



Tantalum

Powders, Alloys and
Customized Fabricated
Products

Exceeds or Meets ASTM Specifications
Economical and Competitive
Alternative for Plansee and
HC Starck

Standard Specification

- ASTM B365 Tantalum and Tantalum Alloy Rod, and Wire
- ASTM B521 Tantalum and Tantalum Alloy Seamless, and Welded Tubes
- ASTM B708 Tantalum and Tantalum Alloy Plate, Sheet, and Strip
- ASTM F560 Unalloyed Tantalum for Surgical Implant Applications

Tantalum & Tantalum Alloy

- R05200, unalloyed tantalum, electron-beam furnace or vacuum-arc melt, or both
- R05400, unalloyed tantalum, powder-metallurgy consolidation.
- R05255, tantalum alloy, 90 % tantalum, 10 % tungsten
- R05252, tantalum alloy, 97.5 % tantalum, 2.5 % tungsten
- R05240, tantalum alloy, 60 % tantalum, 40 % niobium

Benefits

99.95% and 99.99% materials
Exceeds ASTM Standards

Tantalum Metal & Tantalum Alloy

Shapes: Lump | Ingot | Foil | Strip | Sheet | Plate | Tube | Pipe | Capillary Bar | Rod | Wire | Wire Mesh | Disc | Mesh | Crucible | Flange Marker Band | Ribbon | Powder |

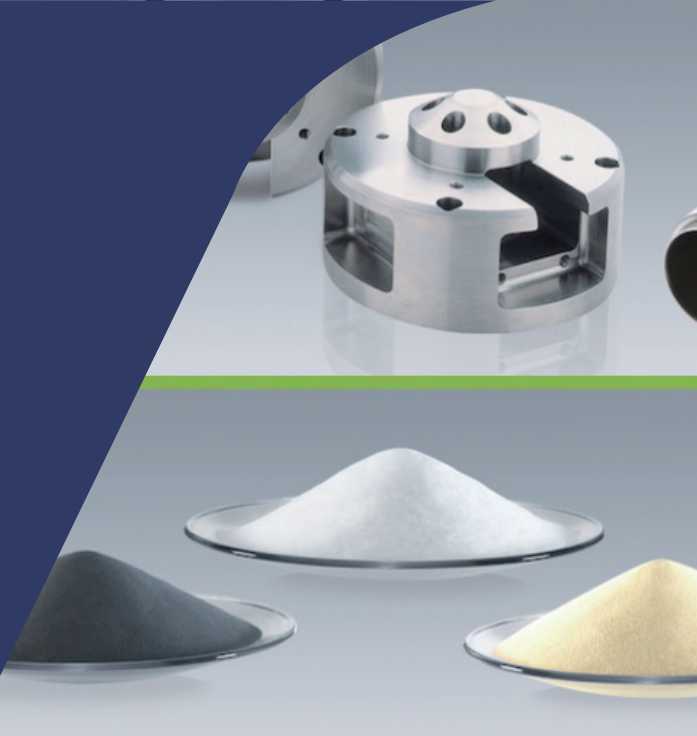
Purity: ≥99.9%, ≥99.95%, ≥99.99%

Powders

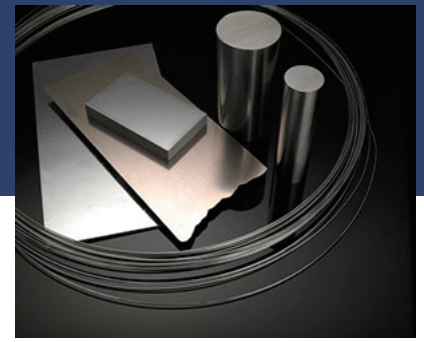
- Tantalum metal powder (Ta): ≥99.9%, ≥99.95%, ≥99.99%
- Tantalum Oxide (Tantalum Pentoxide, Ta₂O₅): ≥99.9%, ≥99.95%, ≥99.99%
- Tantalum Chloride (Tantalum Pentachloride, TaCl₅): >99.9%
- Tantalum Carbide (TaC): ≥99.7%, ≥99%
- Tantalum Silicide (TaSi₂): ≥99.9%

