0.6	45°	D6528
7	60	0.6	45°	D6528
7.5	63	0.6	45°	D6528
8	58	0.6	45°	D6527K
8	63	0.6	45°	D6527L/D6528
8.5	67	0.6	45°	D6528
9	67	0.6	45°	D6528
9.5	72	0.6	45°	D6528
10	66	0.6	45°	D6527K
10	72	0.6	45°	D6527L/D6528
11	83	0.8	45°	D6528
12	73	0.8	45°	D6527K
12	83	0.8	45°	D6527L/D6528
13	83	0.8	45°	D6528
14	75	0.8	45°	D6527K
14	83	0.8	45°	D6527L/D6528
15	92	0.8	45°	D6528
16	82	0.8	45°	D6527K
16	92	0.8	45°	D6527L/D6528
18	84	0.8	45°	D6527K
18	92	0.8	45°	D6527L/D6528
20	92	1.0	45°	D6527K
20	104	1.0	45°	D6527L/D6528

单位unit(mm)

精磨倒角短棒（DIN）
Ground Rods with Chamfer-DIN

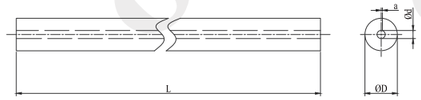


直径ΦD	长度 L (公差Tol./0,+1)	倒角尺寸 C (公差Tol./±0.1)	倒角角度 Angle of Chamfer (公差Tol./±3°)	标准 Standard
3	47	0.4	45°	D6539
4	56	0.4	45°	D6539
5	63	0.5	45°	D6539
6	63	0.5	45°	D6537K
6	67	0.5	45°	D6537K/D6537L/D6539
6	75	0.5	45°	D6537L
6	83	0.5	45°	D6537L
7	75	0.6	45°	D6539
8	80	0.6	45°	D6537K/D6539
8	92	0.6	45°	D6537L
9	85	0.6	45°	D6539
10	90	0.6	45°	D6537K/D6539
10	104	0.6	45°	D6537L
11	96	0.8	45°	D6539
12	103	0.8	45°	D6537K/D6539
12	119	0.8	45°	D6537L
13	103	0.8	45°	D6539
14	108	0.8	45°	D6537K/D6539
14	125	0.8	45°	D6537L
15	112	0.8	45°	D6539
16	116	0.8	45°	D6537K/D6539
16	134	0.8	45°	D6537L
17	120	0.8	45°	D6539
18	124	0.8	45°	D6537K/D6539
18	144	0.8	45°	D6537L
19	128	1.0	45°	D6539
20	132	1.0	45°	D6537K/D6539
20	154	1.0	45°	D6537L

单位unit(mm)

