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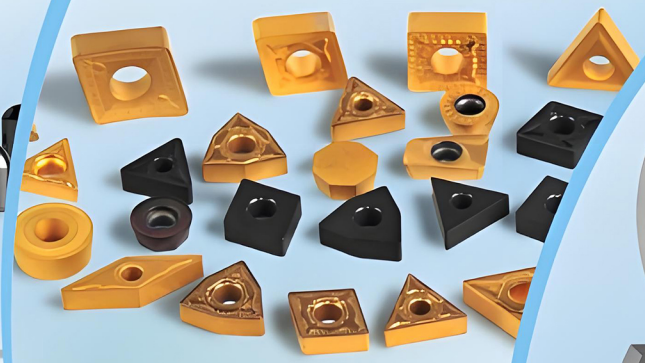
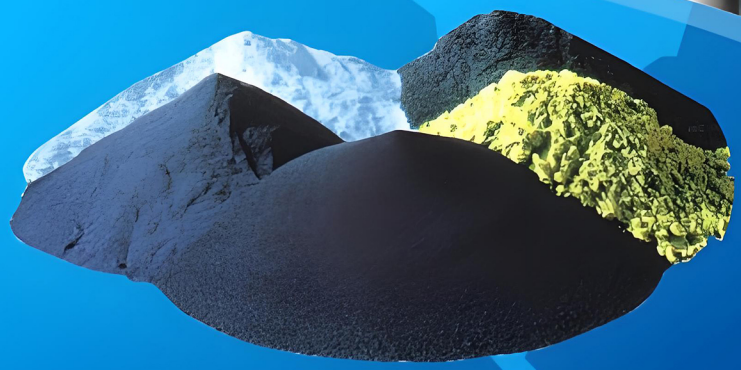
POWDER PRODUCTS OF TUNGSTEN





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Tungsten Powder Product Series

Including WO_3, $WO_{2.90}$, and $WO_{2.72}$, which are primarily used as raw materials for tungsten powder production, and can also be applied as dyes and catalysts.

Tungsten Powder (W), classified by particle size, is primarily used as a raw material for tungsten carbide powder production and can also be employed in manufacturing tungsten alloys and pure tungsten products.

Tungsten Carbide (WC), categorized by particle size, serves as a raw material for manufacturing cemented carbides and hardfacing materials.

The molecular formula is $[(NH_4)_6(H_2W_{12}O_{40})\cdot XH_2O]$, a special type of tungstate. It is graded by main content and utilized in the production of catalysts, corrosion inhibitors, automotive exhaust treatment, petroleum desulfurization and denitrification, among other applications.nted carbides and hardfacing materials.

