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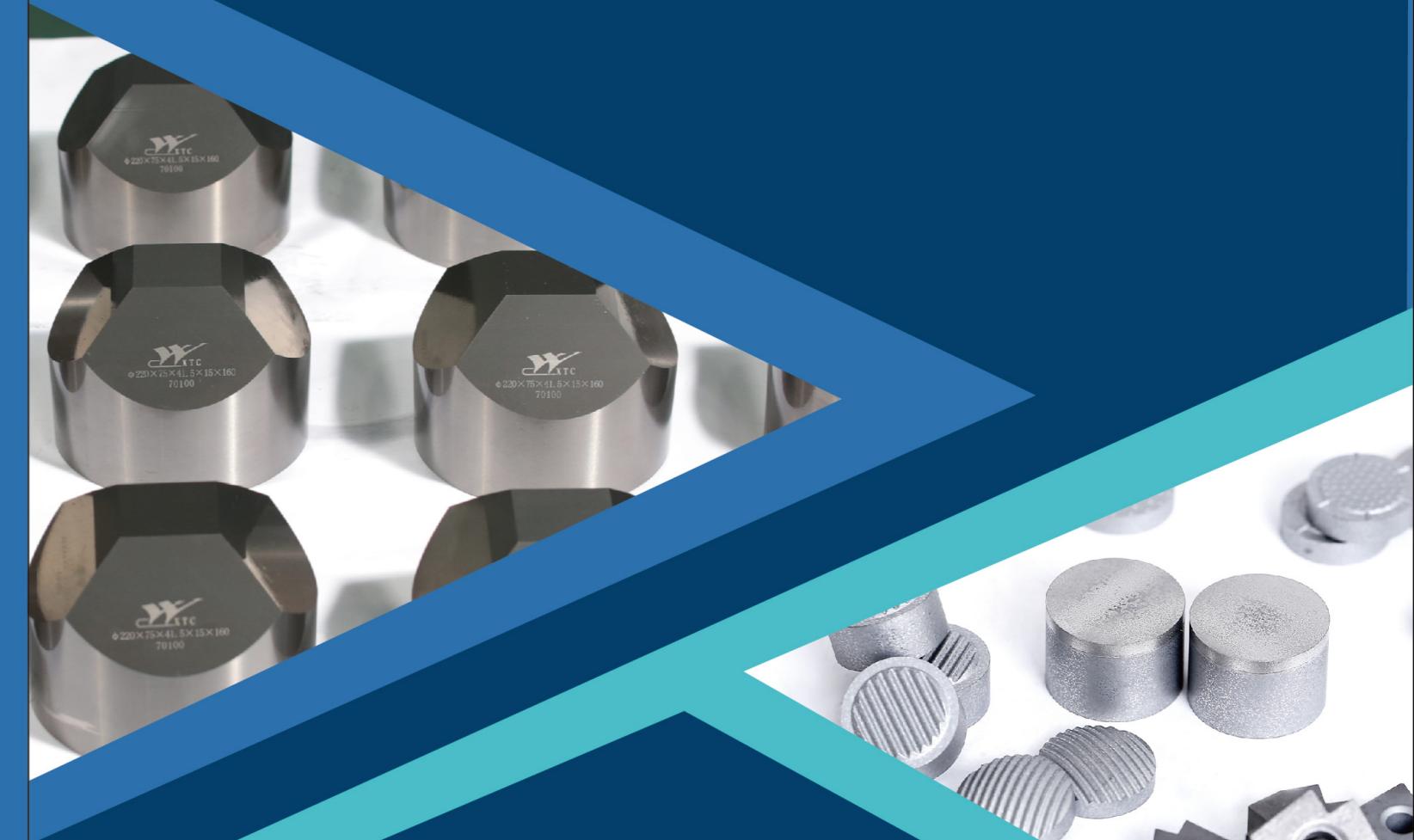
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股票代码 厦门钨业 600549
STOCK CODE OF XTC 600549



ALLOY ANVIL AND CARBIDE SUBSTRATES FOR PDC

硬质合金顶锤、复合片基体

XTC 洛阳金鹭硬质合金工具有限公司
Luoyang Golden Egret Geotools Co.,Ltd.



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COMPANY PROFILE

厦门钨业

厦门钨业是在上海证券交易所上市的集团型股份公司，中国上市公司500强、国家重点高新技术企业、国家火炬计划钨材料产业基地、国家首批发展循环经济示范企业。

厦门钨业主要从事钨精矿、钨钼中间制品、粉末产品、丝材板材、硬质合金、切削工具等各种钨系列产品；稀土氧化物、稀土金属、稀土发光材料、磁性材料和稀土贮氢、系列锂电池材料等各种稀土材料和能源新材料的生产、销售与研发。公司拥有从钨钼矿山→冶炼→深加工→钨钼二次资源回收的完整的钨产业链，以及稀土矿山开发、冶炼加工、稀土新材料、科研应用等完整的稀土产业体系。依托厦钨设有“国家钨材料工程技术研究中心”和“能源新材料研究中心”。

