



远见赢天下

江西江钨硬质合金有限公司

JIANGXI JIANGWU CEMENTED CARBIDE CO.,LTD

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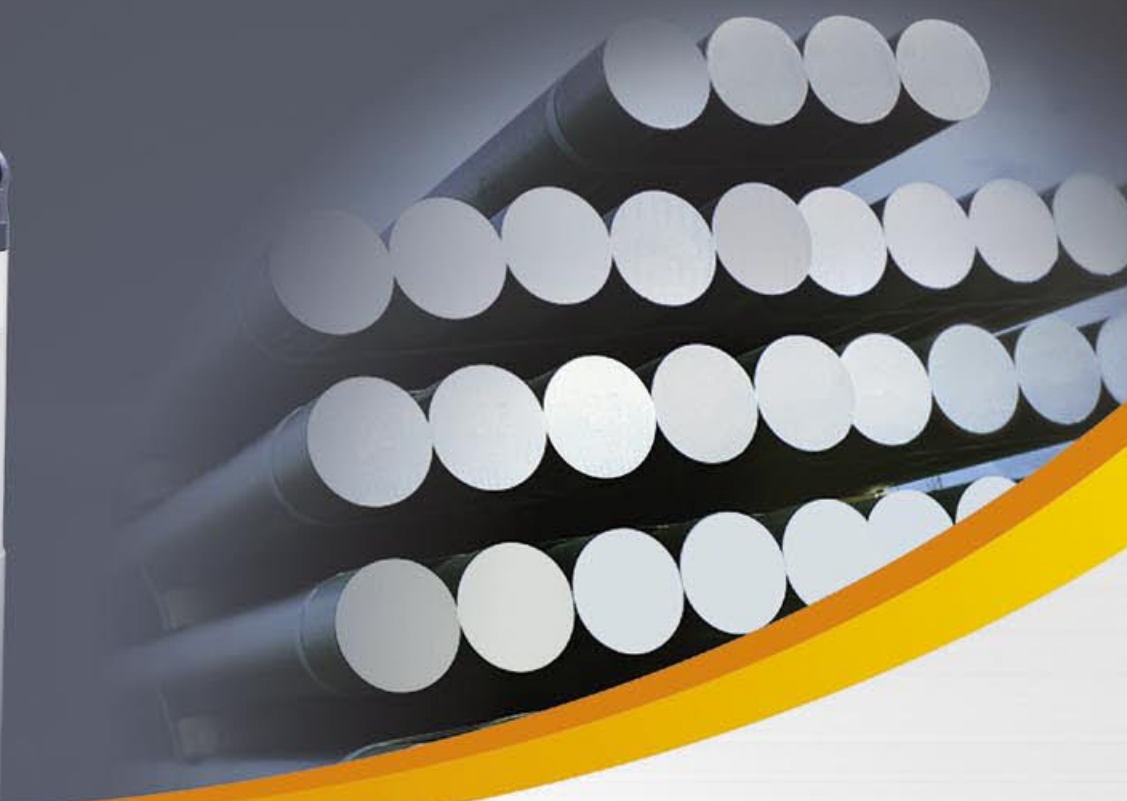
网址Website: www.jxjtc.com



2015 VERSION

硬质合金棒材

CARBIDE RODS



江西江钨硬质合金有限公司

JIANGXI JIANGWU CEMENTED CARBIDE CO.,LTD



公司简介

Company profile

江西江钨硬质合金有限公司（以下简称：江钨合金公司）是江西稀有稀土金属钨业集团有限公司的全资子公司，于2006年8月28日注册成立，注册资本：人民币肆亿元整。公司座落于江西省靖安县工业园区，距省城南昌70公里，交通便利。

江钨合金公司是江钨集团公司“由钨资源向钨制品深加工”战略发展的重点企业。公司依托集团完整钨产业链配套支撑的产业基础优势：拥有国家最高质量级别的黑钨精矿（国家银质奖产品）和白钨精矿（国家金质奖产品）拥有国际领先的钨冶炼技术，尤其是与世界难熔金属领域顶尖企业德国世泰科公司合作钨制品加工技术跨入世界领先水平，保证了后端硬质合金生产拥有世界一流的高质量原料供应。

江钨合金公司拥有一支技术雄厚、年富力强的研发团队。公司设有产品研发和检测中心，为公司发展提供强有力的技术支持，并通过多年的努力，已取得显著的研发成果，累计获得专利授权26项。