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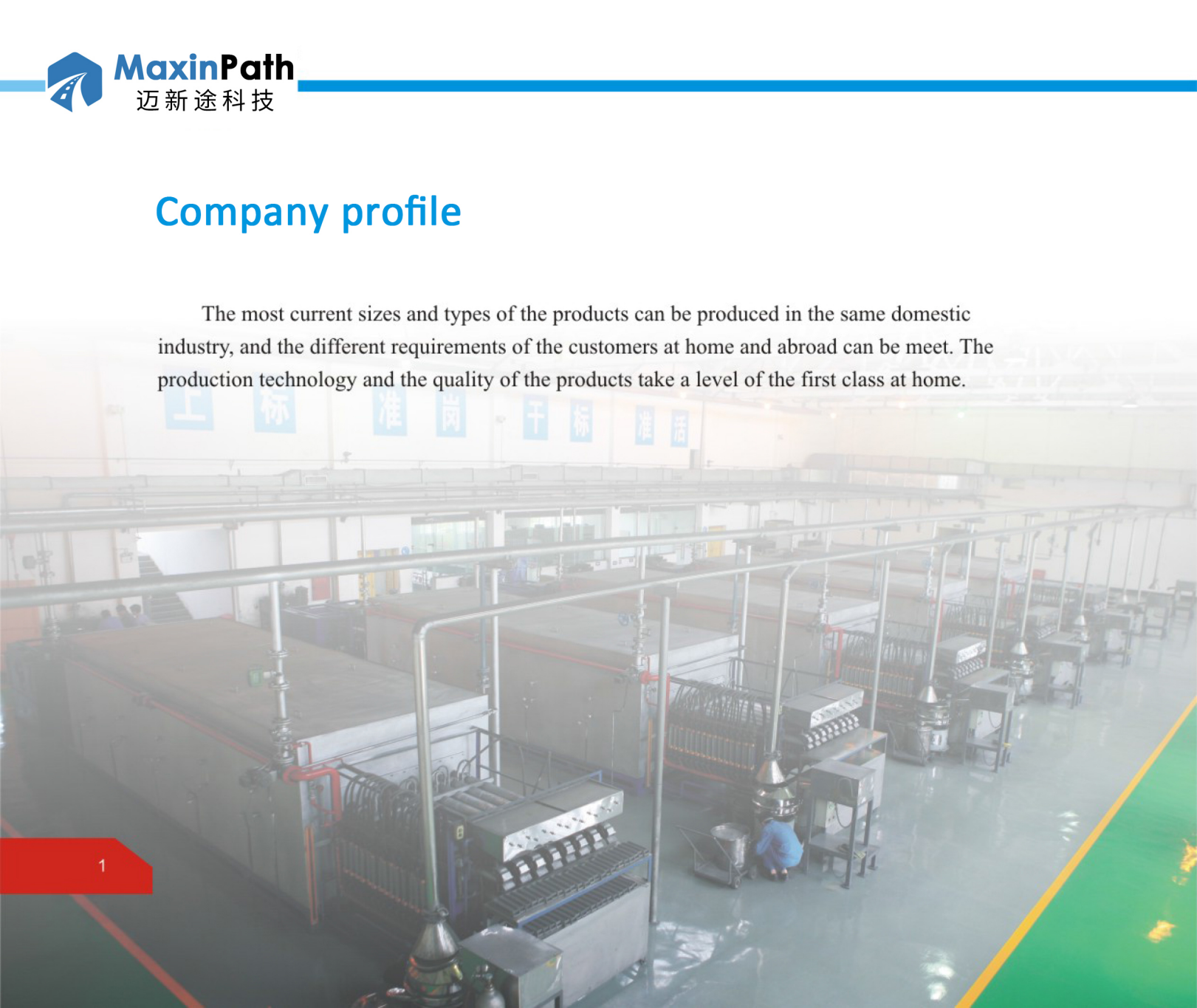
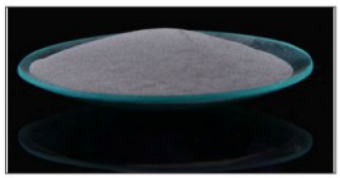
Company profile

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.



Tungsten metal powder



Any kinds of the tungsten metal powders with a particle size between 0.2~60μm 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.

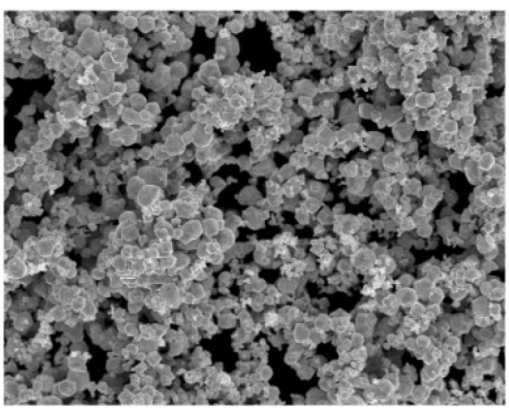
Common tungsten powders: The series of tungsten powders has stable quality and wide adaptability.