Properties of Tantalum

Atomic number	73	CAS number	7440-25-7
Atomic mass	180.95	Melting point	2 996 °C
Boiling point	5 450 °C	Atomic volume	0.0180 [nm ³]
Density at 20 °C	16.60 [g/cm ³]	Crystal structure	body-centred cubic
Lattice constant	0.3303 [nm]	Abundance in the Earth's crust	2.0 [g/t]



Tantalum and Tantalum Alloys



Materials R05200 99.95% Ta R05400 99.99% Ta R05252 Ta-2.5W R05255 Ta-10W

Product	Description	Standard
Tantalum Sheet / Tantalum Plate	Thickness: 0.003" – 0.4" (0.07–10 mm) Width: 1.18" – 40" (30–1000 mm) Length: 1.18" – 118" (30–3000 mm)	ASTM B708
Tantalum Foil / Tantalum Strip	Thickness: 0.005"–0.020" (0.1270 - 0.50 mm) Width & Length: < 36" x coil (< 915 mm x coil)	ASTM B708
Tantalum Tube / Tantalum Pipe	OD: 0.04" – 6" (1.0-150mm) WT: 0.008" – 0.2" (0.2-5.0mm) L: 8" – 236" (200-6000mm)	ASTM B521 ASTM F560
Tantalum Capillary	OD: 0.012" – 1.38" (0.31–35.00 mm) WT: 0.003" – 0.04" (0.08–1.00 mm) L: <40" (< 1000mm)	ASTM B521 ASTM F560
Tantalum Bar / Tantalum Rod	Diameter: 1" – 8" (25.4 – 200mm), Length: < 236" (< 6000mm)	ASTM B365
Tantalum Wire	Diameter: 0.004" – 0.16" (0.1– 4mm x coil)	ASTM B365 ASTM F560

Material	Product
Tantalum Metal Powder, Ta	99.99%, metallurgical grade 99.95%, metallurgical grade 99.95+% ~ 99.98+%, Capacitor Grade 99.95%, Tantalum Thermal Spray Powder
Tantalum (V) Oxide, Ta ₂ O ₅	99.99%, -325 mesh, -200 mesh, -150 mesh, -80 mesh 99.95%, -325 mesh, -200 mesh, -150 mesh, -80 mesh 99.6%, -325 mesh, -200 mesh, -150 mesh, -80 mesh
Tantalum Chloride, TaCl ₅	99.9%, Tantalum Chloride, TaCl ₅
Tantalum Carbide Powder, TaC	99.7%, APS <3 μm 99%, APS <3 μm



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Stanford Advanced Materials
23661 Birtcher Dr.
Lake Forest, California, 92630
Tel: (949) 407-8904
Fax: (949) 812-6690
E-mail: sales@SAMaterials.com
Website: <https://www.samaterials.com/>



Molybdenum

Powders, Alloys and
Customized Machined
& Fabricated Products

Exceeds or Meets ASTM Specifications
Economical and Competitive Alternative
for Plansee and HC Starck

Standard Specification

- ASTM B386 Molybdenum and Molybdenum Alloy Plate, Sheet, Strip, and Foil
- ASTM B387-Molybdenum and Molybdenum Alloy Bar, Rod, and Wire

Molybdenum & Molybdenum Alloy

- Molybdenum 361-Unalloyed powder metallurgical molybdenum.
- Molybdenum Alloy 364-Powder metallurgical molybdenum-0.5 % titanium-0.1 % zirconium (TZM) alloy.
- ML (Molybdenum-Lanthanum Oxide) -lanthanum oxide 0.3 or 0.7 percent.