厦钨以“让员工实现自我价值，使用户得到满意服务，为股东取得丰厚回报，与社会共谋和谐发展”为宗旨，将继续发展资金、技术、设备和人才等优势，持续创新，占领技术制高点，为打造最具竞争实力的国际性一流公司而不懈奋斗。

XTC specializes in producing , selling and doing R & D in various of tungsten series including tungsten concentrate , semi product of tungsten molybdenum , powder product , wire plate , cemented carbide and cutting tools etc.; various of rare earth material and new energy material including rare earth oxide , rare earth metal , rare earth luminescent materials , magnetic materials and lithium battery materials . XTC has a complete tungsten industrial chain from own tungsten molybdenum mine , melting , deep processing end up to secondary resources recovery of tungsten molybdenum , and it also equipped with a complete rare earth industrial system which including development of rare earth mining , smelting processing , new rare earth material and scientific application . Depend on “China National R&D Centre for Tungsten Technology” and “New Energy& New Material Research Centre” .

XTC is being developed with the purpose to “achieving self-value by employees , satisfying customers by service,cheering up stockholders by profit, building up harmony society by enterprise development ”, managing to be the most competitive international enterprise with sustainable innovation , sufficient capital , advanced equipment , and talented employees .

01

COMPANY PROFILE



COMPANY PROFILE

洛阳金鹭

洛阳金鹭硬质合金工具有限公司，成立于2012年，是国有企业厦门钨业股份有限公司100%投资的“金鹭”系硬质合金骨干企业。公司注册资金10.5亿元人民币，一期投资10亿元人民币。主要从事钨粉、碳化钨粉、硬面材料、硬质合金顶锤、硬质合金辊环、复合片基体、矿山工具等钨系列产品的产品与销售。

洛阳金鹭致力于硬质合金辊环，顶锤以及复合片基体等硬质合金产品的全面开发与生产，我们潜心打造具有高硬度、高抗弯强度、高抗压强度及抗热裂纹性能优异的产品，是超硬材料生产企业追求更高产品品质、更高效益的有力支持者。

LUOYANG GOLDEN EGRET GEOTOOLS CO.,LTD. founded in 2012, is wholly-owned by the listed company XIAMEN TUNGSTEN CO.,LTD(XTC). As a backbone cemented carbide enterprise of XTC with registered capital of 1.05billion RMB and first investment of 1billion RMB, GEOTOOLS specializes in producing high quality tungsten powder,tungsten carbide powder,carbide anvils,carbide roll rings,carbide substrates for PDC bit,mining drill bits and hard facing materials. GEOTOOLS dedicates into development and production of high quality cemented,carbide anvil and substrate for PDC compact with high hardness, high bend strength, high compressive strength and thermal crack resistance. GEOTOOLS is a strong supporter for our customers to persuit better product quality and higher benefit.



02

INDUSTRY CHAIN

产业链

厦钨集团拥有从矿石开采到硬质合金深加工产品的一体化钨产业链：

- 从源头上控制原材料，保证原料供应及成品品质的稳定；
- 有效整合资源、增强下游行业的竞争力；
- 厦钨掌控全球约30%高品位钨资源，年产超3万吨钨冶炼产品，为世界最大的钨品生产和供应基地。