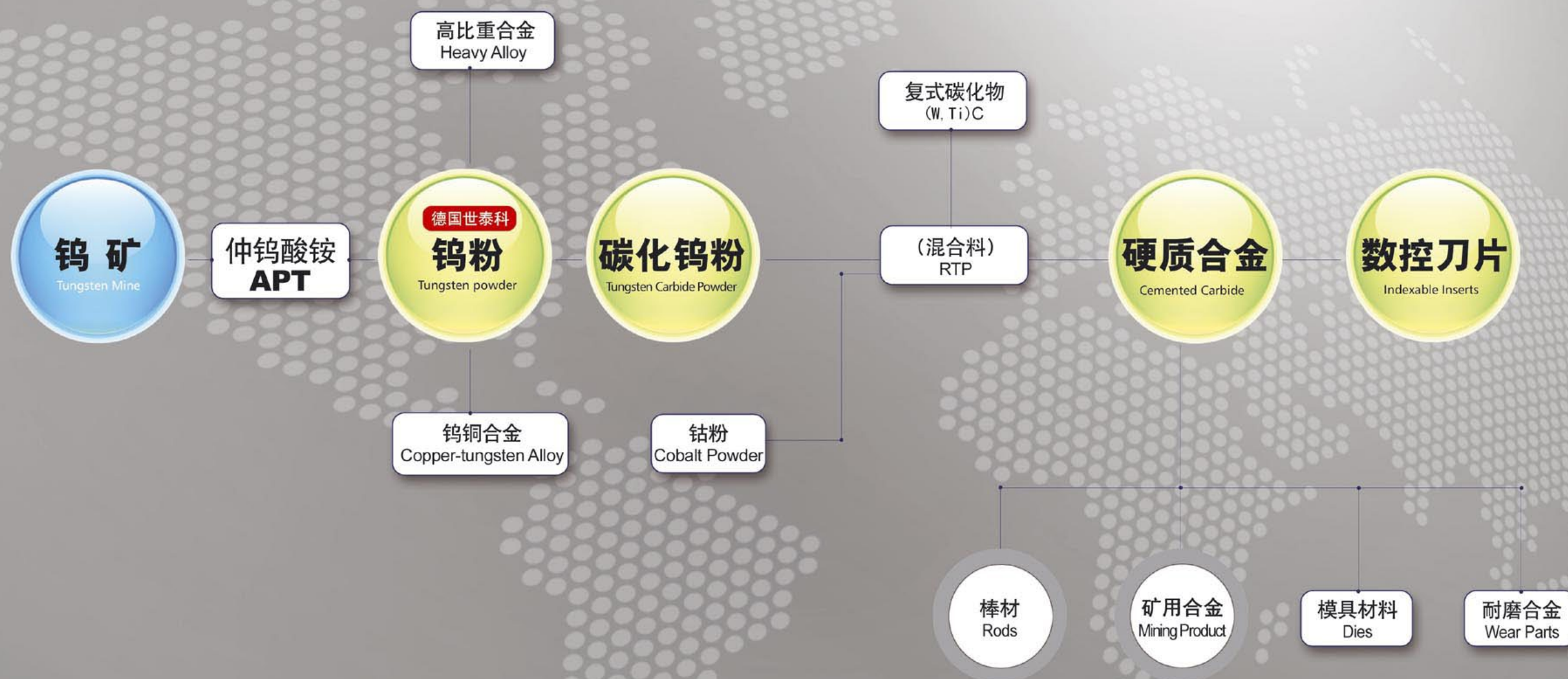
江钨合金公司主要从事高性能的硬质合金、混合料及其他各类合金制品的研发生产和销售，生产产品：主要有硬质合金数控刀片、硬质合金圆棒、焊接刀片、地矿产品等上万种规格型号的合金产品。年营业收入达到3亿元，年实现利税达到3500万元，高端产品生产和研发能力、企业综合实力进入中国前二强，成为江西钨产业转型发展、集聚发展的领头羊。

Jiangxi Jiangwu Cemented Carbide Co., Ltd. (JTCC for short) is a wholly-owned by Jiangxi Rare Earth and Rare Metals Tungsten Group Corporation LTD JXTC for short. The company was founded on August 28th, 2006 with registered capital of four hundred millions RMB. It located in the northwest of Jiangxi with convenient transportation which the distance is 70Km from provincial capital Nanchang city. JTCC is one of the most important strategic development enterprise of "Tungsten resource further processing of Tungsten Products" for JXTC. Relying on industrial bases advantage supporting by Group company, which has Black Tungsten Mine with national top quality (national silver medal products) and White Tungsten Mine (National gold metal products), and has international leading technology in Tungsten smelting. Especially in cooperating with H.C. Starck company in Germany, which is the world top company in refractory metal field, to step into world leading level in tungsten product processing technology. It ensures supplying high quality raw material with first class in the world for cemented carbide production.

JTCC has a young and strong researching and developing team with rich technology. The company established R&D and testing center to provide strong technical support to the company developing. With many years efforts, R&D center achieved outstanding results in research and development, which obtained 26 authorized patents license.

The company specialized in manufacturing, developing & sales of cemented carbide, grade powder and other products with high-performance. Our products: CNC Inserts, carbide rods, brazed insert, mining products, etc... and tens of thousands of types and sizes in carbide. The annual revenue reached 300millions RMB and taxes reached 35millions RMB. What come into China top two is the research and development capabilities of high-end products and the comprehensive strength of the company. JTCC becomes the leader of Jiangxi tungsten industrial transformation and focus development.