Classification of the particle size	Grade	BET (m^2/g) Particle size (μm)	Main chemical composition(%)	
			W	O
Super fine	FW02	BET: > 5.0	≥99.9	≤0.60
	FW04	BET:4.0–5.0	≥99.9	≤0.55
	FW06	0.6–0.8	≥99.9	≤0.50
Sub–fine	FW08	0.80–1.00	≥99.9	≤0.25
Fine	FW10	1.00–1.50	≥99.9	≤0.20
	FW15	1.50–2.00	≥99.9	≤0.15
	FW20	2.00–2.50	≥99.9	≤0.10
Medium fine	FW25	2.50–3.00	≥99.9	≤0.08
	FW30	3.00–4.00	≥99.9	≤0.08
	FW40	4.00–6.00	≥99.9	≤0.06
	FW60	6.00–8.00	≥99.9	≤0.06
Coarse	FW80	8.00–10.00	≥99.9	≤0.06
	FW100	10.00–15.00	≥99.9	≤0.05
Extra coarse	FW150	15.00–20.00	≥99.9	≤0.05
	FW200	20.00–25.00	≥99.9	≤0.08
Super coarse	FW250	25.00–30.00	≥99.9	≤0.10
	FW300	30.00–40.00	≥99.9	≤0.12
	FW400	40.00–60.00	≥99.9	≤0.15

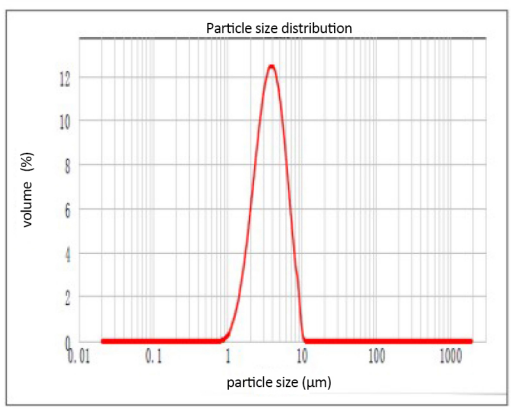
Note: The particle size of the tungsten metal powder in the table is as supplied in the standard.

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.

Classification of the particle size	Grade	Particle size (μm)	Main chemical composition(%)	
			W	O
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



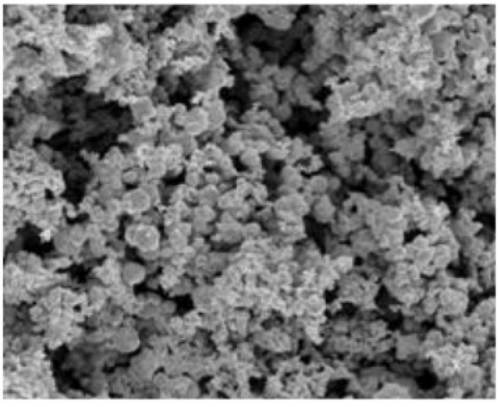
FWG-4 1000×



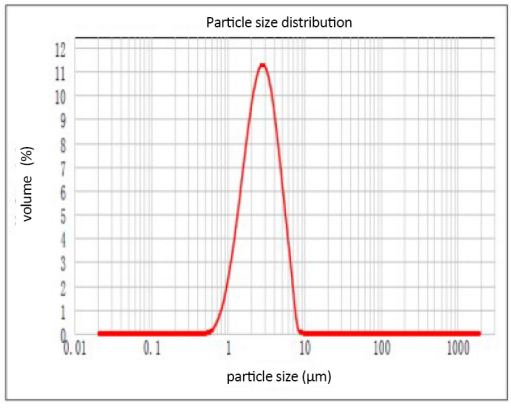
FWG-4 particle size determined by laser

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

Classification of the particle size	Grade	Particle size (μm)	Main chemical composition(%)	
			W	O
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 1000×



FWAF2.5-3.0 particle size determined by laser

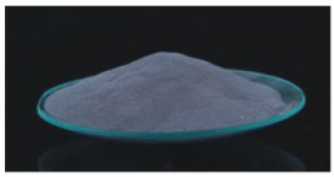
Tungsten metal powder Chemical composition

	Element	Max	Typical value
Content of impurities, (%)	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

Note: 1、Tungsten content is calculated using100% 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.