制粉车间 Powder process workshop



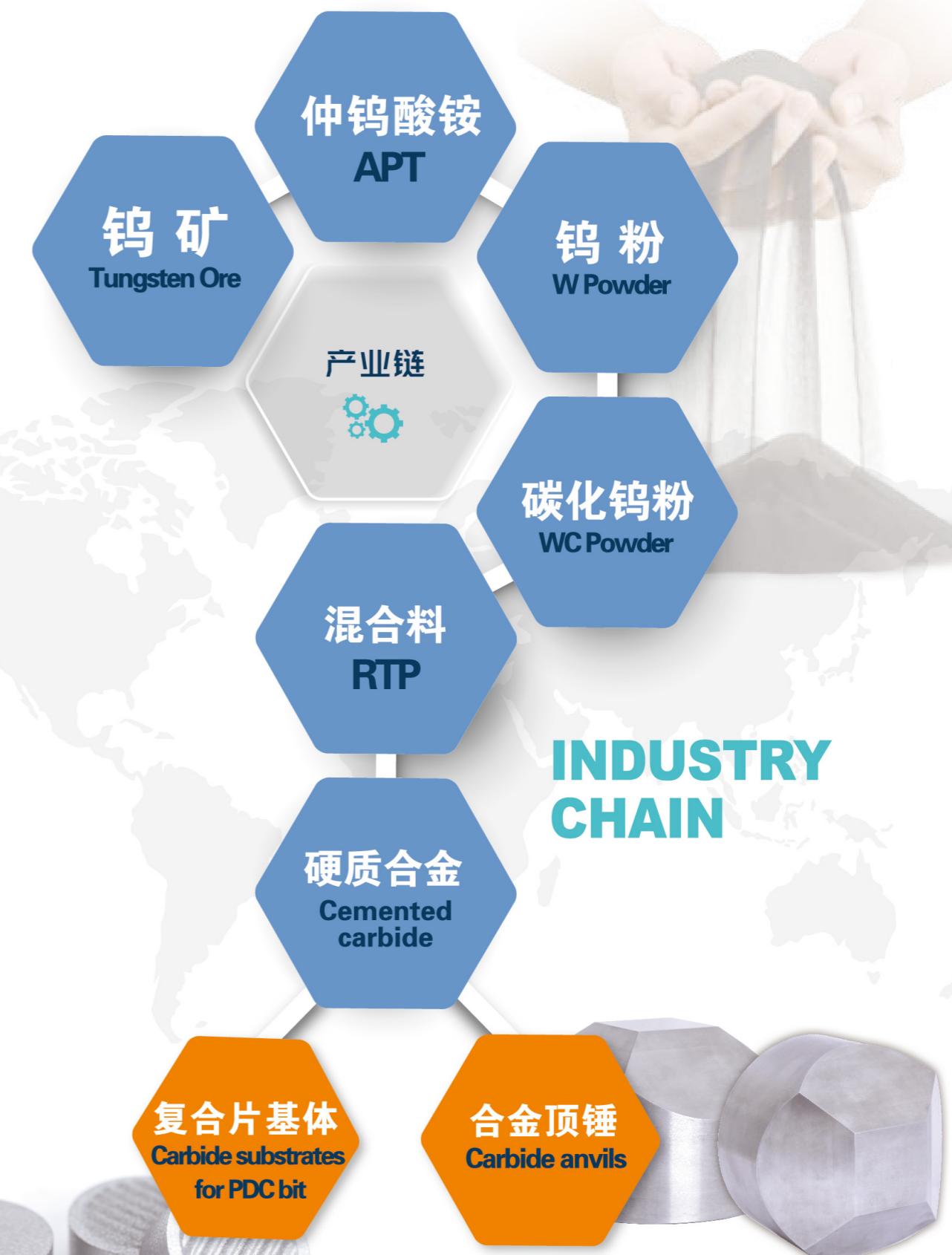
RTP车间 RTP workshop



合金制品车间 Great products workshop

Xiamen tungsten ore mining group has from the hard alloy deep-processing products of tungsten industry chain integration:

- Control of raw materials from the source to ensure the quality of raw materials and finished products.
- Effective integration of resources, reduce production costs, maintain price stability, enhance the competitiveness of the downstream industry.
- Xiamen tungsten controls about 30 percent of the world high grade tungsten resources, an annual output of over 3 million tons of tungsten smelting products, is the world's largest tungsten production and supply base.

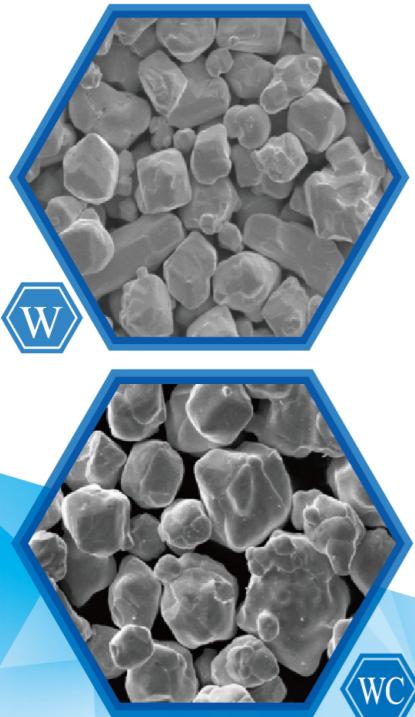


金鹭WC原料的技术特性

钨粉末制造处于国际先进水平，自主生产的钨粉、碳化钨粉，颗粒均匀性好，单晶强度、硬度高。

Tungsten powder manufacturing is in the international advanced level, and its know-how of tungsten powder, tungsten carbide powder produced by XTC are with better grain size and higher hardness.

- 洛阳金鹭采用优质WC粉（粒度2um左右）为原料。
- 金鹭牌优质WC粉的生产采用一流的自动化还原和碳化设备，同时采用先进的还原、碳化工艺，制备出的WC具有粉末纯度高，碳化完全，游离碳低，亚晶尺寸均匀，单晶强度和硬度高，晶型完整等优异特点。
- Our alloy anvil adopts qualitative WC powder (grain size around 2um) as raw materials.
- XTC qualitative WC powder produced by the state of automatic reduction and carbonization equipment, adopting advanced reduction, carbonization process at the same time, the preparation of WC powder with high purity, carbide, completely free carbon is low, the crystal size uniform, single crystal strength and high hardness, excellent features such as complete crystal shape.



WC technical characteristics of raw materials

混合料的技术特点

TECHNICAL CHARACTERISTICS OF RTP

混合料制备主要设备
EQUIPMENT FOR RTP



自动球磨机
Milling machine

喷雾干燥塔
Spray-drying



洛阳金鹭顶锤混合料粒子形态
Morphology of RTP



THE PROCESS FLOW 工艺流程



07



全自动粉末液压成型机

Automatic hydraulic press machine

压坯的特征：

- (1) “自动化双向压制”技术使产品各部位密度均匀一致。
- (2) 脱模保护预加载功能保证压坯无裂纹、分层等缺陷，质量稳定性高。

Characteristics of blank:

- (1) “Automatic bidirectional pressing” ensures even density of the final products.
- (2) The preloading function of the mold release ensures the stable quality by avoiding cracks and delamination of the pressing.

