



®

ZGCC

钨系列 粉末制品

POWDER PRODUCTS OF TUNGSTEN



自贡硬质合金有限责任公司
Zigong Cemented Carbide Corp., Ltd.



品质成就未来

QUALITY ACCOMPLISHES THE FUTURE

自贡硬质合金有限责任公司

- 世界500强企业中国五矿集团的核心成员
- 中国第一家自主设计建设的大型硬质合金企业
- 国内领先的硬质合金及配套工具制造商
- 世界先进水平的硬面材料及其应用服务提供者
- 国内领先的钨钼制品制造商

ZIGONG CEMENTED CARBIDE CO., LTD.

- Zigong Cemented Carbide Co., Ltd (ZGCC) is a core member of China Minmetals Group which is one of the world 500 top companies.
- ZGCC is the first home-designed and built large scale cemented carbide manufacturing enterprise in China.
- It is one of the leading manufacturers of cemented carbides and related tools at home.
- It is a reliable supplier of the hard-facing materials with advanced world levels and their application services.
- It holds the leadership position in the tungsten and molybdenum product manufacture in China.



ISO9001:
CN-CQC08Q10970
ISO14001:
CN-CQC08E22096



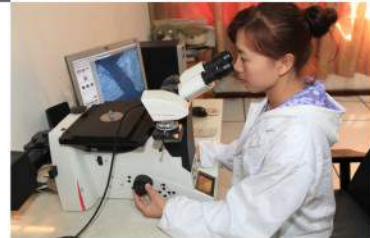
ISO9001:
00108Q10970RGL/S100
ISO14001:
00108E22096R2L/S100



体系认证
CNAS C001-Q



我们的优势 Our superiority



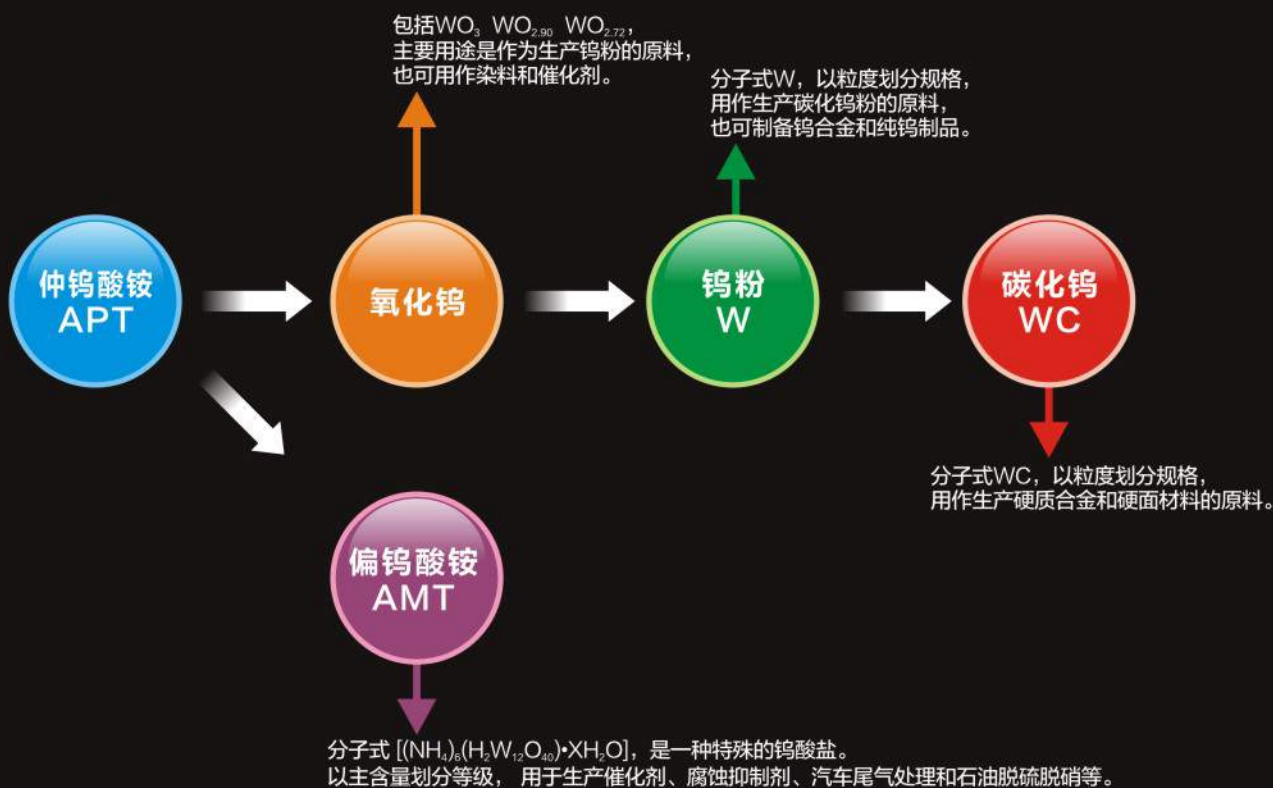
- 50年专注于专业领域的持续努力
 - 高品质，完整的产业链，丰富的产品系列，粗晶系列齿类产品形成新的竞争优势。
 - 国家级高新技术企业、设有博士后科研工作站
 - 致力于不断寻找新的材质以提高产品性能、新的加工方法以提高加工效率和灵活度
-
- ZGCC has been concentrating on the specialized fields for 50 years.
 - Of high quality, complete operation chains, full series of products available.
The carbide buttons in coarse grain are prevailing in the market.
 - ZGCC is a state-rank high tech company, having a postdoctoral scientific research workstation.
 - Sparing no efforts to develop and seek for new materials to improve product quality and new processing methods to maximize machining practice.