Tungsten carbide powder



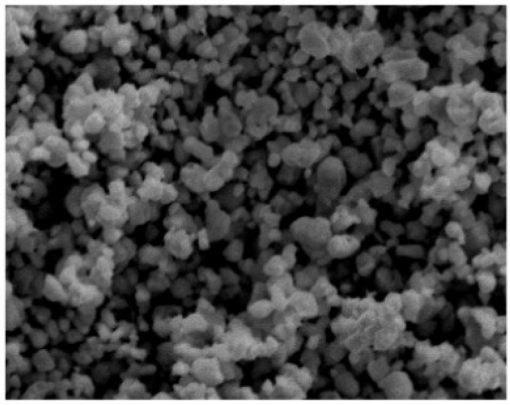
Any tungsten carbide powder with a particle size between 0.2~60 μm can be produced. The products have a high purity, centralized particle size distribution, perfect crystal morphology and stable quality.
Appearance: dark gery or light grey. The color is uniform and unanimous.
Usage: the tungsten carbide powder is mainly using for manufacturing cemented carbide products including cutting tools, mining tools and wear parts, etc.

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

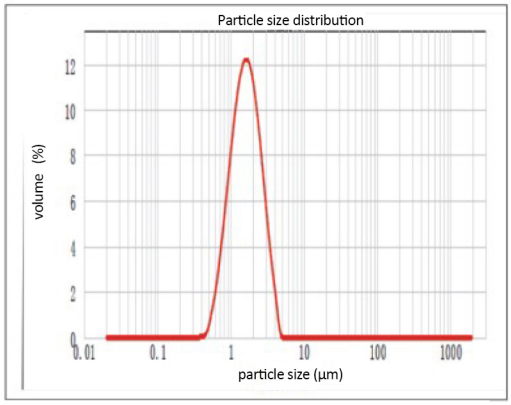
Classification of the particle size	Grade	Particle size (μm)	Tc, %	Fc, %	Cc, %	O, %
Fine	FWC10	1.00–1.50	6.13±0.05	≤0.06	≥6.08	≤0.12
	FWC15	1.50–2.00	6.13±0.05	≤0.06	≥6.08	≤0.10
	FWC20	2.00–2.50	6.13±0.05	≤0.05	≥6.08	≤0.08
Medium	FWC25	2.50–3.00	6.13±0.05	≤0.05	≥6.08	≤0.06
	FWC30	3.00–4.00	6.13±0.05	≤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
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
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

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

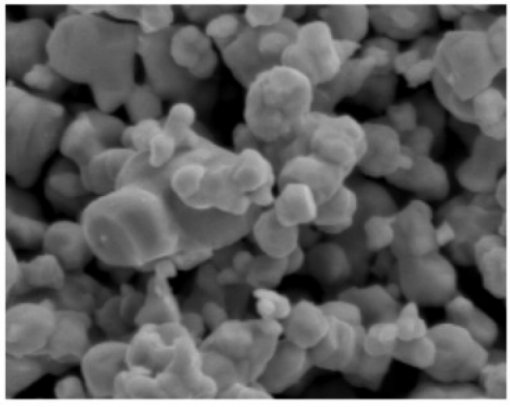
SEM Morphology and Particle Size Distribution of General WC Powder