PRESS FORMING TECHNOLOGY

压制成型技术



08

SINTERING TECHNOLOGY

烧结成型技术

德国PVA进口低压炉
PVA HIP furnace



设备特点：

自主研发的集脱蜡和加压烧结于一体的“一体化烧结工艺”，使产品质量更加稳定可靠。

Equipment characteristics:

Integrating de-wax and pressure sintering process which is developed independently by XTC itself to enhance stability of product quality.



ALLOY ANVIL PROCESSING TECHNOLOGY

顶锤加工技术

顶锤加工设备
Anvil processing equipment

顶锤加工设备为先进的专用数控磨床，设备精度高，稳定性好，产品精度处于行业领先水平。

Carbide Anvil processing equipment is composed by advanced CNC grinding machine with high-precision, better stability. The products precision stands a leading level in the industry.



洛阳金鹭顶锤具有超高的尺寸精度。

Luoyang Golden carbide anvil has the highest dimensional precision.

洛阳金鹭顶锤尺寸公差与行业标准YS/T503-2009对比									
Compare dimensional tolerance comparison between XTC anvil and industrial standard YS/T503-2009									
尺寸公差范围 Dimensional tolerance range					形位公差范围 Geometrical tolerance				
D (mm)	E (mm)	H (mm)	F (mm)	β (°)					
± 0.025	± 0.025	± 0.05	± 0.05	± 0.05	± 0.5	± 0.05	± 0.05	± 0.08	± 0.08

顶面与圆锥轴线垂直度 (mm)	圆锥圆柱度 (mm)	锥面直线度 (mm)	上、下顶面平面度 (mm)	上、下顶面平行度 (mm)
Perpendicularity (mm) of top face and axis	Cylindricity(mm) of circular cone	Straightness (mm) of conical surface	Flatness (mm) of upper and lower face	Parallelisms (mm) of upper and lower face
0.02	0.1	0.01	0.02	0.01

★ 注：蓝色数值为洛阳金鹭可以达到的尺寸控制标准，灰色数值为行业尺寸控制标准。

Note: XTC standard in blue, Industrial standard in grey.

- 顶锤的合理使用对顶锤的寿命影响极大，在使用过程中还需注意：
 - 顶锤为脆性材料，应小心搬运，搬运过程中顶锤之间不能发生碰撞；
 - 对于出厂前没有经过时效处理的顶锤，在使用前客户应自行通过时效处理消除其内部应力；
 - 在顶锤的装配、转移、上机过程中，应注意人身安全，小心被碰伤或砸伤。

Correct using greatly influences anvil's life period, please be noted:

- Anvil Carbide is a kind of fragile material should be carried carefully and avoiding any collision during transport;
- Aging treatment shall be undertaken before using to eliminate inner-stress;
- Avoiding any personal injury during assembly, transfer and operation of Carbide Anvil.

消除顶锤内应力
Eliminate inner-stress of anvil

LONGEST ANVIL LIFE
优异的顶锤寿命

稳定的合成工艺
Stable synthetic process

高品质钢环、垫块
High-quality steel ring and cushion block

提高装配精度
High assembly accuracy

稳定的六面顶压机
Stable 6-surface diamond presser

PRODUCT INTRODUCTION

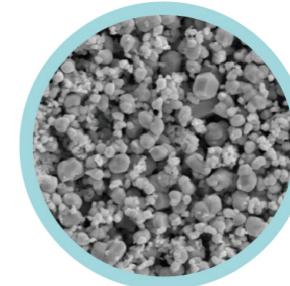
顶锤牌号介绍

洛阳金鹭顶锤现在所用的两个主要牌号为GF35H、GF40H。采用洛阳金鹭优质WC原料，利用自主开发的高效精密压制成型技术、一体式脱蜡烧结-低压烧结工艺和高精度的机加工工艺，生产的合金顶锤具有稳定的抗压强度和抗弯强度，抗热疲劳、抗热冲击性能优良，尤其适合制造Φ160及其以上的大规格顶锤。

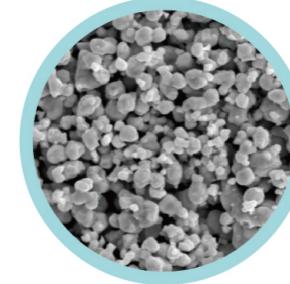
洛阳金鹭顶锤经过超声探伤及磁性能无损检测，并可按客户需求提供高效的时效处理消除顶锤内部应力。

GF35H and GF40H are the two main grades for XTC Carbide Anvil, which produced by excellent WC raw material of XTC itself and high-precision machining with self-developed efficient precise compression molding technology and integrating de-waxing and sintering process. Thereof the XTC anvil has stable compressive strength, bending strength, thermal fatigue resistance, thermal impact resistance, especially for those with large-size of Φ 160 and over.

XTC Carbide Anvil with ultrasonic inspection and magnetic performance can provide efficient aging treatment to eliminate inner-stress of Carbide Anvil according to request of customer.