ZGCC

钨系列粉末产品链



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企业简介

Company profile

粉末分厂是自贡硬质合金有限责任公司的核心生产单位之一，分厂实力雄厚，有各类主要生产设备100多台（套），年产各种高品质W粉、WC粉5000吨。其中，“三七”钨粉曾经荣获国家冶金部金质奖章，近些年新开发的超细纳米WC粉、特粗WC粉不但填补了国家相关领域的空白，而且以优异的品质获得众多客户的青睐。我公司生产的粉末产品主要应用于硬质合金制造，部分应用于军工、电子和医疗行业。随着环保产业的发展，还广泛应用于石油催化提纯、尾气处理等领域。

我公司的粉末产品涵盖了目前国内同行的绝大多数规格型号，能够满足国际和国内市场不同用户的需求。生产技术和产品质量处于国内一流水平，其中偏钨酸铵、军工用钨粉和超粗碳化钨处于国内领先地位。

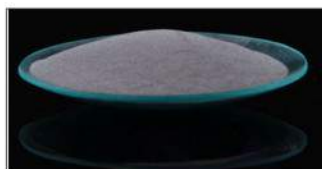
The powder products produced by the powder plant of Zigong Cemented Carbide Co., Ltd, are mainly used for cemented carbide manufacturing, but apart from these is also used for war, electronic and medical industries. With the development of environmental industries, some of them are also used for oil catalytic purification.

The most current sizes and types of the products can be produced in the same domestic industry, and the different requirements of the customers at home and abroad can be meet. The production technology and the quality of the products take a level of the first class at home.



W 粉

Tungsten metal powder



粉末分厂能够生产粒度 $0.2 \sim 60 \mu\text{m}$ 之间的任何一种钨粉，产品具有纯度高、分散性好、质量稳定等优良特性。

外观：钨粉外观呈深灰色或亮灰色，颜色均匀一致。

用途：广泛应用于硬质合金、高比重合金、军工产品、钨制品等多个领域。

Any kinds of the tungsten metal powders with a particle size between $0.2\sim60\mu\text{m}$ can be produced. The products have a high purity, good dispersity, and stable quality, etc.

Appearance: Deep grey or light grey, the color is uniform and unanimous.

Usage: The tungsten metal powder can be used widely for manufacturing cemented carbide, high density alloy, war products and the other tungsten products.

通用钨粉：该系列钨粉具有质量稳定、适应性广。

Common tungsten powders: The series of tungsten powders has stable quality and wide adaptability.

类 别 Classification of the particle size	牌号 Grade	BET (m^2/g) 粒度 (μm) Particle size	主要化学组成 (%) Main chemical composition	
			W	O
超细颗粒 Super fine	FW02	BET: >5.0	≥ 99.9	≤ 0.60
	FW04	BET: $4.0\sim5.0$	≥ 99.9	≤ 0.55
	FW06	$0.6\sim0.8$	≥ 99.9	≤ 0.50
亚细颗粒 Sub-fine	FW08	$0.80\sim1.00$	≥ 99.9	≤ 0.25
细颗粒 Fine	FW10	$1.00\sim1.50$	≥ 99.9	≤ 0.20
	FW15	$1.50\sim2.00$	≥ 99.9	≤ 0.15
	FW20	$2.00\sim2.50$	≥ 99.9	≤ 0.10
中颗粒 Medium fine	FW25	$2.50\sim3.00$	≥ 99.9	≤ 0.08
	FW30	$3.00\sim4.00$	≥ 99.9	≤ 0.08
	FW40	$4.00\sim6.00$	≥ 99.9	≤ 0.06
	FW60	$6.00\sim8.00$	≥ 99.9	≤ 0.06
粗颗粒 Coarse	FW80	$8.00\sim10.00$	≥ 99.9	≤ 0.06
	FW100	$10.00\sim15.00$	≥ 99.9	≤ 0.05
特粗颗粒 Extra coarse	FW150	$15.00\sim20.00$	≥ 99.9	≤ 0.05
	FW200	$20.00\sim25.00$	≥ 99.9	≤ 0.08
超粗颗粒 Super coarse	FW250	$25.00\sim30.00$	≥ 99.9	≤ 0.10
	FW300	$30.00\sim40.00$	≥ 99.9	≤ 0.12
	FW400	$40.00\sim60.00$	≥ 99.9	≤ 0.15

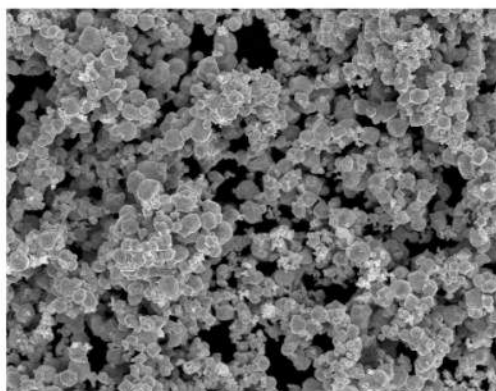
注明：此标准中的粒度为钨粉供应态的粒度。

Note: The particle size of the tungsten metal powder in the table is as supplied in the standard.