INDUSTRIAL CHAIN



诚信致远·合作共赢
INTEGRITY TOWIN WIN-WIN COOPERATION

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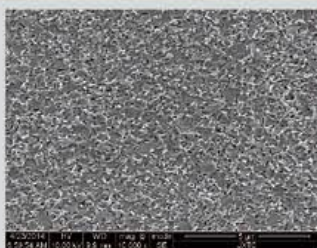
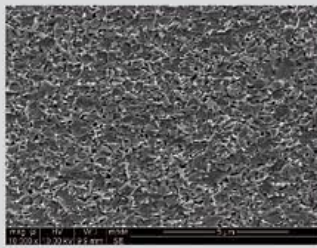
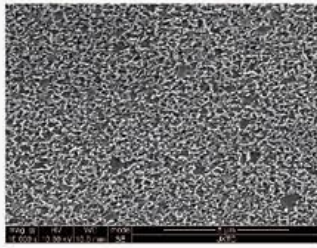
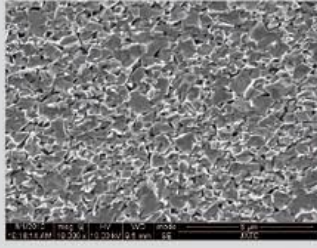
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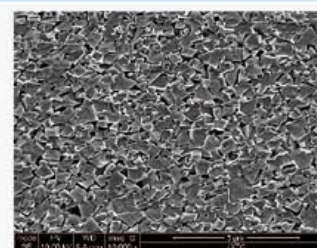
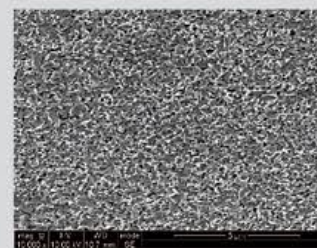
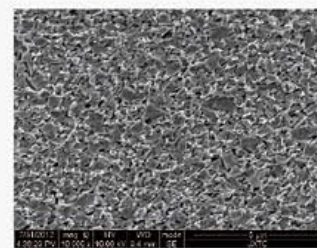
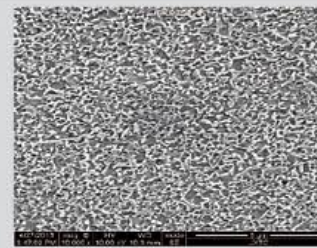
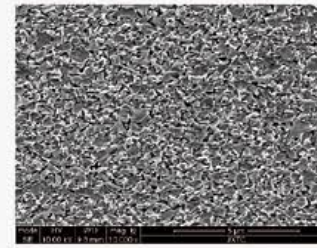
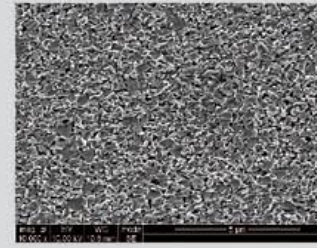
型材产品牌号概览 Grade Introduction

序号 NO.	牌号 Grade	国际分类号 ISO Code	钴含量 Cobalt (%)	硬度 HRA	密度 Density g/cm³	强度 TRS N/mm²	平均晶粒度 Grain size (μm)
1	JT104U	K05-K10	6.5	94	14.75	3500	0.4
2	JT106U	K05-K10	6.5	94	14.75	3500	0.4
3	JT104F	K05-K10	6.0	93.5	14.83	3500	0.6
4	JT204N	K20-30	9.0	94	14.50	3500	0.2
5	JT302A	K20-30	10.0	91.7	14.45	3500	0.8
6	JT304	K20-30	10.0	91.7	14.45	3700	0.8
7	JT304U	K20-30	10.0	93.5	14.45	3500	0.4
8	JT401	K30-40	12.0	92.3	14.15	3800	0.6
9	JT403	K30-40	12.0	92.5	14.15	3800	0.4
10	JT404	K30-40	12.0	92.3	14.15	4000	0.6
11	JT504U	K30-40	13.0	92.7	14.00	3600	0.4

备注: 1.以上数据均为典型值 2.可根据客户的需求定制产品牌号
Note:1. The above data are typical values.2.Customized product grade according to customer demand.

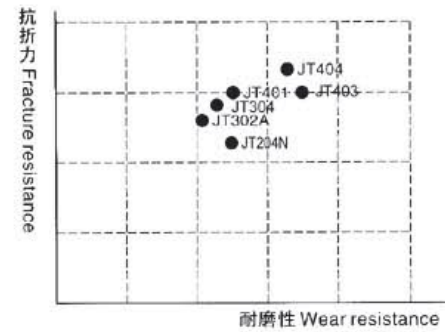
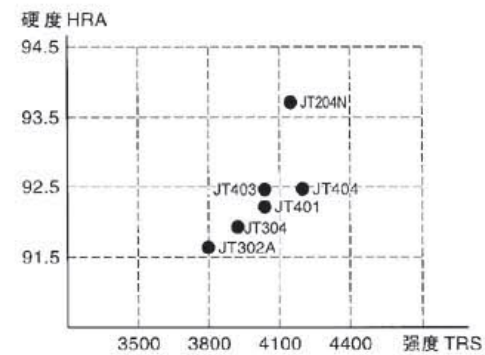
棒材用硬质合金牌号、性能及推荐用途表 Grade performances

牌号 Grade	物理机械性能 Physical & mechanical properties				推荐用途 Applications recommended	金相结构 Metallographical structure
	晶粒度 μm	密度 Densiy g/cm^3	硬度 HRA	抗弯强度 TRS $\geq \text{N}/\text{mm}^2$		
NEW! JT104U	0.4	14.65-14.85	93.5-94.5	3500	在JT106U牌号基础上,采用德国优质原料,产品组织结构缺陷少、分布更均匀,整体性能及其寿命更加显著,市场发挥潜力大。 Based on JT106U grade,uses the German high quality raw materials, product structure less defects, more uniform distribution, the overall performance and its life span is more significant, greatmarket potential.	
JT106U	0.4	14.65-14.85	93.5-94.5	3500	适用于加工镁铝合金、玻璃纤维、碳纤维、木材及硬塑料等材料。 Suitable for processing magnesium alloy, glass fiber, carbon fiber, wood, hard plastic materials, etc.	
NEW! JT104F	0.6	14.75-14.91	93.0-94.0	3500	适用于加工各种铝合金等塑性高的材料。 Suitable for processing all kinds of high plastic materials such as aluminum alloy.	
NEW! JT204N	0.2	14.40-14.60	93.0-94.0	3500	适用于加工HRC60高硬钢等材料。 Suitable for above HRC 60 and high hardness material machining.	
JT302A	0.8	14.35-14.55	91.5-92.0	3500	适用于各种碳钢、铸铁、不锈钢、耐热钢、镍基及钛合金等材料的加工。 Suitable for all kinds of carbon steel, cast iron, stainless steel, heat-resistant steel, nickel base and titanium alloy and other materials processing.	