优质W粉扫描电镜照片4500×
SEM of W powder 4500X



优质WC粉扫描电镜照片4500×
SEM of WC powder 4500X

顶锤牌号适用范围简介

APPLICATION INTRODUCTION OF XTC CARBIDE ANVIL

金鹭牌号 XTC grade	密度 (g/cm³) Density	HV30	HRA	TRS/ MPa	适用范围 Application
GF35H	14.65 ± 0.05	1520 ± 50	91.2 ± 0.5	≥ 3600	通用牌号，抗压强度高，综合性能好，适合大部分工况下的超硬材料合成，比如金刚石、立方氮化硼等产品 General grade, high compressive strength, durable combination property, suitable for synthesis of super-hard material, like diamond, CBN.
GF40H	14.40 ± 0.05	1500 ± 50	91.0 ± 0.5	≥ 3800	特定牌号，热稳定性高，断裂韧性好，适合特殊工况下复合片等产品的合成 Special grade, high heat stability, durable breaking tenacity, suitable for synthesis of diamond compact.

SPECIFICATIONS

顶锤规格型号

系列 Series	尺寸标识 Identification	尺寸 (mm) Size				
		D	E	β (°)	F	H
Φ103	DCΦ103.5×31.2×41.5×12×76	103.5	31.2	41.5	12.0	76.0
Φ115	DCΦ115×38×41.5×13×82.5	115.0	38.0	41.0	13.0	82.5
Φ122	DCΦ122×44×41.5×13×90	122.0	44.0	41.5	13.0	90.0
Φ127	DCΦ127×43×41.5×13.5×95	127.0	43.0	41.5	13.5	95.0
Φ128	DCΦ128×46×41.5×13×95	128.0	46.0	41.5	13.0	95.0
Φ136	DCΦ136×43×41.5×13×97	136.0	43.0	41.5	13.0	97.0
Φ142	DCΦ142×49×41×15×102	142.0	49.0	41.0	15.0	102.0
Φ149	DCΦ149×51×41.5×15×107	149.1	51.0	41.5	15.0	107.0
Φ160	DCΦ160×57×41.5×15×115	160.0	57.0	41.5	15.0	115.0
Φ165	DCΦ165×61×41.5×16×124	165.0	61.0	41.5	16.0	124.0
Φ175	DCΦ175×62.5×41.5×15×120	175.0	62.5	41.5	15.0	120.0
Φ185	DCΦ185×69×41.5×18×135	185.0	69.0	41.5	18.0	135.0
Φ195	DCΦ195×74×41.5×16×145	195.0	74.0	41.5	16.0	145.0
Φ199	DCΦ199×76×41.5×16×142	199	76.0	41.5	16.0	142.0
Φ220	DCΦ220×75×41.5×15×160	220	75.0	41.5	15.0	160.0

注：除上述产品型号外，可根据客户需求开发和生产其他规格产品。

Note: Besides the above grade, XTC is able to develop and produce customized products.

顶锤编号规则

- 每一个洛阳金鹭顶锤都具有独一无二的编号，便于对其进行从生产到使用的全程跟踪。

以160顶锤为例，其编号含义如下：

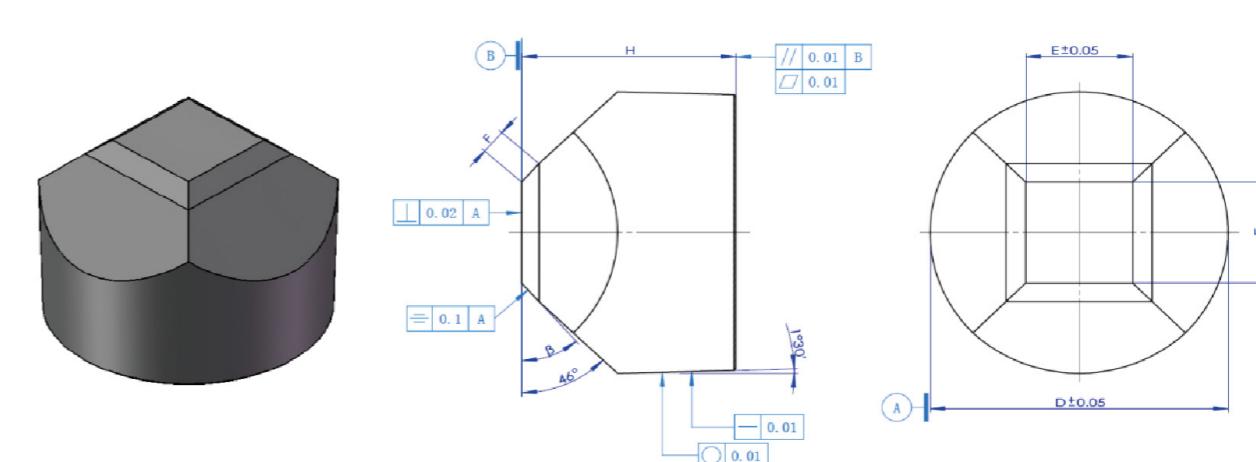
- a: “DC”代表顶锤缩写；
- b: “Φ 160”指顶锤外缘46面最低点圆弧直径，单位为mm；
- c: “58.5”指小顶面宽度，单位为mm；
- d: “41.5”指小顶面与小斜面的夹角为41.5°；
- e: “14”指小斜面宽度，单位为mm；
- f: “115”为小顶面到底面高度，单位为mm；
- g: “*****”顶锤产品序列号。

注：未做特别说明的顶锤大斜面角度均为46°，外圆锥度为1.5°。

DC Φ 160 × 58.5 × 41.5 × 14 × 115

a b c d e f

g



Numbering rule of Carbide Anvil

- Every Luoyang Golden Egret Anvil has unique number to trace completely from manufacturing to use.