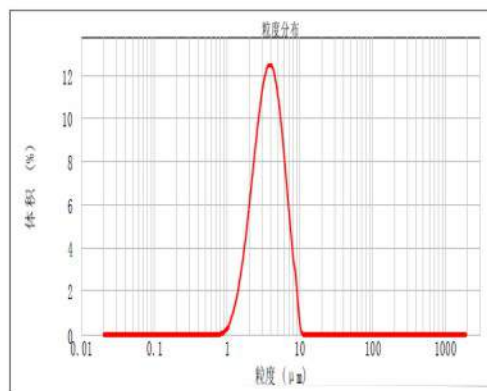
高比重合金用钨粉: 该系列钨粉纯度高, 压坯成型性好、晶型晶貌一致性好。

Tungsten metal powder for high density alloy: this series of tungsten metal powders has high purity, good forming ability of pressing, and unanimity of the crystal morphology.

类 别 assification of the particle size	牌号 Grade	粒度 (μm) Particle size	主要化学组成 (%) Main chemical composition	
			W	O
中颗粒 Medium fine	FWG-1	2.50-3.50	≥ 99.9	≤ 0.07
	FWG-2	2.00-4.00	≥ 99.9	≤ 0.08
	FWG-3	2.00-4.00	≥ 99.9	≤ 0.08
	FWG-4	2.50-3.50	≥ 99.9	≤ 0.07



FWG-4电镜 1000×

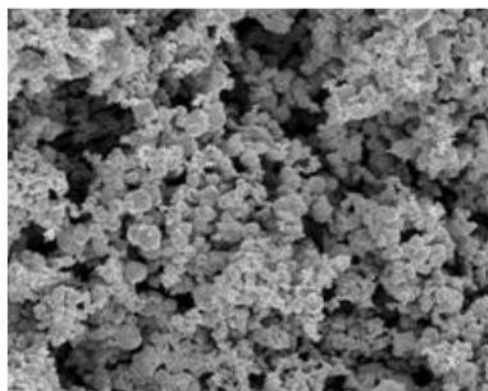


FWG-4激光粒度组成
FWG-4 particle size determined by laser

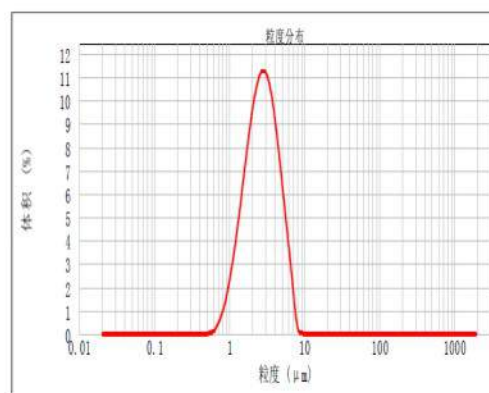
钨制品用钨粉：该系列钨粉纯度高、流动性好、压坯成型性好。

Tungsten metal powder for tungsten products: this series of tungsten metal powder has high purity, good flow ability and forming ability of pressing.

类 别 Classification of the particle size	牌号 Grade	粒度 (μm) Particle size	主要化学组成 (%) Main chemical composition	
			W	O
中颗粒 Medium fine	FWAF2.0-2.4	2.00-2.40	≥ 99.9	≤ 0.10
	FWAF2.5-3.0	2.50-3.00	≥ 99.9	≤ 0.08
	FWAF4-6	4.00-6.00	≥ 99.9	≤ 0.06
	FWAF6-8	6.00-8.00	≥ 99.9	≤ 0.06



FWAF2.5-3.0电镜 1000×



FWAF2.5-3.0激光粒度组成
FWAF2.5-3.0 particle size determined by laser

W 粉化学成分

Tungsten metal powder Chemical composition

杂质含量 Content of impurities, (%)	元素 Element	最大值 Max	典型值 Typical value
	Al	0.001	0.0005
	As	0.0015	0.0005
	Bi	0.0003	0.0001
	C	0.005	0.002
	Ca	0.0015	0.0005
	Cd	0.0003	0.0001
	Co	0.001	0.0005
	Cr	0.002 / 0.005*	0.001/0.002*
	Cu	0.0005	0.0001
	Fe	0.005 / 0.015*	0.002/0.003*
	K	0.002	0.0007
	Mg	0.001	0.0005
	Mn	0.001	0.0005
	Mo	0.005	0.001
	Na	0.002 / 0.005*	0.0007/0.003*
	Ni	0.003 / 0.005*	0.001/0.002*
	P	0.001	0.0007
	Pb	0.0003	0.0001
	Sb	0.001	0.0005
	Si	0.002	0.0010
	Sn	0.0003	0.0001
	Ti	0.001	0.0005
	V	0.001	0.0005
	S	0.001	0.0005

注明：1、W含量采用100%-除气体以外的杂质含量。

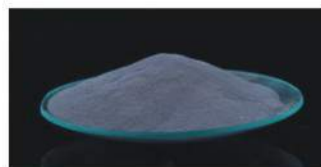
2、Fe、Ni、Cr有*号标识的为FW60到FW400的标准；Na有*号标识的为FW150到FW400的标准。

Note: 1、Tungsten content is calculated using 100% minus all impurities contents with exception of gases.