牌号 Grade	物理机械性能 Physical & mechanical properties				推荐用途 Applications recommended	金相结构 Metallographical structure
	晶粒度 μm	密度 Densiy/ cm^3	硬度 HRA	抗弯强度 TRS $\geq \text{N}/\text{mm}^2$		
NEW! JT304	0.8	14.35-14.55	91.5-92.0	3700	在JT302A牌号基础上,粉末采用更优质原料,使产品获得更好的综合性能,显著提升产品加工性能和使用寿命,使其更具市场竞争力。 Based on JT302A grade,powder using more high-quality raw materials,makes products to get a better comprehensive performance, significantly improve product performance and service life and make it more market competitiveness.	
NEW! JT304U	0.5	14.30-14.50	92.5-93.5	3500	适用于各种高硬钢等高硬材料的加工。 Suitable for processing all kinds of hard materials such as high hard steel.	
JT401	0.6	14.05-14.25	92.0-92.7	3800	适用于镍基合金、钛合金、不锈钢、模具钢、淬硬钢及灰口铸铁等材料的加工。 Suitable for nickel base alloy, titanium alloy, stainless steel, die steel, hardened steel and grey cast iron and other materials processing.	
JT403	0.4	14.05-14.25	92.2-93	3800	在JT401牌号的基础上采用更细的粉末,使产品获得更好的耐磨性,提高产品的加工性能和使用寿命。推荐用于各种铣刀、钻头、铰刀、适用于高速加工。 Based on JT401, take ultra grain size to get a better wear resistance and life. Recommended for making endmills, drills, good at high speed machining.	
NEW! JT404	0.6	14.05-14.25	92.0-92.7	4000	粉末采用更优质原料,产品使用寿命和抗折力均有极大提升,整体加工效果显著提高,适于高硬加工。 Powder using more high-quality raw materials, the service life of the product and resistance to bending force are greatly improve, the overall processing effect is significantly improved, suitable for high hard machining.	
NEW! JT504U	0.5	13.90-14.10	92.3-93.0	3600	适用于加工各种不锈钢等材料。 Suitable for processing various materials such as stainless steel.	

材料选择及产品公差 Material choose and tolerance

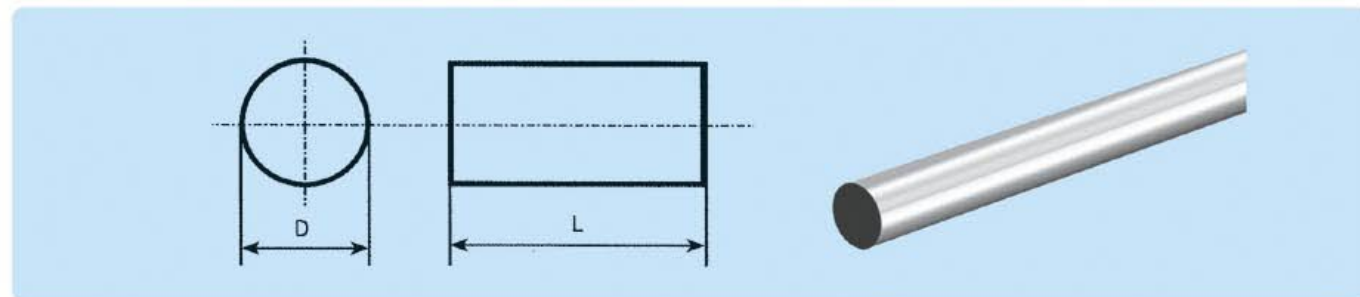
材料选择 Material Choose



标准产品公差 Standard Tolerance

型号表示: $\Phi \times L$

Type specifications: $\Phi \times L$



(公制) The metric system

型 号 Type	外径公差 Tolerance of diameter(mm)	长度公差 Tolerance of lenght(mm)
$\Phi 1.0 \times 330$	+0.15/+0.30	-0/+5.0
$\Phi 2.0 \times 330$	+0.15/+0.30	-0/+5.0
$\Phi 3.0 \times 330$	+0.15/+0.30	-0/+5.0
$\Phi 4.0 \times 330$	+0.30/+0.50	-0/+5.0
$\Phi 5.0 \times 330$	+0.30/+0.50	-0/+5.0
$\Phi 6.0 \times 330$	+0.30/+0.50	-0/+5.0
$\Phi 7.0 \times 330$	+0.30/+0.60	-0/+5.0

续表1 Table 1

型 号 Type	外径公差 Tolerance of diameter(mm)	长度公差 Tolerance of lenght(mm)
$\Phi 8.0 \times 330$	+0.30/+0.60	-0/+5.0
$\Phi 9.0 \times 330$	+0.30/+0.60	-0/+5.0
$\Phi 10.0 \times 330$	+0.30/+0.60	-0/+5.0
$\Phi 11.0 \times 330$	+0.30/+0.60	-0/+5.0
$\Phi 12.0 \times 330$	+0.30/+0.60	-0/+5.0
$\Phi 13.0 \times 330$	+0.30/+0.70	-0/+5.0
$\Phi 14.0 \times 330$	+0.30/+0.70	-0/+5.0
$\Phi 15.0 \times 330$	+0.30/+0.70	-0/+5.0
$\Phi 16.0 \times 330$	+0.30/+0.70	-0/+5.0
$\Phi 17.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 18.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 19.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 20.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 21.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 22.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 23.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 24.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 25.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 26.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 27.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 28.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 29.0 \times 330$	+0.30/+0.80	-0/+5.0
$\Phi 30.0 \times 330$	+0.30/+0.80	-0/+5.0