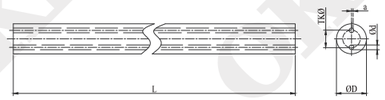
带内冷孔棒材
Rods with Coolant Holes

公制单直孔长棒
Solid Long Rods – Central Coolant Holes



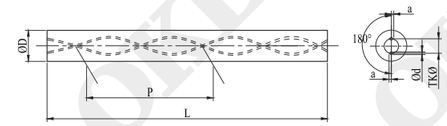
规格（mm）		长度L（公差TOl./0,+5）	规格（mm）	
ΦD	毛坯公差		Φd	TOl.
3	+0.30,+0.50	310/330	0.50	±0.10
4	+0.30,+0.50	310/330	0.80	±0.10
5	+0.30,+0.50	310/330	0.80	±0.10
6	+0.30,+0.50	310/330	1.00	±0.15
7	+0.30,+0.60	310/330	1.00	±0.15
8	+0.30,+0.60	310/330	1.00	±0.15
9	+0.30,+0.60	310/330	1.40	±0.15
10	+0.30,+0.60	310/330	1.40	±0.15
11	+0.30,+0.60	310/330	1.40	±0.15
12	+0.30,+0.60	310/330	1.75	±0.15
13	+0.30,+0.70	310/330	1.75	±0.15
14	+0.30,+0.70	310/330	1.75	±0.15
15	+0.30,+0.70	310/330	2.00	±0.20
16	+0.30,+0.70	310/330	2.00	±0.20
17	+0.30,+0.80	310/330	2.00	±0.20
18	+0.30,+0.80	310/330	2.00	±0.20
19	+0.30,+0.80	310/330	2.00	±0.20
20	+0.30,+0.80	310/330	2.50	±0.25
21	+0.30,+0.80	310/330	2.50	±0.25
22	+0.30,+0.80	310/330	2.50	±0.25
23	+0.30,+0.80	310/330	2.50	±0.25
24	+0.30,+0.80	310/330	3.00	±0.25
25	+0.30,+0.80	310/330	3.00	±0.25
26	+0.30,+0.80	310/330	3.00	±0.25
27	+0.30,+0.80	310/330	3.00	±0.25
28	+0.30,+0.80	310/330	3.00	±0.25
29	+0.30,+0.80	310/330	3.00	±0.25
30	+0.30,+0.80	310/330	3.00	±0.25

公制双直孔长棒
Solid Long Rods –Two Straight Coolant Holes



规格（mm）		长度L（公差TOl./0,+5）	内孔径d		孔间距TK Hole center deviation	
直径ΦD	毛坯公差		Φd	TOl.	TKΦ	Tol.
4	+0.30,+0.50	310/330	0.80	±0.10	1.80	+0,-0.15
5	+0.30,+0.50	310/330	0.80	±0.10	2.00	+0,-0.15
6	+0.30,+0.50	310/330	1.00	±0.15	3.00	+0,-0.20
7	+0.30,+0.60	310/330	1.00	±0.15	3.50	+0,-0.20
8	+0.30,+0.60	310/330	1.00	±0.15	4.00	+0,-0.30
9	+0.30,+0.60	310/330	1.40	±0.15	4.00	+0,-0.30
10	+0.30,+0.60	310/330	1.40	±0.15	5.00	+0,-0.30
11	+0.30,+0.60	310/330	1.40	±0.15	5.00	+0,-0.30
12	+0.30,+0.60	310/330	1.75	±0.15	6.00	+0,-0.30
13	+0.30,+0.70	310/330	1.75	±0.15	6.00	+0,-0.30
14	+0.30,+0.70	310/330	1.75	±0.15	7.00	+0,-0.30
15	+0.30,+0.70	310/330	2.00	±0.20	7.00	+0,-0.30
16	+0.30,+0.70	310/330	2.00	±0.20	8.00	+0,-0.30
17	+0.30,+0.80	310/330	2.00	±0.20	8.00	+0,-0.30
18	+0.30,+0.80	310/330	2.00	±0.20	9.00	+0,-0.30
19	+0.30,+0.80	310/330	2.00	±0.20	9.00	+0,-0.30
20	+0.30,+0.80	310/330	2.50	±0.25	10.00	+0,-0.40
21	+0.30,+0.80	310/330	2.50	±0.25	10.00	+0,-0.40
22	+0.30,+0.80	310/330	2.50	±0.25	11.00	+0,-0.40
23	+0.30,+0.80	310/330	2.50	±0.25	11.00	+0,-0.40
24	+0.30,+0.80	310/330	3.00	±0.25	12.00	+0,-0.50
25	+0.30,+0.80	310/330	3.00	±0.25	12.00	+0,-0.50
26	+0.30,+0.80	310/330	3.00	±0.25	13.00	+0,-0.50

公制30° 双螺旋孔长棒
Solid Long Rods – Two Helical Coolant Holes(30°)