2、Fe, Ni, Cr with mark * hereof are as a standard for FW60--FW400; Na with mark * is hereof as a standard for FW150-FW400.

WC 粉

Tungsten carbide powder



粉末分厂能够生产粒度0.2—60 μm之间的任何一种碳化钨粉，产品具有纯度高，粒度分布集中、晶型完整、质量稳定等特性。

外观：碳化钨外观呈灰黑色或浅灰色粉末，颜色均匀一致。

用途：广泛应用于硬质合金生产，如切削刀具、矿山工具、耐磨零部件等。

Any tungsten carbide powder with a particle size between 0.2~60 μm can be produced. The products have a high purity, centralized particle size distribution, perfect crystal morphology and stable quality.

Appearance: dark grey or light grey. The color is uniform and unanimous.

Usage: the tungsten carbide powder is mainly using for manufacturing cemented carbide products including cutting tools, mining tools and wear parts, etc.

通用WC粉：该系列碳化钨粉产品质量稳定，能满足大多数硬质合金生产。

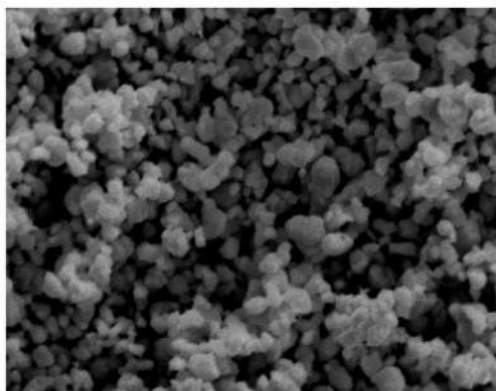
Common tungsten carbide powders: this series of tungsten powders has a stable quality and can meet the requirements of the cemented carbide production.

类别 Classification of the particle size	牌号规格代码 Grade	粒度, μm Particle size	Tc, %	Fc, %	Cc, %	O, %
细颗粒 Fine	FWC10	1.00-1.50	6.13 ± 0.05	≤0.06	≥6.08	≤0.12
	FWC15	1.50-2.00	6.13 ± 0.05	≤0.06	≥6.08	≤0.10
	FWC20	2.00-2.50	6.13 ± 0.05	≤0.05	≥6.08	≤0.08
中颗粒 Medium	FWC25	2.50-3.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.06
	FWC30	3.00-4.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.05
	FWC40	4.00-5.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.05
	FWC50	5.00-6.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.05
	FWC60	6.00-8.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.04
粗颗粒 Coarse	FWC80	8.00-10.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03
	FWC100	10.00-15.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03
特粗颗粒 Extra coarse	FWC150	15.00-20.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03
	FWC200	20.00-25.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03

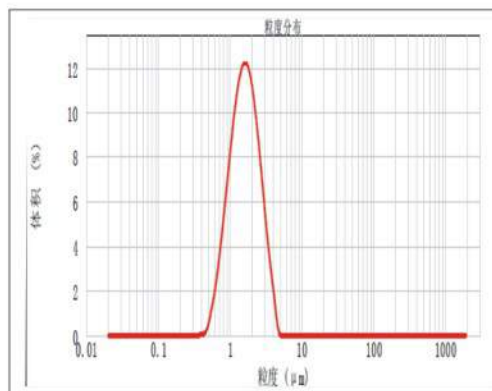
- 注明：1、此标准中的粒度为碳化钨粉供应态的F_{ss}粒度(μm)。
2、总碳含量、F_{ss}粒度的标准可根据用户需要进行调整。
3、当总碳含量超过上述标准的最高值时，游离碳含量会相应增加。

- Note :** 1、The particle sizes of the tungsten carbide powder in the table is a F_{ss} particle size(μm) as supplied.
2、The total carbon content and F_{ss} particle size can be adjusted upon the customer's requirements.
3、The free carbon content will be also increased when the total carbon content exceeded the above limit.