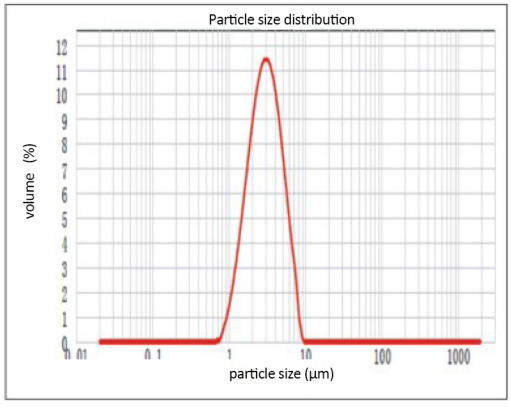
WC10 5000×



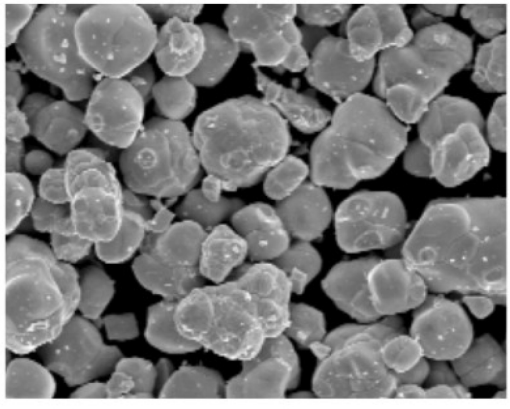
WC10 Particle size determined by laser(as milled)



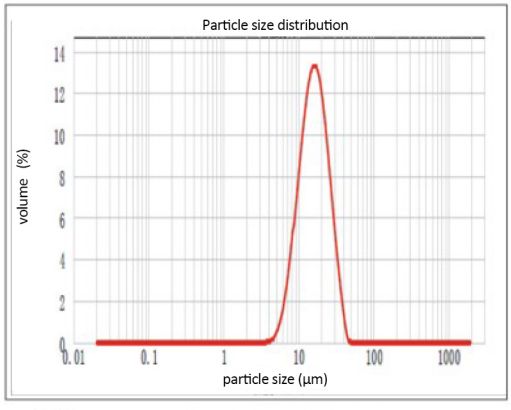
WC30 3000×



WC30 Particle size determined by laser(as milled)



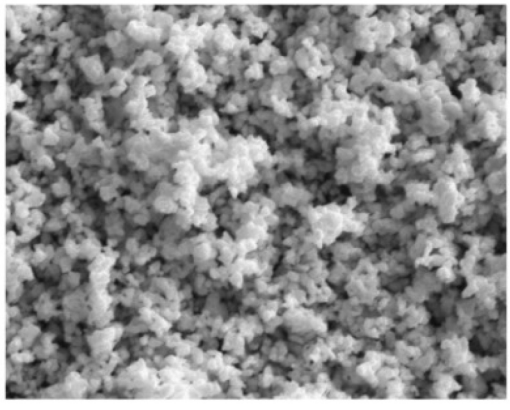
WC100 500×



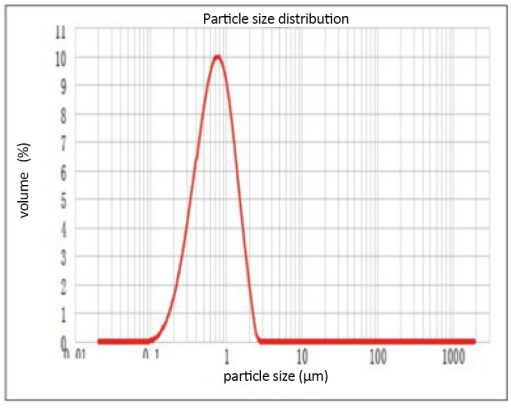
WC100 Particle size determined by laser(as supplied)

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.

Classification of the particle size	Grade	BET (m^2/g) Particle size (μm)	Tc, %	Fc, %	Cc, %	O, %
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	Particle size: 0.60-0.80	6.13±0.05	≤0.10	≥6.08	≤0.25