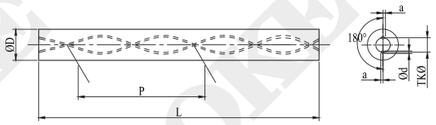


直径D	长度L（公差TOl./0,+5）	内孔径d	孔间距TK	螺距（±0.5°）			孔中心偏离 Hole center deviation
				P	TOl.		
3	330	0.40	1.70	16.32	−0.32	+0.33	0.15
4	330	0.60	2.20	21.77	-0.43	+0.45	0.15
5	330	0.70	2.60	27.21	-0.54	+0.56	0.15
6	330	0.70	2.60	32.65	-0.65	+0.67	0.15
7	330	1.00	3.70	38.09	-0.76	+0.78	0.15
8	330	1.00	4.00	43.53	-0.86	+0.89	0.15
9	330	1.40	4.80	48.97	-0.97	+1.00	0.20
10	330	1.40	4.80	54.41	-1.08	+1.11	0.20
11	330	1.40	5.30	59.86	-1.19	+1.22	0.30
12	330	1.40	6.25	65.30	-1.30	+1.34	0.30
13	330	1.75	6.50	70.74	-1.40	+1.45	0.37
14	330	1.75	7.10	76.18	-1.51	+1.56	0.40
14	330	1.90	6.70	76.18	-1.51	+1.56	0.40
15	330	1.75	7.70	81.62	-1.62	+1.67	0.40
16	330	1.75	8.30	87.06	-1.73	+1.78	0.40
16	330	2.10	8.00	87.07	-1.73	+1.78	0.45
16	330	2.50	8.80	87.06	-1.73	+1.78	0.45
17	330	1.75	8.90	92.50	-1.84	+1.89	0.45
18	330	2.00	9.55	97.95	-1.94	+2.00	0.50
18	330	2.80	9.90	97.95	-1.95	+2.00	0.50
19	330	2.00	10.10	103.39	-2.05	+2.12	0.50
20	330	2.00	10.40	108.83	-2.16	+2.23	0.50
20	330	2.50	10.00	108.83	-2.16	+2.23	0.50
21	330	2.00	11.15	114.27	-2.27	+2.34	0.50
22	330	2.00	11.60	119.71	-2.38	+2.45	0.50
23	330	2.00	12.20	125.15	-2.48	+2.56	0.50
24	330	2.00	12.80	130.59	-2.59	+2.67	0.50
25	330	2.00	13.30	136.03	-2.70	+2.78	0.50

毛坯Unground ΦD(mm)		精磨Ground ΦD(mm)	长度L(mm)
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)
3≤D≤6	+0.60,+1.00	3≤D≤25	h5/h6
6＜D≤24	+0.70,+1.10		
D=25	+0.80,+1.20		
内孔径 d（mm）		孔间距 TK（mm）	
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)
0.40≤d≤0.90	±0.10	TK≤4.00	+0,−0.40
0.90＜d≤1.70	±0.15	4.00＜TK≤5.00	+0,−0.60
d=1.75	±0.20	5.00＜TK≤10.10	+0,−0.80
d=2.00	±0.25	10.10＜TK≤13.30	+0,−1.00

公制40° 双螺旋孔长棒

Solid Long Rods – Two Helical Coolant Holes(40°)