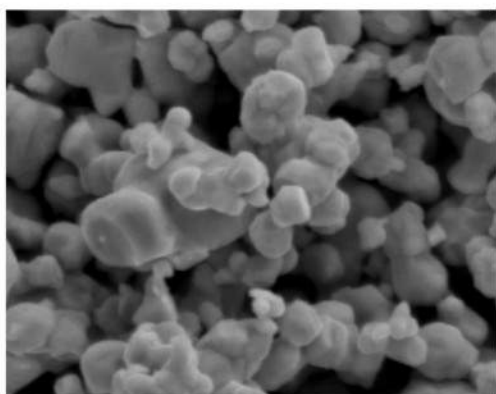
通用WC粉电镜形貌与粒度分布



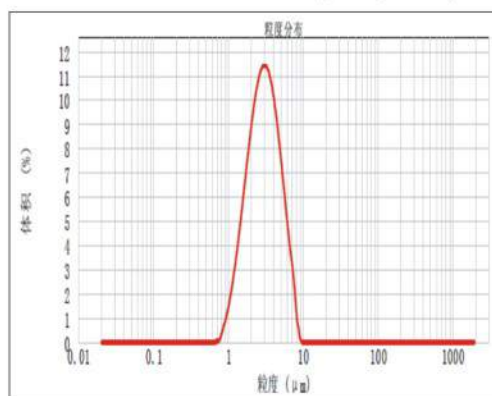
WC10电镜 5000×



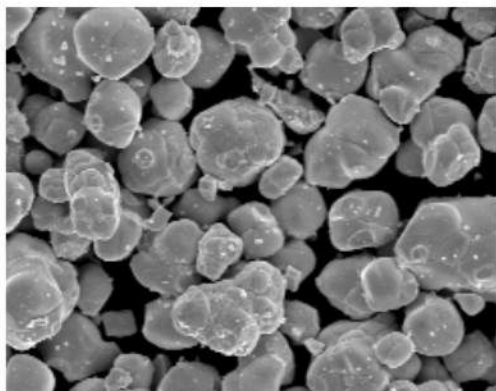
WC10激光粒度组成（研磨态）
WC10 Particle size determined by laser(as milled)



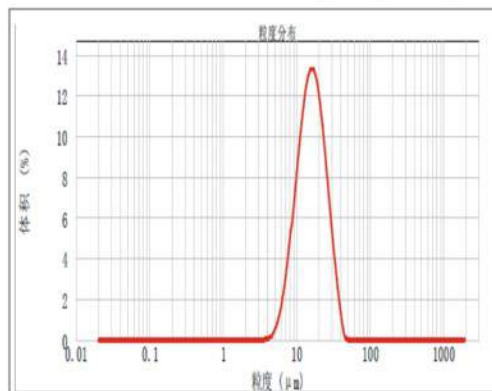
WC30电镜 3000×



WC30激光粒度组成（研磨态）
WC30 Particle size determined by laser(as milled)



WC100电镜 500×

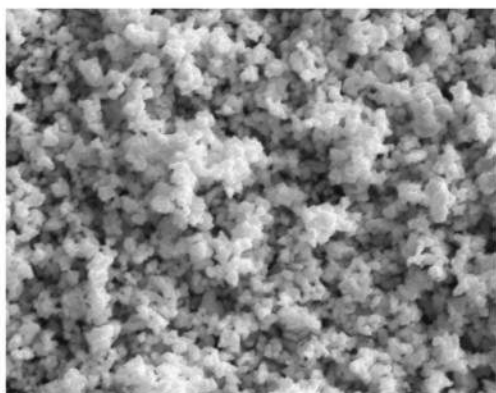


WC100激光粒度组成（供应态）
WC100 Particle size determined by laser(as supplied)

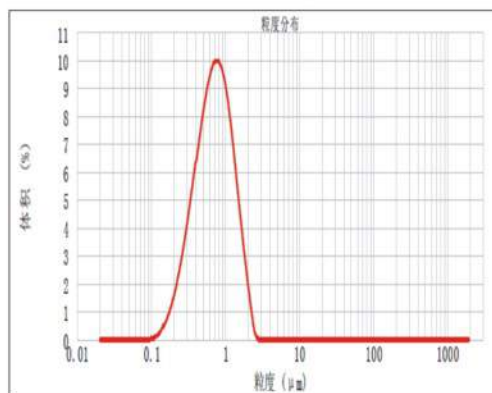
超细WC粉：该系列碳化钨粉粒度分布集中、分散性好，合金烧结温度敏感性低、氧含量低、产品质量稳定。

Superfine tungsten carbide powder: this series of tungsten carbide powder has a good centralized particle size distribution, good dispersity, low sensitivity to alloy sintering temperature, low oxygen content and stable quality of the products.

类 别 Classification of the particle size	牌号规格代码 Grade	BET: m ² /g; 粒度: μm Particle size	Tc, %	Fc, %	Cc, %	O, %
超细颗粒 Super fine	FWC02	BET: ≥2.5	6.20 ± 0.05	≤0.15	≥6.08	≤0.5
	FWC04	BET: 1.9~2.5	6.20 ± 0.05	≤0.12	≥6.08	≤0.35
	FWC06	粒度 Particle size: 0.60~0.80	6.13 ± 0.05	≤0.10	≥6.08	≤0.25



WC04电镜 5000×

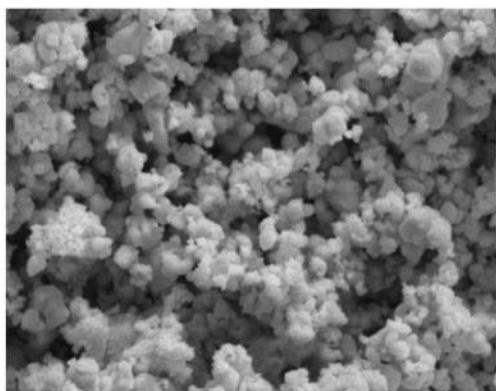


WC04激光粒度组成（研磨态）
WC04 Particle size determined by laser(as milled)

