

Data Sheet

Tantalum (Ta, TaW2.5, TaW10)



Significant Characteristics and Applications

- | Excellent corrosion resistance to aggressive fluids and many molten metals
- | Very high melting point, only exceeded by Tungsten and Rhenium
- | Very ductile, good weldability and relatively good deformability
- | Very good biocompatibility

Tantalum is used as pure metal or as an alloy in the process industry for manufacturing vessels, stirrers, tubes and heat exchangers, for medical implants, markers and surgical instruments as well as for high temperature applications for heating elements, heat shielding and other components.

Tantalum-Tungsten (TaW2.5)

Compared with pure Tantalum, this alloy has a better strength, particularly a better high temperature strength.

Tantalum-Tungsten (TaW10)

Compared with pure Tantalum and TaW2.5 this alloy has a considerably increased strength up to very high temperatures. Due to the difficult processing and manufacturing the availability of many semi-finished parts is restricted.

Physical Properties

Element Symbol	Ta
Atomic Number	73
Atomic Mass	180.95
Valency	2, 3, 4, 5
Density (20 °C)	16.65 g/cm ³
Crystal Structure	body-centered cubic (bcc)
Melting Point	2996 °C
Boiling Point	5425 °C
Vapor Pressure	1 · 10 ⁻⁸ hPa (~2000 °C) 1 · 10 ⁻⁵ hPa (~2400 °C)
Specific Electrical Resistivity	0.135 · 10 ⁻⁶ Ω · m (20 °C) 0.55 · 10 ⁻⁶ Ω · m (1000 °C) 0.90 · 10 ⁻⁶ Ω · m (2000 °C)
Coefficient of Thermal Expansion	6.5 · 10 ⁻⁶ K ⁻¹ (20 °C) 8 · 10 ⁻⁶ K ⁻¹ (1500 °C)
Thermal Conductivity	54 W/m · K ⁻¹ (20 °C) 83 W/m · K ⁻¹ (2000 °C)

Mechanical Properties

Hardness	90-210 HV (min.)
E-Modulus	186 GPa (20 °C)
Tensile Strength R _m	170-300 MPa (typ.)
Yield Strength R _{p0.2}	100-200 MPa (typ.)
Elongation A	10-30 % (typ.)

Important Alloys

TaR05200 (vacuum arc-melt)
TaR05400 (powder metallurgical)
Ta97.5W2.5 (R05252 vacuum arc-melt)
Ta90W10 (R05255 vacuum arc-melt)
Ta60Nb40 (R05240 vacuum arc-melt)
Ta 99.95 % (3N5 Quality)
Ta 99.99 % (4N Quality)
Ta 99.995 % (4N5 Quality)
Ta 99.999 % (5N Quality)

ASTM Standard Specifications

ASTM B364 (Tantalum and Tantalum-Alloy Ingots)
ASTM B365 (Tantalum and Tantalum Alloy Rod and Wire)
ASTM B708 (Tantalum and Tantalum Alloy Plate, Sheet and Strip)
ASTM B521 (Tantalum and Tantalum Alloy Seamless and Welded Tubes)
ASTM F560 (Unalloyed Tantalum for Surgical Implant Applications)

Range of Products

Foils, strips, ribbons, sheets, plates, wires, rods, tubes, sputtering targets, evaporation boats, crucibles, filaments, heaters, high temperature components, standard fabricated components (screws, nuts and others) and parts according to drawings.