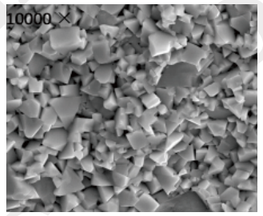


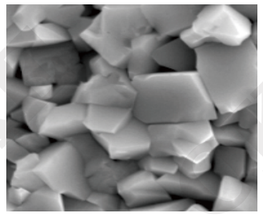
直径D	长度L（公差TOl./0,+5）	内孔径d	孔间距TK	螺距（±0.5°）			孔中心偏离 Hole center deviation
				P	TOl.		
6	330	0.50	2.20	22.46	-0.39	+0.40	0.15
7	330	0.65	2.40	26.21	-0.46	+0.47	0.15
8	330	0.65	2.70	29.95	-0.53	+0.54	0.15
9	330	0.75	3.20	33.70	-0.59	+0.60	0.20
10	330	0.80	3.50	37.44	-0.66	+0.67	0.20
11	330	0.80	3.70	41.18	-0.72	+0.74	0.30
12	330	0.90	4.20	44.93	-0.79	+0.80	0.30
13	330	0.90	4.40	48.67	-0.85	+0.87	0.37
14	330	1.00	4.70	52.42	-0.92	+0.94	0.40
15	330	1.10	5.10	56.16	-0.99	+1.01	0.40
16	330	1.20	5.50	59.90	-1.05	+1.07	0.40
17	330	1.20	5.90	63.65	-1.12	+1.14	0.45
18	330	1.40	6.30	67.39	-1.18	+1.21	0.50
19	330	1.40	6.70	71.14	-1.25	+1.27	0.50
20	330	1.50	7.10	74.88	-1.31	+1.34	0.50

毛坯Unground ΦD(mm)		精磨Ground ΦD(mm)	长度L(mm)
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)
6≤D≤20	+1.10,+1.50	6≤D≤20	h5/h6
内孔径 d（mm）		孔间距 TK（mm）	
范围(Range)	公差(Tol.)	范围(Range)	公差(Tol.)
0.40≤d≤0.60	±0.10	TK≤2.20	+0,-0.40
0.60＜d≤0.90	±0.15	2.20＜TK≤2.70	+0,-0.60
0.90＜d≤1.20	±0.20	2.70＜TK≤6.30	+0,-0.80
1.20＜d≤1.50	±0.25	6.30＜TK≤7.10	+0,-1.00

木工用硬质合金圆棒牌号介绍

Carbide Rod Grades for Wood Cutting

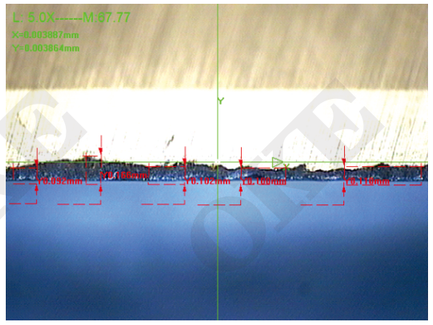
牌号Grade	显微组织 Microstructure	成分 Composition	Co:2.85%, WC balance,Other0.65%
WP03		晶粒度 Grainsize	Ultrafine grain 0.2–0.4um
ISO:<K01		密度 Density	15.20g/cm^3
		硬度 Hardness	94.5HRA
		强度 TRS	3200MPa
切削应用 Cutting Applications	刨花板，密度板 Chipboard,Density Board	断裂韧性Kic	8.5MPa.m$^{1/2}$

牌号Grade	显微组织 Microstructure	成分 Composition	Co:8%, WC balance
WP20		晶粒度 Grainsize	Ultrafine grain 1.0–1.2um
ISO: K20		密度 Density	14.7g/cm^3
		硬度 Hardness	91.6HRA
		强度 TRS	3800MPa
切削应用 Cutting Applications	实木（软木、硬木） Wood(Soft wood ,Hard wood)	断裂韧性Kic	11MPa.m$^{1/2}$

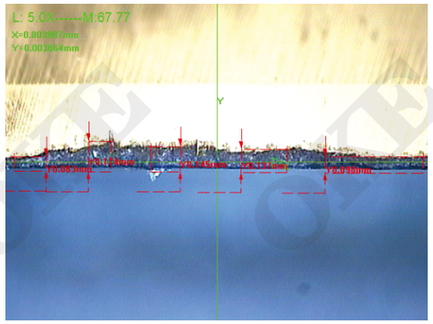
WP03 牌号切削实验数据对比
Cutting Experimental Data With WP03

切削材质 Cutting Material	切削设备 Cutting Machine	切削刀具 Cutting Tool
刨花板 Chipboard	数控雕刻机 CNC Engraving Machine	三刃开料刀 TCT 3-Edge Straight Bit