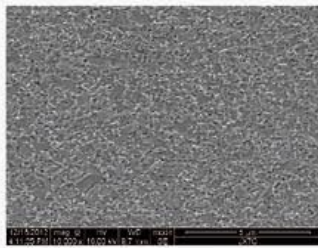
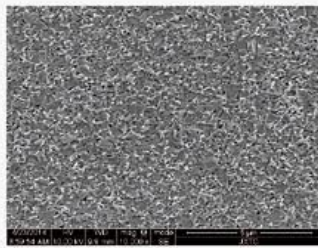
(英制) The british system

型 号 Type	外径公差 Tolerance of diameter(mm)	长度公差 Tolerance of lenght(mm)
$\Phi 1/8 \times 13$	+0.006/+0.018	-0/+0.197
$\Phi 5/32 \times 13$	+0.006/+0.018	-0/+0.197
$\Phi 3/16 \times 13$	+0.006/+0.018	-0/+0.197
$\Phi 1/4 \times 13$	+0.006/+0.018	-0/+0.197
$\Phi 3/8 \times 13$	+0.006/+0.018	-0/+0.197
$\Phi 1/2 \times 13$	+0.006/+0.018	-0/+0.197
$\Phi 5/16 \times 13$	+0.006/+0.018	-0/+0.197

可按客户要求提供外径 $D \leq 45\text{mm}$, 长度 $L \leq 700\text{mm}$ 的毛坯棒材
Rod blanks of $D \leq 45\text{mm}$, $L \leq 700\text{mm}$ can be supplied at customers' requests.

PCB刀具用棒材牌号性能

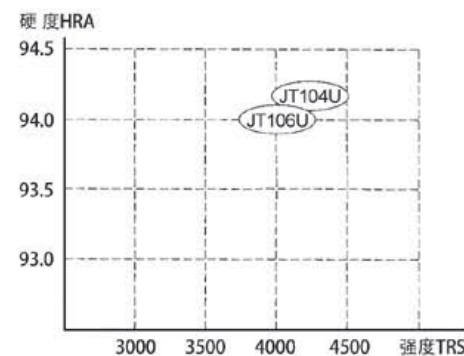
Grade performances for PCB tools

牌号 Grade	性能参数 Physical & mechanical properties				推荐用途 Applications recommended	金相结构 Metallographical structure
	晶粒度 μm	密度 Density g/cm^3	硬度 HRA	强度 TRS $\geq \text{N}/\text{mm}^2$		
JT106U	0.4	14.75	94	4000	适用于加工镁铝合金、玻璃纤维、碳纤维、木材、硬塑料等材料。推荐用于制作0.8mm以上的微铣刀、其他材料加工用钻头。 Suitable for machining aluminum-magnesium alloys, glass fiber, carbon fiber, wood, harden plastic, etc. It is recommended for above 0.8mm endmills and drills of other materials.	
JT104U	0.4	14.75	94.1	4200	适用于加工镁铝合金、玻璃纤维、碳纤维、木材、硬塑料等材料。推荐用于制作0.4mm以上的微铣刀、其他材料加工用钻头。 Suitable for machining aluminum-magnesium alloys, glass fiber, carbon fiber, wood, harden plastic, etc. It is recommended for above 0.4mm endmills and drills of other materials.	

PCB刀具用棒材牌号性能

Grade performances for PCB tools

材料选择 Material Choose



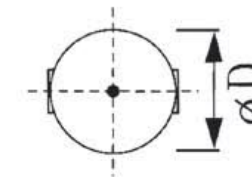
刀具适用规格 Tool Application Size

牌号 Grade	0.5>	1.0	1.5	2.0	2.5	>3.0
JT106U						
JT104U						

公差标准 Standard Tolerance

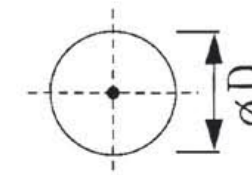
毛坯棒 Unground

尺寸 Size(mm)	公差 Tol(mm)
$\phi \leq 5.0$	+0.20~+0.45
$\phi > 5.0$	+0.20~+0.50



粗磨棒 Rough ground

尺寸 Size(mm)	公差 Tol(mm)
$\phi \leq 5.0$	+0.00~+0.05
$\phi > 5.0$	+0.00~+0.10



牌号对照参考表

Grade Comparison

江西江钨	株洲硬质合金	南昌硬质合金	自贡长城	厦门金鹭	春保硬质合金	日本住友
JXTC	ZCCCT	NCC	Great Wall	GESAC	CB Carbide	SUMITOMO
JT106U	YU06R	TSF10	ZK10UF	GU10UF	K6UF	AF505
JT104U	YU06A			GU10UF		
JT104F	YF06			GU10F	WF03	AF505
JT204N			ZK10SF			AF308
JT302A		YK15			WF15	
JT304	YL10.2		ZK30UF	GU20	K200	AF510
JT401	XF30	YK25	ZK40SF		WF25	
JT403	XF30	YK25		GU25UF		
JT404				GU25UF	TF25+	AF312
JT504U						AF312

备注：牌号对照均为相近或类似，仅供参考，不具法律效力

Note: Grades comparison is similar, for reference only, do not have legal effect.

材质项目名词解释

Definition of Physical Property

◎硬度

Hardness

金属材料抵抗其它更硬物体压入表面的能力称为硬度，主要采用洛氏或维氏硬度测量法，两种硬度值转换时需要注意换算。
The hardness of material is defined as the ability to fight against the hard pressed into surface of the object, mainly using measurements of Rockwell and Vickers. As the principles of the Vickers and Rockwell tests are different, care must be taken when converting from one system to the other.