Properties of Molybdenum

Atomic number	42	CAS number	7439-98-7
Atomic mass	95.94	Melting point	2893K / 2620 °C
Boiling point	5833K / 5560 °C	Atomic volume	0.0153 [nm ³]
Density at 20 °C	10.2 [g/cm ³]	Crystal structure	body-centred cubic
Lattice constant	0.3147 [nm]	Abundance in the Earth's crust	1.2 [g/t]

Benefits

99.95% molybdenum, TZM, ML alloy materials
Exceeds ASTM Standards

Pure Molybdenum

Shapes: Lump | Ingot | Foil | Strip | Sheet | Plate | Tube | Bar | Rod | Wire | Disc | Crucible | Fastener | Boat | Electrode | Flange | Mesh | Heat Shield | Powder

Materials: 99.95% Molybdenum, TZM, ML alloy

TZM

Shapes: Ingot | Foil | Strip | Sheet | Plate | Tube | Bar | Rod | Wire | Disc | Crucible | Fastener | Heat Shield

ML (Mo-La Alloy)

Shapes: Ingot | Foil | Strip | Sheet | Plate | Tube | Bar | Rod | Wire | Disc | Crucible | Fastener | Heat Shield



Machined & Fabricated Molybdenum Products

Molybdenum Fabricated Products

Product	Description	Standard
Molybdenum Sheet / Molybdenum Foil	0.001" – 0.185" (0.03mm - 4.7mm) x W x L	ASTM B386
Molybdenum Foil / Molybdenum Strip	> 0.185" (4.7mm) x W x L	ASTM B386
Molybdenum Tube / Molybdenum Pipe	Inside Diameter (ID): < 5" (125mm) Wall Thickness (WT): > 0.2" (6mm) Maximum Length: < 120" (3000mm) Outside Diameter (OD): Tailor-made	ASTM B387
Molybdenum Bar / Molybdenum Rod	Diameter: > 0.157" (4.0mm) Dia. x L	ASTM B387
Molybdenum Wire	Diameter: 0.008" -0.157" (0.2mm - 4.0mm) x L	ASTM B387

Main Products and Applications

Targets	TFT-LCD, Thin Film Solar Cell, TP, Semiconductor, etc
Electrodes	Fiberglass, Aluminosilicate Fiber, Industrial Ceramic Fiber, Building Material etc.
Furnace Hot Zone	Sapphire Growth Furnaces, Atmosphere Furnaces, Vacuum Furnaces, etc.
Fabricated Parts	Semiconductor, Lighting Industries, etc
High-density Parts	Automobile, Aerospace Industries, etc



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Tungsten

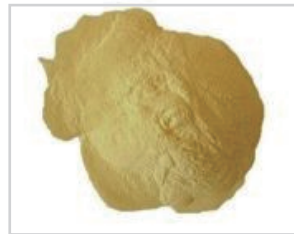
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Market

Pure tungsten is a hard, lustrous, and silvery white metal. It has the highest melting point among the refractory metals (which are a class of metals that are extraordinarily resistant to heat and wear, includes Tungsten, Tantalum, Molybdenum, Niobium, Hafnium, Chromium, Vanadium, Zirconium, and Titanium etc.). Tungsten also has the lowest vapor pressure and the highest tensile strength of all the elements.

Tungsten is mainly used in the production of hard materials based on tungsten carbide, one of the hardest carbides. Carbide tooling is actually a ceramic/metal composite, where metallic cobalt acts as a binding (matrix) material to hold the WC particles in place. This type of industrial application accounts for about 60% of current tungsten consumption.



Machined & Fabricated Beryllium Products

Pure Tungsten Metal:

Shapes: rod, bar, plate, sheet, wire, crucible, boat, powder, etc.