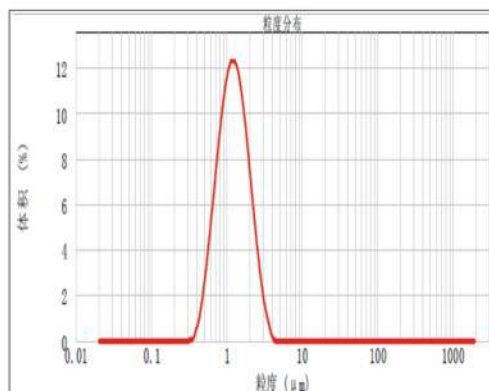
亚细WC粉：该系列碳化钨粉粒度分布集中，分散性好，氧含量低、产品质量稳定。

Sub fine tungsten carbide: this series of tungsten carbide powder has centralized particle size distribution, good dispersion low oxygen content and stable quality.

类 别 Classification of the particle size	牌号规格代码 Grade	粒度, μm Particle size	Tc, %	Fc, %	Cc, %	O, %
亚细颗粒 Sub fine	FWC08	0.80-1.00	6.13 ± 0.05	≤ 0.06	≥ 6.08	≤ 0.15



WC08电镜 5000×

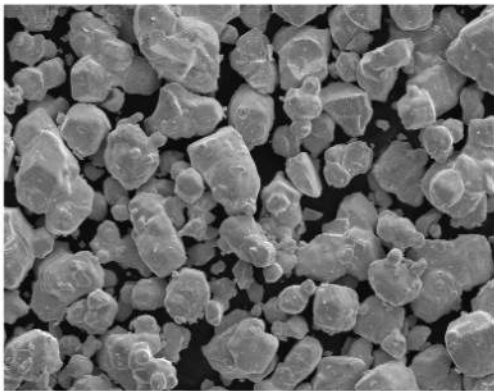


WC08激光粒度组成 (研磨态)
WC08 Particle size determined by laser(as milled)

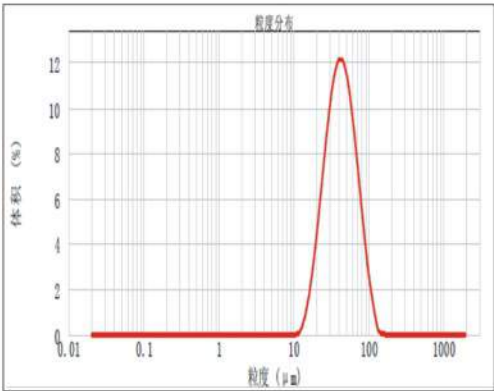
超粗WC粉： 该系列碳化钨晶粒发育完整、颗粒形貌一致性好。

Super coarse tungsten carbide: this series of tungsten carbide powder has a perfect grain structure and good unanimity of the particle morphology.

类别 Classification of the particle size	牌号规格代码 Grade	粒度, μm Particle size	Tc, %	Fc, %	Cc, %	O, %
超粗颗粒 Super coarse	FWC250	25.00-30.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03
	FWC300	30.00-40.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03
	FWC400	40.00-60.00	6.13 ± 0.05	≤0.05	≥6.08	≤0.03



WC300电镜 200 ×



WC300激光粒度组成（供应态）
WC300 Particle size determined by laser(as supplied)

WC粉 化学成分

Tungsten carbide powder Chemical composition

杂质含量 Content of impurities, (%)	元素 Element	最大值 Max	典型值 Typical value
	Al	0.002	0.0005
	As	0.0015	0.0005
	Bi	0.0003	0.0001
	Ca	0.002	0.0005
	Cd	0.0003	0.0001
	Co	0.01/0.02*	0.005/0.01*
	Cr	0.003/0.005*	0.002/0.003*
	Cu	0.0005	0.0001
	Fe	0.02	0.01
	K	0.0015	0.0007
	Mg	0.001	0.0005
	Mn	0.001	0.0005
	Mo	0.005	0.001
	Na	0.0015	0.0007
	Ni	0.006	0.003
	P	0.001	0.0007
	Pb	0.0003	0.0001
	Sb	0.001	0.0005
	Si	0.003	0.001
	Sn	0.0003	0.0001
	Ti	0.001	0.0005
	V	0.001	0.0005
	S	0.001	0.0005

注明：1、WC含量采用100%-除气体以外的杂质含量。

2、带*号为Fsss粒度5μm以上适用。

Note: 1、Tungsten carbide content is calculated using 100% minus all impurities contents with exception of gases.

2、Fsss particle size with a mark * is suitable only for the particle size larger than 5μm.