WP03材质和A公司材质磨损值对比
Wean comparison of WP03 and A-GRADE

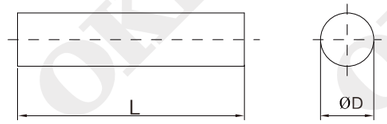


WP03牌号刀具刃口磨损图
WP03 cutter edge wear figure



国外某公司牌号刀具刃口磨损图
A-grade cutter edge wear figure

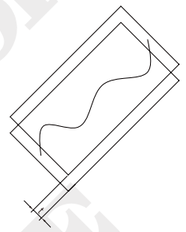
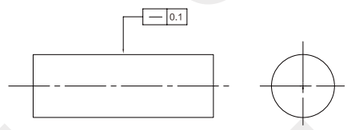
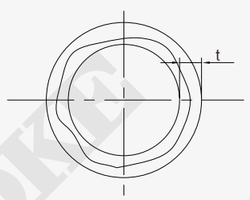
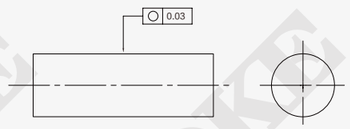
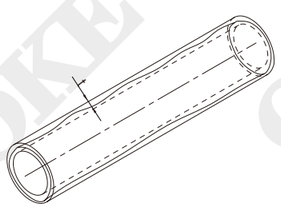
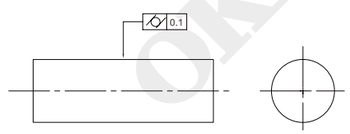
木工用硬质合金圆棒常用规格型号
Carbide Rod Common Specifications for Wood Cutting



直径ΦD (mm)	长度 L(mm)	直径ΦD (mm)	长度 L(mm)	直径ΦD (mm)	长度 L(mm)
6.3	20	8.3	20	10.3	20
6.3	22	8.3	22	10.3	22
6.3	24	8.3	24	10.3	24
6.3	26	8.3	26	10.3	26
6.3	28	8.3	28	10.3	28
6.3	30	8.3	30	10.3	30
6.3	32	8.3	32	10.3	32
6.3	34	8.3	34	10.3	34
6.3	36	8.3	36	10.3	36
6.3	38	8.3	38	10.3	38
6.3	40	8.3	40	10.3	40
6.3	42	8.3	42	10.3	42
6.3	44	8.3	44	10.3	44
6.3	46	8.3	46	10.3	46

外径公差（mm） D(Tol.)	长度公差（mm） L(Tol.)
D (+0.05) (+0.0)	L (+0.3) (+0.0)

尺寸项目名词
Definitions of Geometrical Tolerance

	公差带定义 Definition of Tolerance Zone	标注和解释 Indication and Explanation
直线度 Straightness Tolerance	 在给定方向上公差带是距离为公差值t的 两平行平面之间的区域 The tolerance zone, in the considered plane, is limited by two parallel straight lines a distance t apart and in the specified direction only.	 被测圆柱面的任一素线必须位于距离为 公差值0.1的两平行平面之内 Any extracted (actual) line on the upper surface, parallel to the plane of projection in which the indication is shown, shall be contained between two parallel straight lines 0.1 apart.
圆度 Roundness Tolerance	 公差带是在同一正截面上， 半径值差为公差值t的两同心圆之间的区域 The tolerance zone, in the considered cross-section, is limited by twoconcentric circles with a difference in radii of t.	 被测圆柱面任一正截面的圆周必须位于 半径差为公差值0.03的两同心圆之间 The extracted (actual) circumferential line, in any cross-section of the cylindrical and conical surfaces, shall be contained between two co-planar concentric circles, with a difference in radii of 0.03.
圆柱度 Cylindricity	 公差带是半径差为公差值t的两同轴 圆柱面之间的区域 The tolerance zone is limited by two coaxial cylinders with a difference in radii of t.	 公差带是在同一正截面上， 半径值差为公差值t的两同心圆之间的区域 The tolerance zone, in the considered cross-section, is limited by twoconcentric circles with a difference in radii of t.