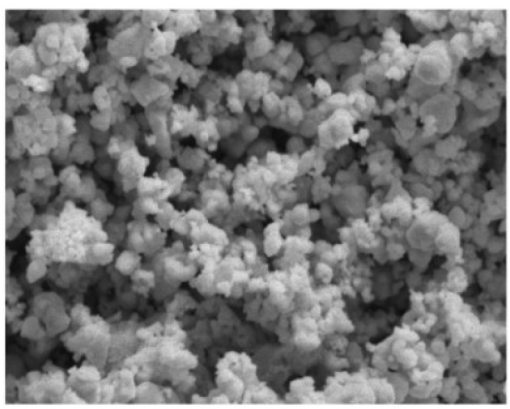
WC04 5000×



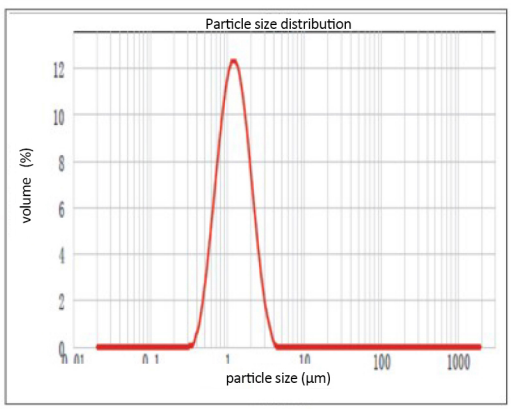
WC04 Particle size determined by laser(as milled)

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

Classification of the particle size	Grade	Particle size (μm)	Tc, %	Fc, %	Cc, %	O, %
Sub fine	FWC08	0.80–1.00	6.13±0.05	≤0.06	≥6.08	≤0.15



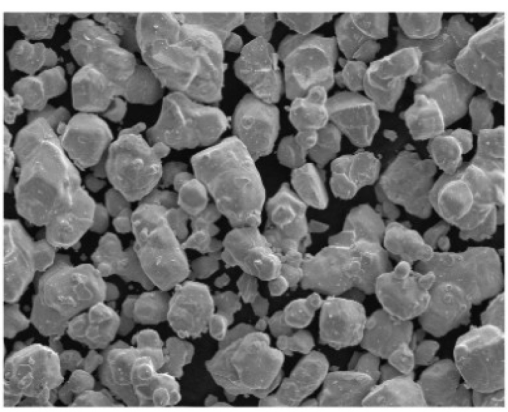
WC08 5000×



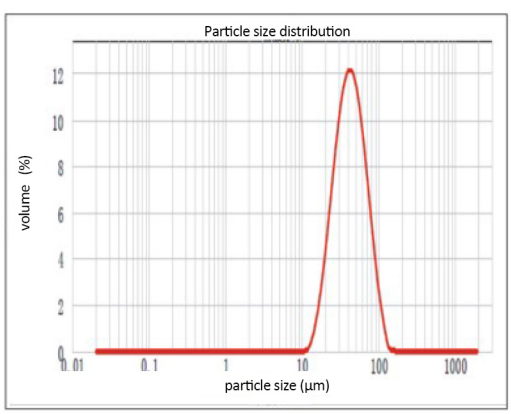
WC08 Particle size determined by laser(as milled)

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

Classification of the particle size	Grade	Particle size (μm)	Tc, %	Fc, %	Cc, %	O, %
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 200×



WC300 Particle size determined by laser(as supplied)

Tungsten carbide powder Chemical composition

	Element	Max	Typical value
Content of impurities, (%)	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

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.

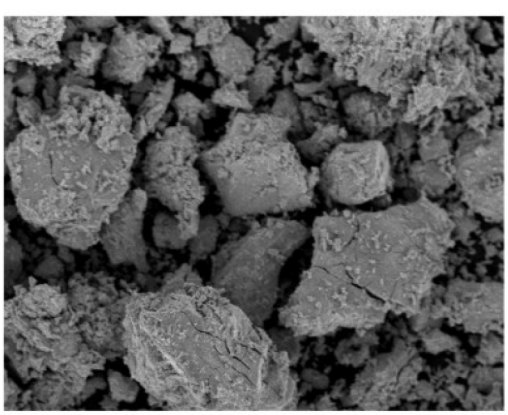
Ammonium Metatungstate (AMT)

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.