◎矫顽磁力

Coercive force

矫顽磁力测量的是合金试样完全去磁化所需的反向磁场大小，它可用来评定合金的组织状况，矫顽磁力随钴含量降低而增大，当钴含量一定时，碳化钨晶粒越细，钴相分散程度越高，矫顽磁力也越大。
Coercive Force is a measure of the residual magnetism in the hysteresis loop when the Cobalt (Co) binder in grade of cemented carbide is magnetized and then demagnetized. It can be used to assess the status of alloy organization. The finer the grain size of the carbide phase the higher will be the coercive force value.

◎磁饱和

Magnetic saturation

磁饱和是最大磁化强度与质量的比值，通过测定硬质合金中具有磁性的钴（Co）粘结相的磁饱和，可以评定合金成份。低磁饱和值表示合金含碳量低，或者含有n相碳化物，高磁饱和值表示存在“游离磷或石墨”。
Magnetic saturation is the ratio of magnetic intensity to quality. Magnetic Saturation measurements on the Cobalt (Co) binder phase in cemented carbide are used by the industry to evaluate its composition. Low Magnetic Saturation values indicate a low carbon level and/or the presence of EtaPhase Carbides. High Magnetic Saturation values indicate the presence of 'free carbon' or Graphite.

◎密度

Density

材料的密度（比重）是材料质量与其体积的比率，使用液体置换法进行测定，硬质合金密度随WC-Co相中钴含量增加而增加。
The density (specific gravity) of a material is the ratio of its mass to its volume. It is measured using a water displacement technique. Cemented carbide density decreases linearly with increasing Cobalt content for the We-Co Grade.

材质项目名词解释

Definition of Physical Property

◎抗弯强度

Transverse rupture stress

抗弯强度是表征材料抵抗弯曲不断裂的能力，即试样跨距中点加载负荷至断裂时，单位面积上所受的力大小。
The Transverse Rupture Stress (TRS) is the ability of material to resist bending, measured at the breaking point of a material in a standard three point bend test.

◎金相

Metallographic

硬质合金烧结钴相粘结后，过量钴可能在某些结构区域中存在，形成“钴池”；而当粘结相不完全粘结，则将形成一些少量残余孔隙，合金中钴池及孔隙率使用金相显微镜检验得到。
Cobalt phase will bond after sintering, excess cobalt may exist in certain area of the structure, forming the cobalt pool; If bonding phase is incompletely adhesive, there will form some residual pores. Cobalt pools and porosity can be detected by using metallographic microscope.

◎孔隙度

Porosity

ISO 4505
硬质合金是使用粉末冶金方法制造的，其中金属粘结相用于将碳化相烧结在一起。因此存在这样的可能：由于不完全的烧结，少量的残余孔隙会存在于产品的金相结构中。材料中存在的孔隙的体积是使用一种标准的比较程序来评价的。后者根据一系列的标准图谱将孔隙尺寸范围和分布分成不同类别。尺寸10微米以下的孔隙称为“A”型孔隙。尺寸10~25微米的孔隙称为“B”型孔隙。更大尺寸的孔隙单独测量和分类。硬质合金中孔隙的存在对机械性能有负面的影响。

ISO 4505
Cemented carbide is manufactured by powder metallurgy and the metal binder phase is used to sinter together the carbide phase. So there exists such a possibility: A small amount of residual pores are present in the microstructure of cemented carbide due to the incomplete sintering. The volume of the pores present in the material is to be evaluated by a standard comparison procedure. The latter divides the scope of dimensions and the distribution of pores into several categories: A pore under 10 microns is called porosity "A" A pore of 10-25 microns is called porosity "B" Pores of bigger dimensions are to be measured and classified separately. The existence of pores in cemented carbide will have adverse effects on its mechanical properties.

材质项目名词解释

Definition of Physical Property

◎钴池

Cobalt lake

硬质合金是采用金属粉末冶金方法制造的。其中金属粘结相用于将碳化物相烧结在一起。因此存在这样的机会：烧结后结构中某些地方存在过多的钴。这种情况被称为“钴池”。钴池是烧结时钴的不完全分布的结果。这可能是由于烧结温度过低，钴不能充分流动。原始粉末材料成形密度不够，或是在热等静压处理时孔隙被钴填充结果。材料中钴池体积的评价是根据其尺寸和分布采用显微照片比较和/或单个测量。硬质合金中钴池的存在会影响耐磨性和强度。

Cemented carbide is manufactured by powder metallurgy and the metal the binder phase is to sinter together the carbide phase. So there exists such an opportunity: Too much cobalt is present in some places of structure after the sintering process and it is called "cobalt lake". Cobalt lake is caused by the incomplete distribution of cobalt in the sintering process. The reason may be the too low sintering temperature to hinder the sufficient flow of cobalt, the insufficiency of density of the virgin compacted material or the filling of cobalt into the pores in the HIP process. The evaluation of the volume of cobalt lake in the material is made by the comparison of micrographs and/or measurement of one by one based on the sizes and distribution. The presence of cobalt lake in cemented carbide will affect its wear resistance and strength.

◎自断裂韧性

Fracture toughness KIC

断裂韧性KIC是含有临界尺寸缺陷的试样的强度测量尺度，它反映材料塑性变形和断裂全过程中吸收能量的能力，是强度和塑性的综合表现，使用维氏压痕法测定。

Fracture toughness KIC is the measurement strength of samples containing critical defect. Fracture toughness reflects the ability of material to absorb energy in the process of plastic deformation and fracture. Fracture toughness is the performance of strength and the plasticity, which is measured by Vickers.

