



High Performance Metal Solutions

High Temperature Solutions for Furnace Operations and Repair

H.C.Starck 

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Whether you are heat treating large aerospace parts in vacuum furnaces, running high production parts for brazing through controlled atmosphere furnaces, or annealing medical and aerospace products to critical specifications, H.C. Starck Solutions offers you value-added product solutions for these crucial applications.

H.C. Starck Solutions serves the heat treating and furnace markets with products from molybdenum, tungsten, tantalum, and alloys such as La-doped molybdenum and TZM. These materials are characterized by their high ductility and toughness, high thermal and electrical conductivity, low coefficient of thermal expansion, and excellent strength and stability at temperatures up to 2000 °C.

We offer product solutions in vacuum heat treating, sintering, annealing, brazing, and all high temperature furnace applications in the medical, aerospace, defense and automotive industries.

- > **Furnace Parts**
- > **Heat Shields**
- > **Vacuum Furnace Materials**
- > **Hot Zone Replacement Parts**
- > **Heating Element Materials**
- > **Molybdenum & Tungsten Mill Products**
- > **Tantalum Hot Zones & Furnace Hardware**

Physical Properties	UNIT	Molybdenum	Tantalum	Tungsten
Typical Commercial Purity		99.95 %	99.9 %	99.95 %
Specifications	ASTM	B-386	B-364	B-760
Density	g/cc	10.2	16.6	19.3
	lbs/cu inch	0.369	0.600	0.697
Melting Point	Celcius	2623	3017	3422
	Fahrenheit	4753	5463	6192
Boiling Point	Celcius	4612	5425	5644
	Fahrenheit	8335	9797	10211
Typical Hardness	DPH (Vickers)	230	200	310
Thermal Conductivity @ 20 °C	cal/sec/cm ² /cm °C	0.35	0.13	0.397
Coefficient of Thermal Expansion	°C x 10 ⁻⁶	4.9	6.5	4.3
Electrical Resistivity	Microohms-cm	5.7	13.5	5.5
Electrical Conductivity	% IACS	34	13.9	31
Tensile Strength (ksi)	Ambient	120-200	35-70	100-500
	500 °C	35-85	25-45	134
	1000 °C	20-30	13-17	50-75
Modulus of Elasticity 10 ⁶ psi	Ambient	45	27	59
	500 °C	41	25	55
	1000 °C	39	22	50

Form	Thickness	Width	Length
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MOLYBDENUM FORMS AND TOLERANCES

Sheet	0.005" to 0.187" (0.127 mm to 4.750 mm)	24" max. (610 mm)	sheet ** (2.438 m) or coil*
Foil	0.001" to 0.0049" (0.0254 mm to 0.12 mm)	1/2" to 12" (12.7 mm to 305 mm)	coil

TUNGSTEN FORMS AND TOLERANCES

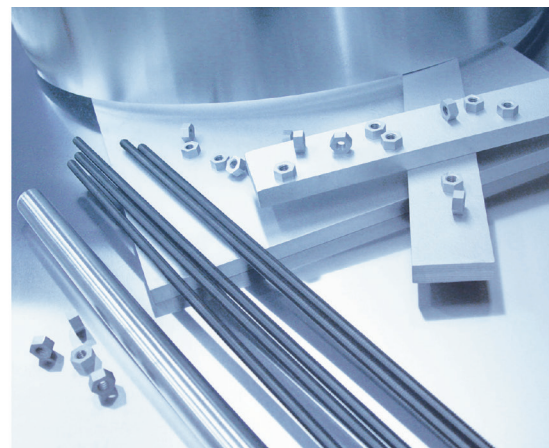
Sheet	0.040" to 0.187" (1.016 mm to 4.750 mm)	24" max. (610 mm)	sheet ** (2.438 m)
Sheet	0.005" to 0.039" (0.127 mm to 0.991 mm)	12" max. (305 mm)	max. 30 feet (9.144 m) or coil*
Foil	0.002" to 0.0049" (0.50 mm to 0.12 mm)	1/2" to 6" (12.7 mm to 152.4 mm)	coil

TANTALUM FORMS AND TOLERANCES

Sheet	0.015" to 0.060" (0.380 mm to 1.524 mm)	40" (1016 mm)	coil
Sheet	0.005" to 0.020" (0.127 mm to 0.51 mm)	36" max. (915 mm)	coil
Foil	0.0005" to 0.005" (0.0127 mm to 0.1270 mm)	12" max. (305 mm)	coil

* Coil availability depends on thickness

** Sheet availability depends on width and thickness



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