偏钨酸铵 (AMT)

Ammonium Metatungstate (AMT)



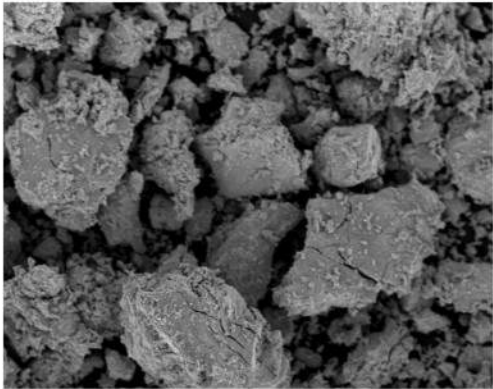
外观: 偏钨酸铵外观为白色或浅黄色结晶粉末，颜色均匀一致，目视无可见机械杂质及结块。
用途: 偏钨酸铵广泛应用于石油、火电、垃圾处理、汽车尾气处理等工业，在硬质合金领域的应用也逐步增加。
Appearance: white or light yellow crystal powder. The color is uniform and unanimous. There are no mechanical impurities and agglomerates visible.
Usage: the Ammonium Metatungstate is used widely in oil industry, thermal power plant, garbage disposal, vehicle tail gas disposal, etc. Its use in the cemented carbide production will be also increased gradually.

类 别 Classification	牌 号 Grade	WO ₃ 含量, % WO ₃ Content	PH 值 PH Value	烧 损 Ignited loss
喷雾法 Spraying method	AMT-P-A	≥91.5	2.0-4.5	实测 Concrete determined
	AMT-P-B	≥91.0		
	AMT-P-C	≥90.0		
结晶法 Crystallizing method	AMT-J-A	≥91.5		
	AMT-J-B	≥91.0		
	AMT-J-C	≥90.0		

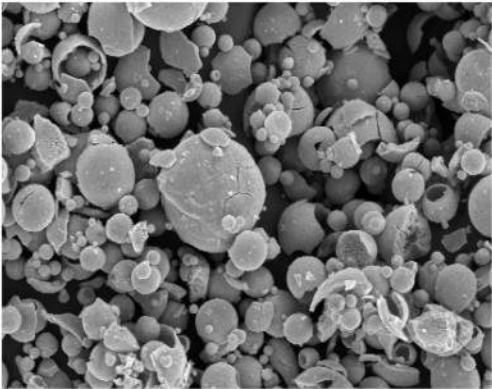
说明: AMT中WO₃的百分含量可以根据客户要求进行调整。
Note: the percentage of WO₃ content in AMT can be adjusted upon customer's requirements.

电镜形貌

Electron microscopic photo of crystal morphology



AMT (结晶法) Crystallizing method



AMT (喷雾法) Spraying method

偏钨酸铵（AMT）化学成分

Ammonium Metatungstate (AMT) Chemical composition

杂质含量 Content of impurities, (%)	元素 Element	最大值 Max	典型值 Typical value
	Al	0.0010	0.0005
	As	0.0010	0.0005
	Bi	0.0001	0.0001
	Ca	0.0010	0.0005
	Co	0.0010	0.0005
	Cr	0.0010	0.0005
	Cu	0.0005	0.0001
	Fe	0.0015	0.0005
	K	0.0010	0.0005
	Mn	0.0010	0.0005
	Mg	0.0005	0.0005
	Mo	0.003	0.001
	Na	0.0010	0.0005
	Ni	0.0005	0.0005
	P	0.0008	0.0005
	Pb	0.0001	0.0001
	S	0.0010	0.0002
	Sb	0.0008	0.0005
	Si	0.0010	0.0005
	Sn	0.0001	0.0001
	Cd	0.0003	0.0001
	Ti	0.0010	0.0005
	V	0.0010	0.0005
	水不溶物 Insolubles in water	0.05	0.018

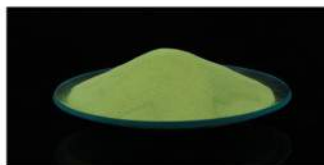
氧化钨

Tungsten oxide

氧化钨产品包括 WO_3 $\text{WO}_{2.90}$ $\text{WO}_{2.72}$ ，主要用途是作为生产钨粉的原料，也可用作染料和催化剂。

黄色氧化钨(WO_3)

Yellow tungsten oxide(WO_3)



黄色氧化钨呈浅黄色结晶粉末，颜色均匀一致，产品中无目视可见的夹杂物或团块。

Yellow tungsten oxide is a crystallized light yellow powder. The color is uniform and unanimous. There are no mechanical impurities and agglomerates visible.

普通型:

1、粒度

产品的费氏粒度15—24 μm 或由供需双方协商确定，产品均通过180 μm (80目) 筛孔。

2、松装密度

黄钨粉末松装密度定为2.50~3.00g/cm³或供需双方议定；

超细型:

1、粒度

费氏粒度：2—8 μm 。

2、松装密度

松装密度：≤2.0g/cm³，或由供需双方协商。

Common yellow tungsten oxide :

1、 Particle size

Fsss 15~24 μm or negotiated by both supplier and buyer. The product will be screened through 180 μm (80 mesh).