Purity: ≥99.95%

Tungsten Composite:

Tungsten Copper Composite (W-Cu composite); Tungsten Silver Composite (W-Ag composite)

Tungsten Carbide (WC):

Cemented Tungsten Carbide: rod, strip, customized

Tungsten Carbide Powder: customized

Other tungsten carbide products: drill, cutter, tip, die, customized

Other Tungsten Products:

Poly tungsten (tungsten-filled polymer); tungsten trioxide (WO₃); tungsten heater; tungsten electrode; furnace system parts; tungsten collimator; tungsten syringe shield; radiation shielding parts

Tungsten Heavy Alloys

Product	Tungsten Nickel Iron Alloy (W-Ni-Fe Alloy)	Tungsten Nickel Copper Alloy (W-Ni-Cu Alloy)
Size	Customized	
Material	W-Ni-Fe	W-Ni-Fe
Standard	ASTM B777/ MIL-T-21014	
Purity	W 90-97%	
Density	17.0-18.5 g/cc	



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Zirconium

Customized Machined &
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Alloy Products

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Market

Standard Specification

- ASTM B551 Zirconium and Zirconium Alloy Strip, Sheet, and Plate
- ASTM B550 Zirconium and Zirconium Alloy Bar, and Wire
- ASTM B523M Seamless and Welded Zirconium, and Zirconium Alloy Tubes

Zirconium & Zirconium Alloy

- Grade R60702 – Unalloyed Zirconium
- Grade R60705 – Zirconium-Niobium
- Low Hafnium Crystal Zirconium
- High Hafnium Crystal Zirconium



Benefits

99.95% Crystal Zirconium Materials
Exceeds ASTM Standards

Zirconium Metal & Compound Products

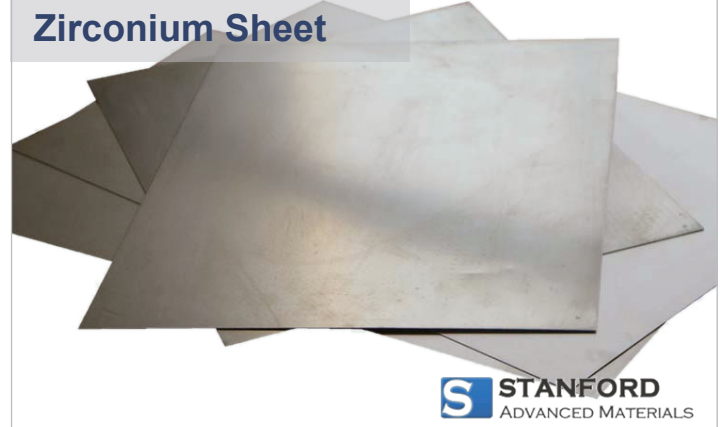
Product	Standard
Zirconium Sheet / Strip	ASTM B551
Zirconium Tube / Pipe	ASTM B523M
Zirconium Bar / Wire	ASTM B550
Low Hafnium Crystal Zirconium	Zr+Hf>99.95%,Hf<300ppm
Low Hafnium Crystal Zirconium	Zr+Hf>99.95%,Hf<3%
Zirconium Oxide Powder	Zr(Hf)O ₂ >99.95%
Yttria Stabilized Zirconia (YSZ) Powder	Yttria (3 mol%) Stabilized Zirconia Yttria (8 mol%) Fully Stabilized Zirconia
Magnesia Stabilized Zirconia	Zr(Hf)O ₂ :96%; MgO:3.0 ± 0.2 %

Zirconium Fabricated Products

Zirconium Tube



Zirconium Sheet



Zirconium Wire



Zirconium Dioxide



Zirconium Metal Properties (Theoretical)

Molecular Weight	91.22	Tensile Strength	230 MPa
Appearance	White	Thermal Conductivity	0.227 W/cm/K @ 298.2 K
Melting Point	1852 °C	Thermal Expansion	(25 °C) 5.7 $\mu\text{m}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
Boiling Point	3580 °C	Vickers Hardness	903 MPa
Density	6506 kg/m ³	Young's Modulus	88 GPa
Electrical Resistivity	40.0 microhm-cm @ 20 oC °C		



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Hafnium

Customized Machined &
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Alloy Products