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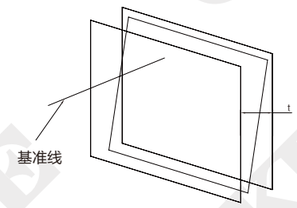
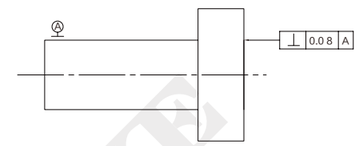
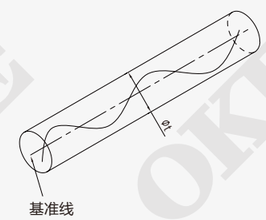
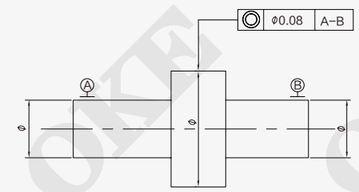
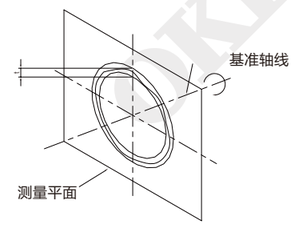
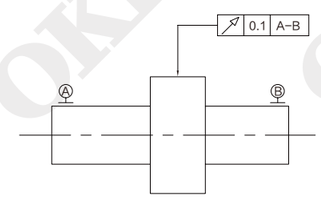
尺寸项目名词
Definitions of Geometrical Tolerance

	公差带定义 Definition of Tolerance Zone	标注和解释 Indication and Explanation
垂直度 Perpendicularity Tolerance of a Surface	 公差带是距离为公差值t且垂直于基准线 的两平行平面之间的区域 The tolerance zone is limited by two parallel planes a distance apart and perpendicular to the datum.	 被测面必须位于距离为公差值 0.08且垂直于基准线A（基准轴线） 的两平行平面之间 The extracted (actual) surface shall be contained between two parallel planes 0.08 apart that is perpendicular to datum axis A.
同轴度 Concentricity Tolerance of a Point	 公差带是直径为公差值Øt的圆柱面内区域， 该圆柱面的轴线与基准轴线同轴 The tolerance zone is limited by a circle of diameter t; the tolerance value shall be preceded by the symbol Ø. The centre of the circular tolerance zone coincides with the datum point.	 大圆柱面的轴线必须位于直径为公差值Ø0.08 且与公共基准线A-B（公共基准轴线） 同轴的圆柱面内 The extracted (actual) median line of the tolerance cylinder shall be within a cylindrical zone of diameter 0.08 the axis of which is the common datum straight line A-B.
圆跳动 Circular run-out Tolerance	 公差带是在垂直于基准轴线的任一半径 位置的测量平面内、半径差为公差值t 且圆心在基准轴线上的两同心圆之间的区域 The tolerance zone is limited within any cross-section perpendicular to the datum axis by two concentric circles with a difference in radii of t , the centers of which coincide with the datum.	 当被测要素围绕公共基准线A-B（公共基准轴线） 旋转一周时，在任一测量平面内的径 向圆跳动均不得大于0.1 The extracted (actual) line in any cross-section plane perpendicular to common datum straight line A-B shall be contained between two coplanar concentric circles with a difference in radii of 0.1.

公差等级
Carbide Rod Tolerances

精磨外径公差
Tol. of Ground Rods' Diameter

DIAMETER	h5	h6	h7
0–3.0mm	0.004mm	0.006mm	0.010mm
0–0.1181in.	0.00015in.	0.00024in.	0.00039in.
3.001–6.0mm	0.005mm	0.008mm	0.012mm
0.1181– 0.2362in.	0.00020in.	0.00031in.	0.00047in.
6.001–10.0mm	0.006mm	0.009mm	0.015mm
0.2363– 0.3937in.	0.00024in.	0.00035in.	0.00059in.
10.001–18.0mm	0.008mm	0.011mm	0.018mm
0.3938– 0.7087in.	0.00031in.	0.00043in.	0.00071in.
18.001 30.0mm	0.009mm	0.013mm	0.021mm
0.7088– 1.1811in.	0.00035in.	0.00051in.	0.00083in.
30.001–50.0mm	0.011mm	0.016mm	0.025mm
1.1812– 1.9685in.	0.00043in.	0.00063in.	0.00098in.