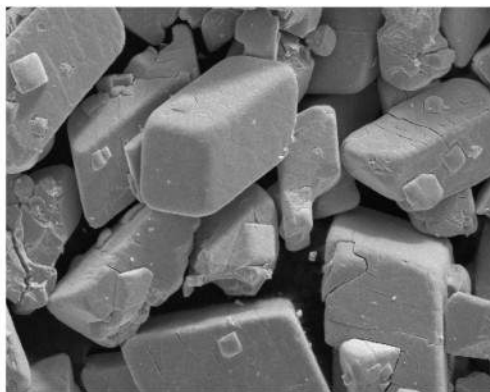
2、 Apparent density

The apparent density of WO_3 will be 2.50~3.00g/cm³ or negotiated by both supplier and buyer.

Super fine:

1、 Particle size: Fsss particle size: 2~8 μm .

2、 Apparent density: ≤2.0g/cm³, or negotiated by both supplier and buyer.



黄钨电镜形貌

Electron microscopic photo of crystal morphology

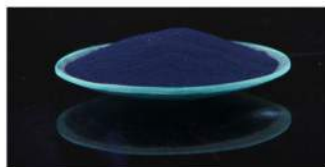
黄钨(WO₃) 化学成分

Yellow tungsten oxide(WO₃) Chemical composition

杂质含量 Content of impurities, (%)	元素 Element	最大值 Max	典型值 Typical value
	Al	0.0010	0.0005
	As	0.0010	0.0005
	Bi	0.0001	0.0001
	Ca	0.0010	0.0005
	Co	0.0010	0.0005
	Cr	0.0010	0.0005
	Cu	0.0005	0.0001
	Fe	0.0015	0.0005
	K	0.0010	0.0005
	Mn	0.0010	0.0005
	Mg	0.0005	0.0005
	Mo	0.003	0.001
	Na	0.0010	0.0005
	Ni	0.0005	0.0005
	P	0.0008	0.0005
	Pb	0.0001	0.0001
	S	0.0010	0.0002
	Sb	0.0008	0.0005
	Si	0.0010	0.0005
	Sn	0.0001	0.0001
	Cd	0.0003	0.0001
	Ti	0.0010	0.0005
	V	0.0010	0.0005
	水不溶物 Insolubles in water	0.05	0.018

蓝色氧化钨 ($\text{WO}_{2.90}$)

Blue tungsten oxide powder ($\text{WO}_{2.90}$)

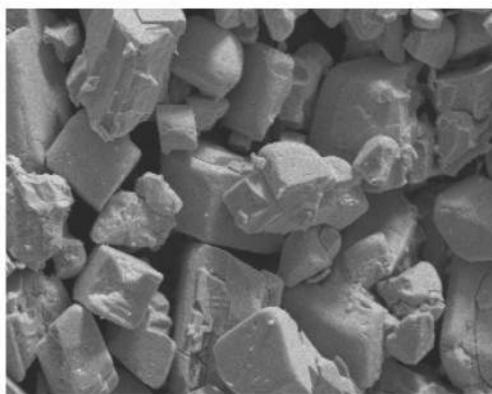


蓝色氧化钨呈深蓝色或蓝黑色结晶粉末，颜色均匀一致，产品中无目视可见的夹杂物或团块。

- 1、相成分：蓝钨的相组成中， $\text{WO}_{2.72}$ 不大于5%。
- 2、粒度：产品的费氏粒度12—20 μm 或由供需双方协商确定，产品均通过180 μm （80目）筛孔。
- 3、松装密度：蓝钨粉末松装密度定为2.20~2.80g/cm³或供需双方议定。

Blue tungsten oxide powder is a deep blue or dark blue crystallized powder. The color is uniform and unanimous. There are no mechanical impurities and agglomerates visible.

- 1、**Phase composition:** Maximal content of $\text{WO}_{2.72}$ is 5%.
- 2、**Particle size:** Fsss 12~20 μm or negotiated by both supplier and buyer. The product will be screened through 180 μm (80 mesh).
- 3、**Apparent density:** The apparent density of blue tungsten oxide is 2.20~2.80g/cm³, or negotiated by both supplier and buyer.



蓝钨电镜形貌

Electron microscopic photo of crystal morphology

蓝钨 (WO_{2.90}) 化学成分

Blue tungsten oxide powder (WO_{2.90}) Chemical composition

杂质含量 Content of impurities, (%)	元素 Element	最大值 Max	典型值 Typical value
	Al	0.0010	0.0005
	As	0.0010	0.0005
	Bi	0.0001	0.0001
	Ca	0.0010	0.0007
	Co	0.0010	0.0005
	Cr	0.0010	0.0005
	Cu	0.0005	0.0001
	Fe	0.0010	0.0005
	K	0.0010	0.0007
	Mg	0.0010	0.0005
	Mn	0.0005	0.0005
	Mo	0.003	0.001
	Na	0.0010	0.0007
	Ni	0.0007	0.0005
	P	0.0007	0.0005
	Pb	0.0001	0.0001
	S	0.0005	0.0002
	Sb	0.0010	0.0008
	Si	0.0010	0.0005
	Sn	0.0003	0.0001
	Cd	0.0003	0.0001
	Ti	0.0010	0.0005
	V	0.0010	0.0005
	烧损 Ignited loss	0.3	0.12

“长城”牌产品从这里走向世界
“GREAT WALL” IS EXTENDING FROM HERE TO THE WORLD





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