Take 160 Carbide Anvil as sample, the meaning of number as below:

- a: “DC” means abbreviation of Carbide Anvil;
- b: “Φ 160” means outer diameter of 46 sides corresponding to the lowest point, in mm;
- c: “58.5” means smaller top surface width, in mm;
- d: “41.5” means angle between small top surface and smaller slope;
- e: “14” means smaller slope width, in mm;
- f: “115” means height from small top surface to bottom, in mm;
- g: “*****” Serial number of Carbide Anvil;

Note: Generally angle of bigger slope is 46°, outer tapper is 1.5°.

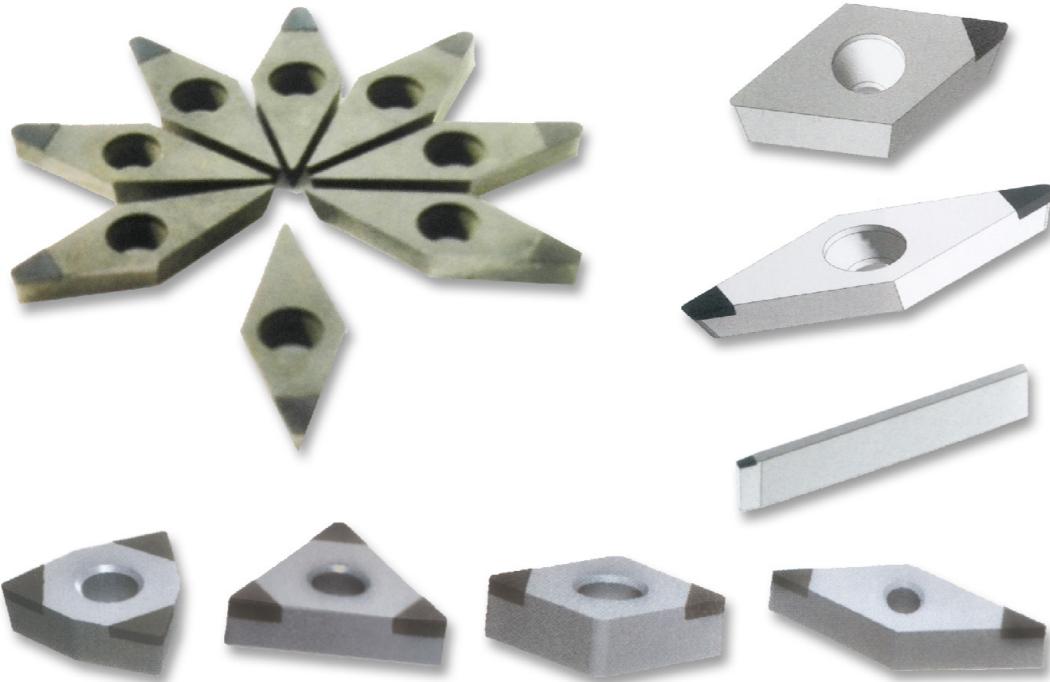


INTRODUCTION
产品规格
介绍



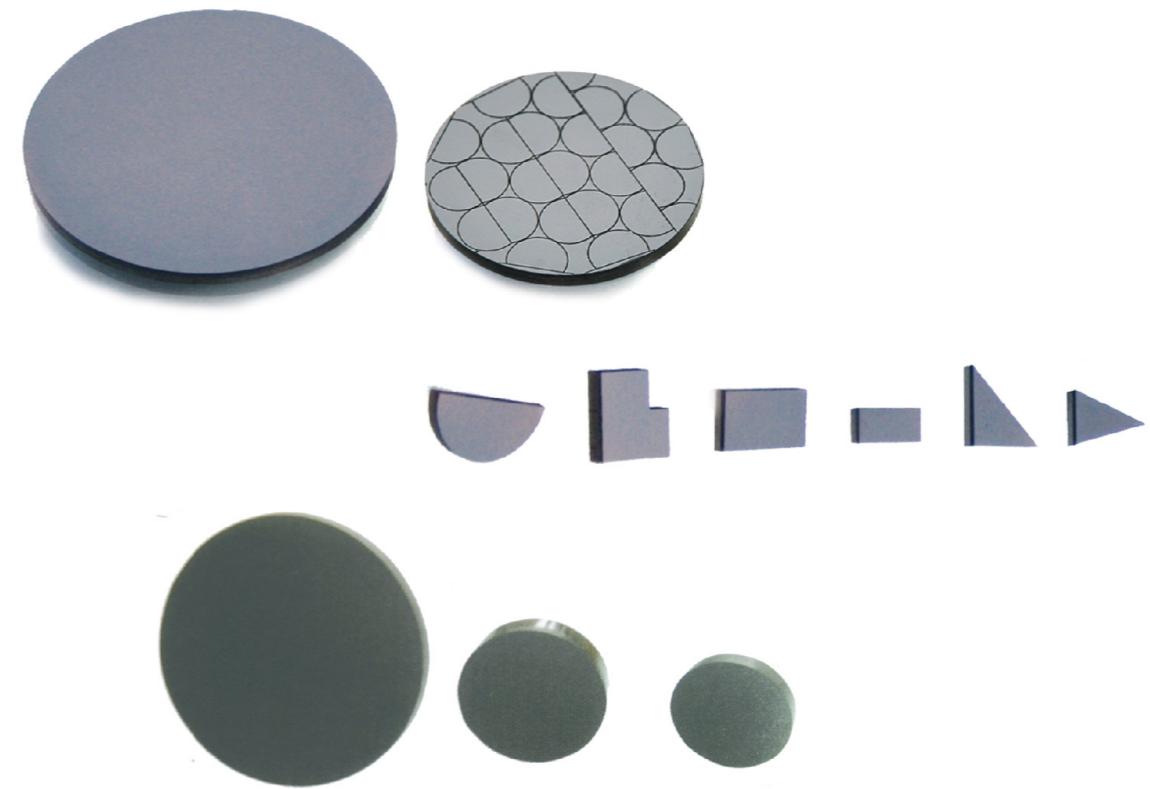
BLADE COMPOSITE SUBSTRATE 刀片复合片基体

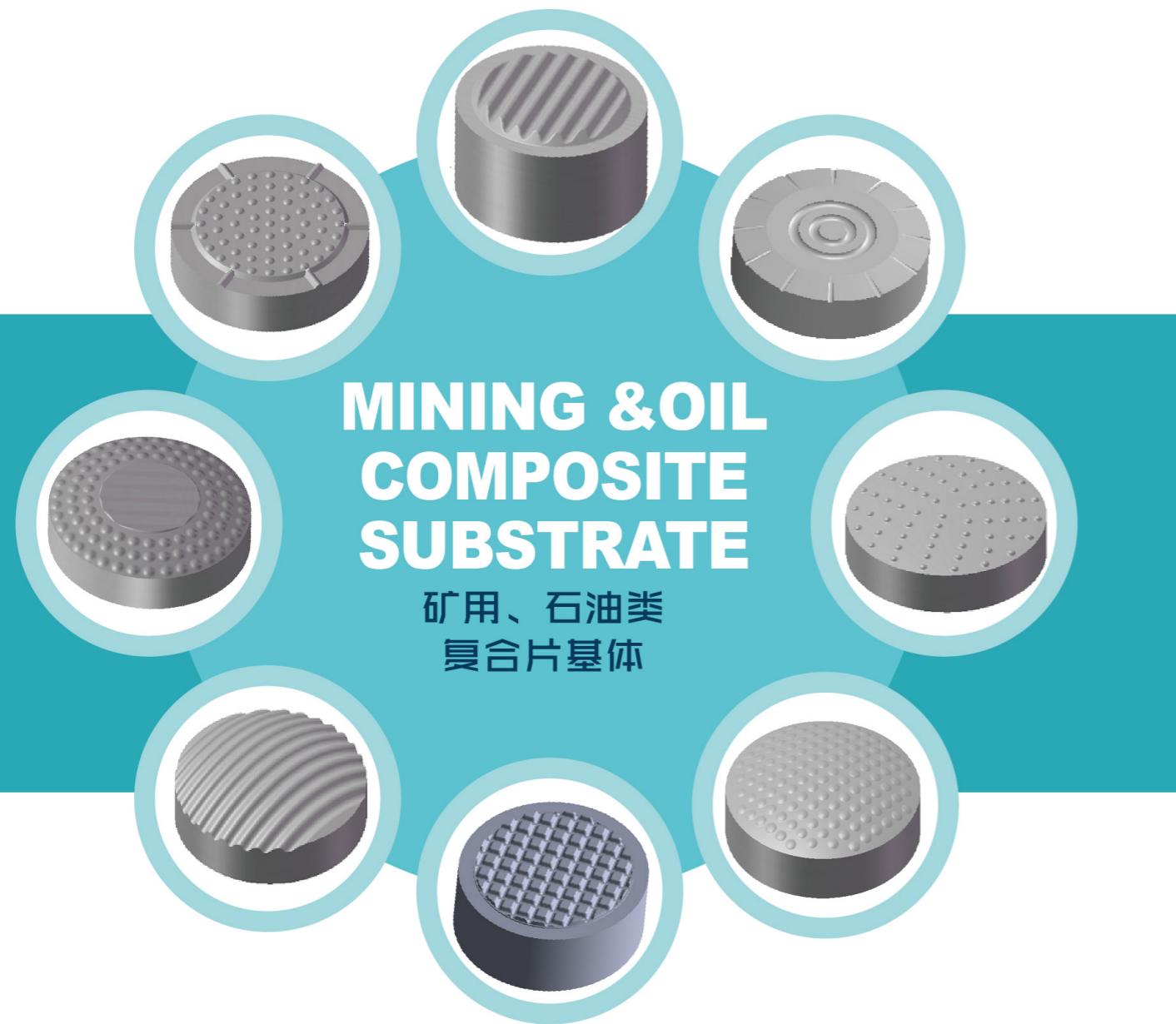
材质指标 INDICATION						
金鹭牌号	通用牌号	Co(%)	Ms(%)	Hc(Oe)	HRA	TRS (MPa)
GF20D	YG6	6	90±5	145±10	90.5±0.5	≥3200
GF30	YG8	8	90±5	195±10	91.2±0.5	≥3400
GF35	YG8	8	90±5	205±10	91.4±0.5	≥3600