◎总碳含量

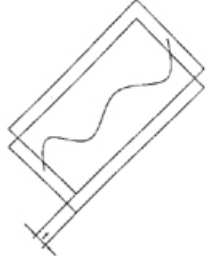
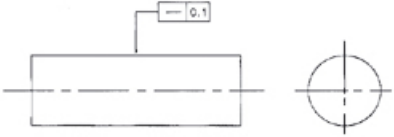
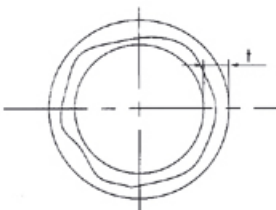
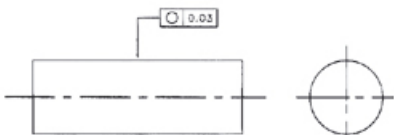
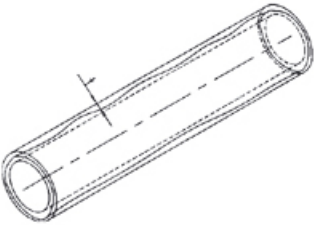
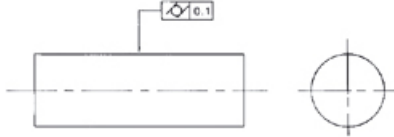
The total carbon

碳化钨（WC）中理想碳含量范围是6.05-6.14%，高于6.14%，将导致组分中明显的碳过量，超过化学计量值，形成“游离碳”，少于6.02%，将形成 η 相碳化物。

The Ideal amount of Carbon In Tungsten Carbide (WC) is 6.13% by weight. An acceptable range of Carbon is 6.05-6.14%, any amount less than 6.02% will result in visible Carbon deficiency by the formation of the Eta-Phase carbides, any amount greater than 6.14% will result in a visible Carbon excess by the formation of 'free-carbon, graphite in the microstructure.

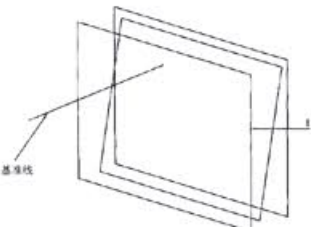
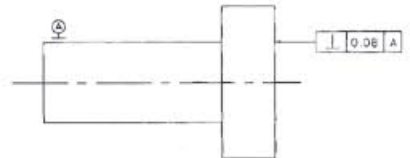
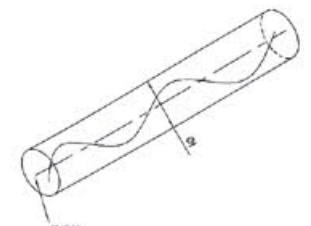
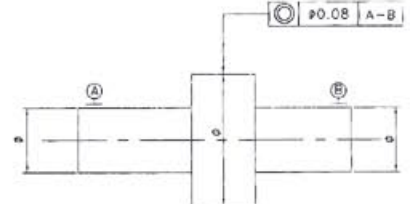
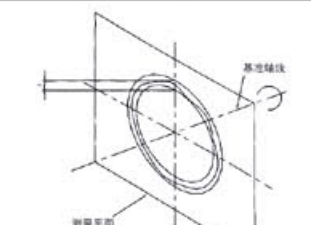
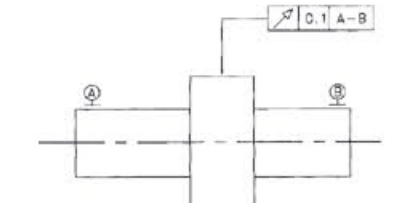
尺寸项目名词

Definition of Geometrical Tolerances

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 two concentric 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 two concentric circles with a difference in radii of t.

尺寸项目名词

Definition of Geometrical Tolerances

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 are perpendicular to datum axis A.
同轴度 concentricity Tolerance of a point  公差带是直径为公差值Φt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 Φ, 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$\Phi 0.08$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.

硬度换算表

Hardness Change

布氏硬度 10mm球 荷重3000kg			洛氏硬度 (3R)				维氏硬度 HV 荷重30kg
标准球	Hult Green 球	碳化钨球	HRA 荷重60kg 金刚石	HRB 荷重100kg 1/16" 球	HRC 荷重150kg 金刚石	HRD 荷重100kg 金刚石	
-	-	-	92.5	-	80.5	-	1700
-	-	-	92.0	-	80.0	-	1600
-	-	-	91.5	-	79.0	-	1550
-	-	-	91.0	-	78.0	-	1500
-	-	-	90.5	-	77.0	-	1450
-	-	-	90.0	-	76.0	-	1400
-	-	-	89.5	-	75.0	-	1350
-	-	-	89.0	-	74.0	-	1300
-	-	-	88.5	-	73.0	-	1250
-	-	-	88.0	-	72.0	-	1200
-	-	-	87.5	-	71.5	-	1150
-	-	-	87.0	-	71.0	-	1140
-	-	-	86.5	-	70.0	-	1076
-	-	-	86.0	-	69.0	-	1004
-	-	-	85.6	-	68.0	76.9	940
-	-	-	85.3	-	67.5	76.5	920
-	-	-	85.0	-	67.0	76.1	900
-	-	767	84.7	-	66.4	75.7	880
-	-	757	84.4	-	65.9	75.3	860
-	-	745	84.1	-	65.3	74.8	840
-	-	733	83.8	-	64.7	74.3	820
-	-	722	83.4	-	64.0	73.8	800
-	-	710	93.0	-	63.3	73.3	780
-	-	698	82.6	-	62.5	72.6	760
-	-	684	82.2	-	61.8	72.1	740
-	-	670	81.8	-	61.0	71.5	720
-	615	656	81.3	-	60.1	70.8	700
-	610	647	81.1	-	59.7	70.5	690
-	603	638	80.8	-	59.2	70.1	680
-	597	630	80.6	-	58.8	69.8	670
-	590	620	80.3	-	58.3	69.4	660
-	585	611	80.0	-	57.8	69.0	650
-	578	601	79.8	-	57.3	68.7	640
-	571	591	79.5	-	56.8	68.3	630
-	564	582	79.2	-	56.3	67.9	620
-	557	573	78.9	-	55.7	67.5	610
-	550	564	78.6	-	55.2	67.0	600
-	542	554	78.4	-	54.7	66.7	590