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Market

Standard Specification

- ASTM B776 Hafnium and Hafnium Alloy Strip, Sheet, and Plate
- ASTM B737 Hot-Rolled and Cold-Finished Hafnium Rod, and Wire
- ASTM C1098 Hafnium Oxide Powder

Benefits

99.95% Crystal Hafnium Metal
99.9% Hafnium Oxide Powder
Exceeds ASTM Standards

Hafnium & Hafnium Compound Products

Product	Standard
Hafnium Sheet / Strip	ASTM B776
Hafnium Bar / Wire	ASTM B737
Hafnium Sputtering Target	Hf+Zr>99.95%,Zr<0.5%
Low Zirconium Crystal Hafnium	Hf+Zr>99.95%,Zr<0.5%
High Zirconium Crystal Hafnium	Hf+Zr>99.95%,Zr<3%

Hafnium Metal Properties (Theoretical)

Molecular Weight	178.49	Electrical Resistivity	35.1 microhm-cm @ 25°C
Appearance	Silver	Thermal Conductivity	0.230 W/cm/K @ 298.2 K
Melting Point	2227°C	Thermal Expansion	(25 °C) 5.9 μm·m-1·K-1
Boiling Point	4602°C	Vickers Hardness	1760 MPa
Density	13.31 g/cm ³	Young's Modulus	78 GPa

Hafnium Compound Products



Hafnium Compound Products

Item No.	Product	Standard	Lot Size
OX72-3N	Hafnium Oxide Powder	Hf+Zr>99.9%,Zr<0.5% D50 < 1.0 μm Surface area: > 8 -20 m2/g	50kg / 100kg
OX72-3NH	Hafnium Oxide Powder	Hf+Zr>99.9%,Zr<4.5% D50 < 1.0 μm Surface area: > 8 -20 m2/g	50kg / 100kg
CL72-3N	Hafnium Chloride Powder	Hf+Zr>99.9%,Zr<0.5%	50kg / 100kg
CL72-3NH	Hafnium Chloride Powder	Hf+Zr>99.9%,Zr<4.5%	50kg / 100kg
CH72-3N	Hafnium Carbide Powder	Hf+Zr>99.9%,Zr<5.0%	50kg / 100kg
CH72-3NH	Hafnium Carbide Powder	Hf+Zr>99.9%,Zr<4.5%	50kg / 100kg



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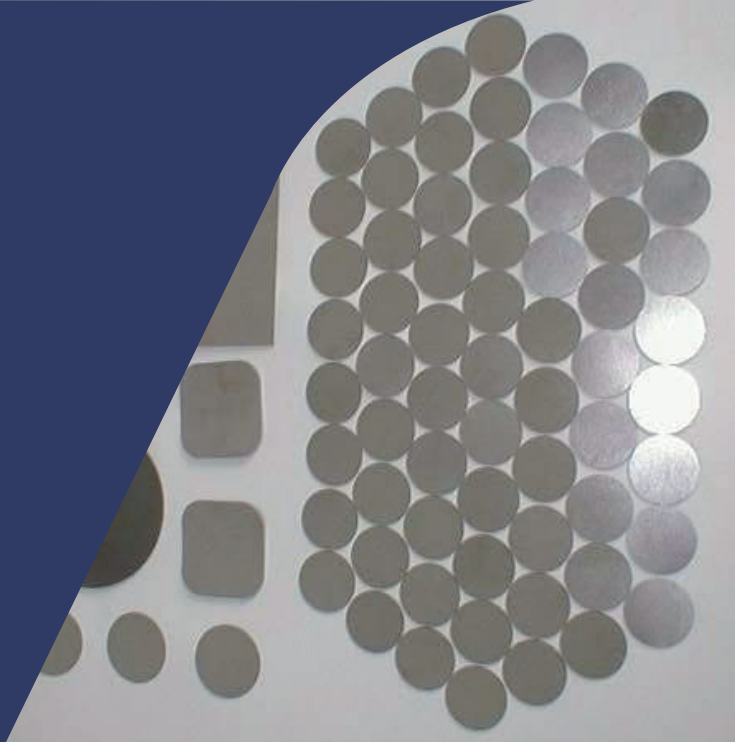
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Beryllium Foil & Sheets