PDC刀片复合片基体 PDC BLADE COMPOSITE SUBSTRATE

材质指标 INDICATION						
金鹭牌号	通用牌号	Co(%)	Ms(%)	Hc(Oe)	HRA	TRS (MPa)
GK50	YG11	11	90±5	150±10	89.2±0.5	≥2600
GF40	YG12	12	90±5	130±10	88.9±0.5	≥2800
GF50	YG16	16	90±5	120±10	87.0±0.5	≥2800





材质指标 INDICATION						
金鹭牌号	通用牌号	Co(%)	Ms(%)	Hc(Oe)	HRA	TRS (MPa)
GF50X	YG16	16	90±5	100±10	86.0±0.5	≥3300
GF45D	YG13	13	90±5	130±10	88.5±0.5	≥3200
GF50D	YG16	16	90±5	130±10	87.5±0.5	≥3300

SPHERICAL TOOTH COMPOSITE MATRIX

球齿类复合片基体



材质指标 INDICATION						
金鹭牌号	通用牌号	Co(%)	Ms(%)	Hc(Oe)	HRA	TRS (MPa)
GF20F	YG6	6	90±5	45±10	90.3±0.5	≥2800
GD30	YG10C	10	90±5	60±10	86.5±0.5	≥2400
GD20	YG8C	8	90±5	50±10	86.5±0.5	≥2200

INSPECTION SYSTEM

产品检测系统

• 材质方面检测： MATERIAL INSPECTION

电感耦合等离子
发射光谱仪作用：
主要用于检测WC
中杂质含量

ICP: to inspect
the impurity of
WC

能谱仪作用：
主要用于检测合金中元素含量
EDS: to test the metal
elements in the alloy

电感耦合等离子
发射光谱仪

INDUCTIVE COUPLED
PLASMA EMISSION
SPECTROMETER(ICP)

能谱仪
ENERGY SPECTROMETER

扫描电子显微镜

SCANNING ELECTRON
MICROSCOPE

METALLOGRAPHIC MICROSCOPE

• 性能检测 FUNCTIONAL INSPECTION:

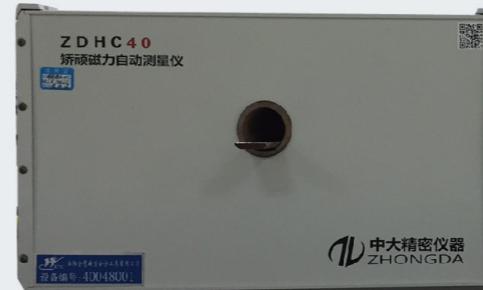
硬度计

MICRO VICKERS

万能试验机

UNIVERSAL TESTER

★ 硬度计万能试验机作用：主要用于检测合金硬度及抗弯强度、抗压强度等性能。
Hardness meter: to test and hardness, bending strength, compressive strength.



磁力仪
MAGNETOMETER



磁饱和检测仪
MAGNETIC SATURATION DETECTOR

★ 磁力仪磁饱和检测仪作用：
主要用于通过检测材质磁性能来反馈合金内部晶粒大小及渗、脱碳现象。

Magnetometer: to react grain size, carburization
and de-carburization by test the magnetism of
the material.

• 内部缺陷的检测 INNER DEFECT DETECTOR



数字式超声波探伤仪
Ultrasonic fault detector

★ 数字式超声波探伤仪内部缺陷的检测作用：
主要用于检测顶锤成品中的裂纹、孔洞等缺陷。

Ultrasonic Defect Detection:
to test and cracks, holes inside the alloy.



三坐标检测仪
CMM three coordinates measuring instrument

★ 三坐标检测仪尺寸及形位公差检测作用：
主要用于检测成品尺寸及形位公差

CMM (Coordinate measuring machine):
to test the final size and tolerance of the final product

QUALITY CONTROL

质量控制

质量是产品生存的根本，是企业发展的立足点。洛阳金鹭是厦门钨业一脉相承的全新开始，发展之初就将优异的产品质量作为起点，稳定的产品质量为发展的保证。有多年粉末及钨系列生产经验和完备的质量控制体系。洛阳金鹭拥有先进的检测设备，完善的过程质量体系（监控）及最终质量检测控制体系。



Quality is the survival root of the product and, the foothold of enterprise development. Luoyang Golden Egret Geotools Co., Ltd. as a new beginning of XTC take best quality as its insurance to the enterprise development at the very beginning. Luoyang Golden Egret Geotools Co., Ltd. occupies advanced testing equipment, processing and final products control system to ensure quality.

QUALIFICATION CERTIFICATE

资质证书



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