

# Tantalum

A rare, hard, blue-grey, lustrous transition metal, tantalum is highly corrosion-resistant. The chemical inertness of tantalum makes it a valuable substance for laboratory equipment and a substitute for platinum.

The high melting point and oxidation resistance lead to the use of the metal in the production of vacuum furnace parts. Due to its high density, shaped charge and explosively formed penetrator liners have been constructed from tantalum. Additionally, due to the fact that it resists attack by body fluids and is nonirritating, tantalum is widely used in making surgical instruments and implants. For example, porous tantalum coatings are used in the construction of orthopedic implants due to tantalum's ability to form a direct bond to hard tissue.



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<b>Physical Properties</b>	Metric	English	Comments
Density	<u>16.65 g/cc</u>	<u>0.6015 lb/in<sup>3</sup></u>	
<b>Mechanical Properties</b>	Metric	English	Comments
Hardness, Brinell	195	195	Converted from Vickers for 3000 kg load/10 mm ball Brinell test.
Hardness, Rockwell A	56	56	Converted from Vickers.
Hardness, Rockwell B	92	92	Converted from Vickers.
Hardness, Rockwell C	12	12	Converted from Vickers.
Hardness, Vickers	200	200	
Tensile Strength, Ultimate	<u>900 MPa</u>	<u>131000 psi</u>	
Modulus of Elasticity	<u>186 GPa</u>	<u>27000 ksi</u>	
Poissons Ratio	0.35	0.35	
Fatigue Strength	<u>230 MPa</u> @# of Cycles 5.00e+7	<u>33400 psi</u> @# of Cycles 5.00e+7	E-beam melted sample; rotating beam test.
Shear Modulus	<u>69.0 GPa</u>	<u>10000 ksi</u>	
<b>Electrical Properties</b>	Metric	English	Comments
Electrical Resistivity	<u>0.0000125 ohm-cm</u>	<u>0.0000125 ohm-cm</u>	
Magnetic Susceptibility	9.00E-07	9.00E-07	cgs/g
Critical Magnetic Field Strength, Oersted	823 - 835	823 - 835	
Critical Superconducting Temp	4.43 - 4.51 K	4.43 - 4.51 K	
<b>Thermal Properties</b>	Metric	English	Comments
Heat of Fusion	<u>170 J/g</u>	<u>73.1 BTU/lb</u>	
	<u>6.50 μm/m-°C</u> @Temperature 20.0 °C	<u>3.61 μin/in-°F</u> @Temperature 68.0 °F	
	<u>6.60 μm/m-°C</u> @Temperature 250 °C	<u>3.67 μin/in-°F</u> @Temperature 482 °F	
	<u>6.70 μm/m-°C</u> @Temperature 500 °C	<u>3.72 μin/in-°F</u> @Temperature 932 °F	
	<u>6.96 μm/m-°C</u> @Temperature 1000 °C	<u>3.87 μin/in-°F</u> @Temperature 1830 °F	
Specific Heat Capacity	<u>0.153 J/g-°C</u>	<u>0.0366 BTU/lb-°F</u>	
Thermal Conductivity	<u>54.4 W/m-K</u>	<u>378 BTU-in/hr-ft<sup>2</sup>-°F</u>	
Melting Point	<u>2996 °C</u>	<u>5425 °F</u>	