Economical and Competitive Alternative For Materion A Trusted 20+ Year Supplier in the US Market

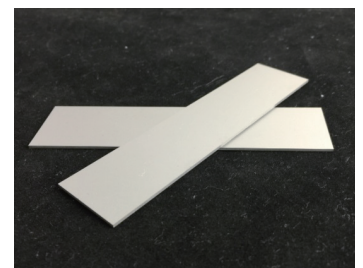
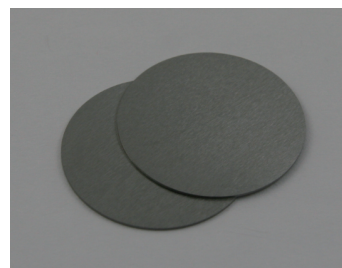
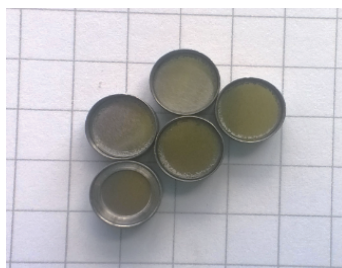
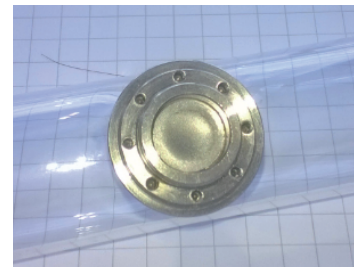
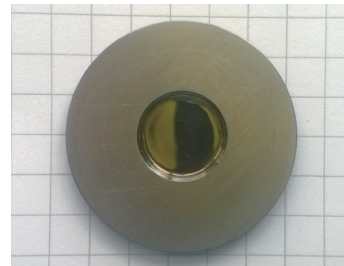
As a free element Beryllium is a steel-gray, strong, lightweight, and brittle alkaline earth metal. Beryllium is relatively transparent, ideal for X-rays and other forms of ionizing radiation; therefore, it is the most common window material for X-ray equipment and components for particle physics experiments.



Applications

Used in the medical industry for imaging, diagnostics, and laser applications due to its strength and stability.

- Beryllium is used in imaging equipment for Homeland Security.
- Beryllium foil is used in high-resolution medical radiography.
- Beryllium is used in analytical equipment for blood, HIV, and other diseases.



Machined & Fabricated Beryllium Products

Available Shapes and Dimensions

Shape	Thickness/mm	Diameter/mm	Width/mm	Length/mm
Round	0.02-0.05	≤50	N/A	N/A
	0.05-0.1	≤100	N/A	N/A
	0.1-0.5	≤100	N/A	N/A
	0.5-1.5	≤100	N/A	N/A
Rectangle	0.02-0.05	N/A	≤50	≤50
	0.05-0.1	N/A	≤100	≤100
	0.1-0.5	N/A	≤100	≤150
	0.5-1.5	N/A	≤100	≤200

Used for aerospace and military applications due to its lightweight properties, low density and high thermal conductivity.

- Lightweight beryllium components are frequently applied to electronics and military systems requiring precise operation under extreme conditions.
- Pure beryllium used in military fighter jets requiring speed and maneuverability.
- Beryllium components enhance surveillance and targeting systems in military helicopters.
- Military communications use copper beryllium alloys in network tubes, rotors, and switches due to its high strength and electrical / thermal conductive properties.

Miscellaneous uses include:

- Used as a component in particle physics experiments.
- Used as a material in acoustic applications for its damping properties.
- Beryllium is used to manufacture x-ray tubes and detectors required to monitor the flow of water, oil, and gas during well extraction.



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