硬度换算表

Hardness Change

布氏硬度 10mm球 荷重3000kg			洛氏硬度 (3R)				维氏 硬度 HV 荷重 30kg
标准球	Hult Green 球	碳化钨球	HRA 荷重60kg 金刚石	HRB 荷重100kg 1/6" 球	HRC 荷重150kg 金刚石	HRD 荷重100kg 金刚石	
-	535	545	78.0	-	54.1	66.2	580
-	527	535	77.8	-	53.6	65.8	570
-	519	525	77.4	-	53.0	65.4	560
505	512	517	77.0	-	52.3	64.8	550
496	503	507	76.7	-	51.7	64.4	540
488	495	497	76.4	-	51.1	63.9	530
480	487	488	76.1	-	50.5	63.5	520
476	479	479	75.7	-	49.8	62.9	510
465	471	471	75.3	-	49.1	62.2	500
456	460	460	74.9	-	48.4	61.6	490
448	452	452	74.5	-	47.7	61.3	480
441	442	442	74.1	-	46.9	60.7	470
433	433	433	73.6	-	46.1	60.1	460
425	425	425	73.3	-	45.3	59.4	450
415	415	425	72.8	-	44.5	58.8	440
405	405	405	72.3	-	43.6	58.2	430
397	397	397	71.8	-	42.7	57.7	420
388	388	388	71.4	-	41.8	56.8	410
379	379	379	70.8	-	40.8	56.0	400
369	369	369	70.3	-	39.8	55.2	390
360	360	360	69.8	(110.0)	38.8	54.4	380
350	350	350	69.2	-	37.7	53.6	370
341	341	341	69.7	(109.0)	36.6	52.8	360
331	331	331	68.1	-	35.5	51.9	350
322	322	322	67.6	(108.0)	34.4	51.1	340
323	313	313	67.0	-	33.3	50.2	330
303	303	303	66.4	(107.0)	32.2	49.4	320
294	294	294	65.8	-	31.0	48.4	310
284	284	284	65.2	(105.5)	29.8	47.5	300
280	280	280	64.8	-	29.2	47.1	295
275	275	275	64.5	(104.5)	28.5	46.5	290
270	270	270	62.4	-	27.8	46.0	285
265	265	265	63.8	(103.5)	27.1	45.3	280
261	261	261	63.5	-	26.4	44.9	275
256	256	256	63.1	(102.0)	25.6	44.3	270
252	252	252	62.7	-	24.8	43.7	265
247	247	247	62.4	(101.0)	24.0	43.1	260
243	243	243	62.0	-	23.1	42.2	255

硬度换算表

Hardness Change

布氏硬度 10mm球 荷重3000kg			洛氏硬度 (3R)				维氏 硬度 HV 荷重 30kg
标准球	Hult Green 球	碳化钨球	HRA 荷重60kg 金刚石	HRB 荷重100kg 1/6" 球	HRC 荷重150kg 金刚石	HRD 荷重100kg 金刚石	
238	238	238	61.6	99.5	22.2	41.7	250
233	233	233	61.2	-	21.3	41.1	245
228	228	228	60.7	98.1	20.3	40.3	240
219	219	219	-	96.7	(18.0)	-	230
209	209	209	-	95.0	(15.7)	-	220
200	200	200	-	93.4	(13.4)	-	210
190	190	190	-	91.5	(11.0)	-	200
181	181	181	-	89.5	(8.5)	-	190
171	171	171	-	87.1	(6.0)	-	180
162	162	162	-	85.0	(3.0)	-	170
152	152	152	-	81.7	(0.0)	-	160
143	143	143	-	78.7	-	-	150
133	133	133	-	75.8	-	-	140
124	124	124	-	71.2	-	-	130
114	114	114	-	66.7	-	-	120
105	105	105	-	62.3	-	-	110
95	95	95	-	56.2	-	-	100
90	90	90	-	52.0	-	-	95
86	86	86	-	48.0	-	-	90
81	81	81	-	41.0	-	-	85

公差等级

Tolerance Grade

DIAMETER	h5	h6	h7
0-3.0mm 0-0.11811 in.	0.004mm 0.00015 in.	0.006mm 0.00024 in.	0.010mm 0.00039 in.
3.001-6.0mm 0.11812-0.23622 in.	0.005mm 0.00020 in.	0.008mm 0.00031 in.	0.012mm 0.00047 in.
6.001-10.0mm 0.2362370 in.	0.006mm 0.00024 in.	0.009mm 0.00035 in.	0.015mm 0.00059 in.
10.001-17.0mm 0.39371-0.70866 in.	0.008mm 0.00031 in.	0.011mm 0.00043 in.	0.018mm 0.00071 in.
18.001-30.0mm 0.90867-1.18110 in.	0.009mm 0.00035 in.	0.013mm 0.00051 in.	0.021mm 0.00083 in.
30.001-50.0mm 1.8111-1.96850 in.	0.011mm 0.00043 in.	0.016mm 0.00063 in.	0.025mm 0.00098 in.