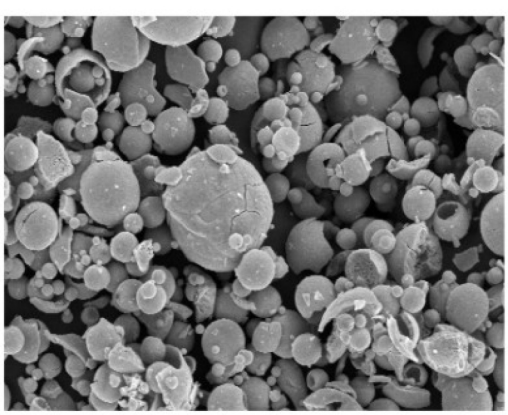
Classification	Grade	WO_3 Content %	PH Value	Ignited loss
Spraying method	AMT-P-A	≥91.5	2.0-4.5	Concrete determined
	AMT-P-B	≥91.0		
	AMT-P-C	≥90.0		
Crystallizing method	AMT-J-A	≥91.5		
	AMT-J-B	≥91.0		
	AMT-J-C	≥90.0		

Note: the percentage of WO_3 content in AMT can be adjusted upon customer's requirements.

Electron microscopic photo of crystal morphology



AMT Crystallizing method



AMT Spraying method

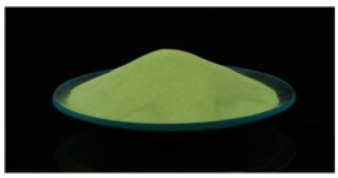
Ammonium Metatungstate (AMT) Chemical composition

	Element	Max	Typical value
Content of impurities, (%)	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
	Insolubles in water	0.05	0.018

Tungsten oxide

Including WO_3, $WO_{2.90}$, and $WO_{2.72}$, which are primarily used as raw materials for tungsten powder production, and can also be applied as dyes and catalysts.

Yellow tungsten oxide powder (wo_3)



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

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).

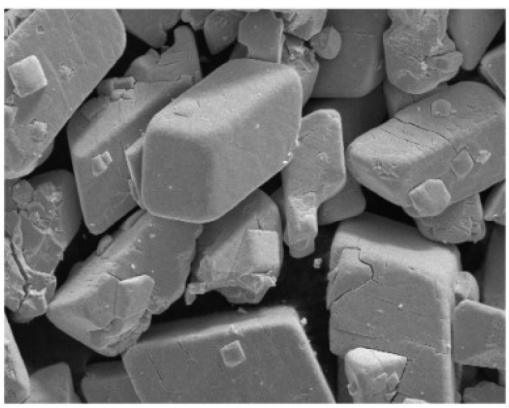
2、Apparent density

The apparent density of WO_3 will be 2.50~3.00g/cm^3 or negotiated by both supplier and buyer.

Super fine:

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

2、Apparent density: ≤2.0g/cm^3, or negotiated by both supplier and buyer.

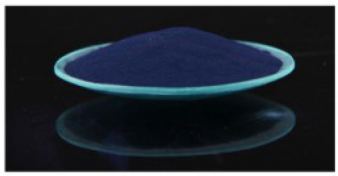


Electron microscopic photo of crystal morphology

Yellow tungsten oxide(WO_3) Chemical composition

	Element	Max	Typical value
Content of impurities, (%)	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
	Insolubles in water	0.05	0.018

Blue tungsten oxide powder ($WO_{2.90}$)

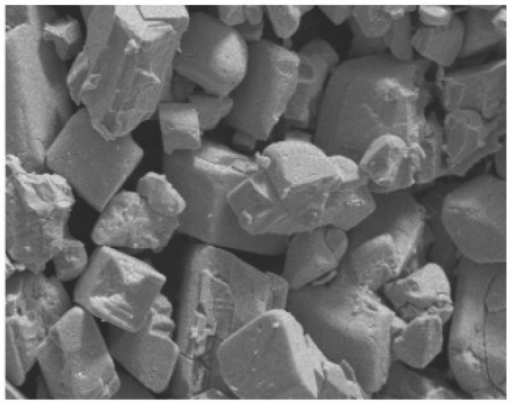


Blue tungsten oxide powder is a deep blue or dark blue crystallized powder. The color is uniform and unanimous. There are no mechanical impurities and agglomerates visible.

1、Phase composition： Maximal content of $WO_{2.72}$ 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/cm^3, or negotiated by both supplier and buyer.



Electron microscopic photo of crystal morphology

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

	Element	Max	Typical value
Content of impurities, (%)	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
	Ignited loss	0.3	0.12

Our products go global from here

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