“h”的公差均为+0.0/–
“h” Tolerance all +0.0/–

棒材表面粗糙度
Surface Roughness of Rods

类型 Type	精度 Accuracy
镜面棒材 Polished Rods	0.00–0.05 μm
亚光洁度 Dull Finished	0.10–0.20 μm
精磨棒材 Ground Rods	0.00–0.10 μm

圆度
Roundness Tolerance

精磨圆棒圆度标准均为0.002 mm
The standard roundness tolerance of the ground rod is 0.002 mm.

▶ 硬度对照表
Hardness Comparison Table

硬度 Kic				抗拉强度	硬度 Kic				抗拉强度 (MPa) TRS
洛氏		维氏	布氏		洛氏		维氏	布氏	
HRC	HRA	HV	HB		HRC	HRA	HV	HB	
70.0	86.6	1037	—	—	51.0	76.3	525	501	1780
69.5	86.3	1017	—	—	50.5	76.1	517	494	1750
69.0	86.1	997	—	—	50.0	75.8	509	488	1720
68.5	85.8	978	—	—	49.5	75.5	501	481	1690
68.0	85.5	959	—	—	49.0	75.3	493	474	1660
67.5	85.2	941	—	—	48.5	75.0	485	468	1630
67.0	85.0	923	—	—	48.0	74.7	478	461	1605
66.5	84.7	906	—	—	47.5	74.5	470	455	1575
66.0	84.4	889	—	—	47.0	74.2	463	449	1550
65.5	84.1	872	—	—	46.5	73.9	456	442	1525
65.0	83.9	856	—	—	46.0	73.7	449	436	1500
64.5	83.6	840	—	—	45.5	73.4	443	430	1475
64.0	83.3	825	—	—	45.0	73.2	436	424	1450
63.5	83.1	810	—	—	44.5	72.9	429	418	1430
63.0	82.8	795	—	—	44.0	72.6	423	413	1405
62.5	82.5	780	—	—	43.5	72.4	417	407	1385
62.0	82.2	766	—	—	43.0	72.1	411	401	1360
61.5	82.0	752	—	—	42.5	71.8	405	396	1340
61.0	81.7	739	—	—	42.0	71.6	399	391	1320
60.5	81.4	726	—	—	41.5	71.3	393	385	1300
60.0	81.2	713	—	2555	41.0	71.1	388	380	1280
59.5	80.9	700	—	2500	40.5	70.8	382	375	1260
59.0	80.6	688	—	2450	40.0	70.5	377	370	1245
58.5	80.3	676	—	2395	39.5	70.3	372	365	1225
58.0	80.1	664	—	2345	39.0	70.0	367	360	1210
57.5	79.8	653	—	2295	38.5	—	362	355	1190
57.0	79.5	642	—	2250	38.0	—	357	350	1175
56.5	79.3	631	—	2205	37.5	—	352	345	1160
56.0	79.0	620	—	2160	37.0	—	347	341	1140
55.5	78.7	609	—	2115	36.5	—	342	336	1125
55.0	78.5	599	—	2075	36.0	—	338	332	1110
54.5	78.2	589	—	2035	35.5	—	333	327	1095
54.0	77.9	579	—	1995	35.0	—	329	323	1080
53.5	77.7	570	—	1955	34.5	—	324	318	1065
53.0	77.4	561	—	1920	34.0	—	320	314	1050
52.5	77.1	551	—	1885	33.5	—	316	310	1035
52.0	76.9	543	—	1850	33.0	—	312	306	1020
51.5	76.6	534	—	1815	32.5	—	308	302	1010