DATA SHEET

TANTALUM

UNS No - R05200 & R05400
R05200: Electron beam or vacuum-arc cast tantalum
R05400: Sintered tantalum

Tantalum is a refractory metal, falling within tungsten as well as molybdenum in terms of melting point (5425 F). Tantalum is well known for its unmatched corrosion resistance and chemical inertness. Tantalum is additionally to a great degree stable at high temperatures, since tantalum has a melting point around 3000°C. High temperature applications require vacuum or inert gas since tantalum may embrittle when utilized as part in oxygen rich environments above 250°C. It is widely available in EB cast and powder metallurgy mill forms. Tantalum has a similar corrosion resistance to that of glass, but all of the typical mechanical and electrical properties of a metal. Tantalum is also one of the most bio-compatible metals available and it is also radio-opaque.

Applications

Electronic and metallurgical these are the two major categories. The electronics industry is the largest single user, where it is utilized in capacitors, filaments and various other high temperature components. Tantalum is utilized for producing a variety of alloys that have high melting points, strength and ductility. The chemical process equipment industry regularly utilizes tantalum in heat exchangers, heaters, vessels, etc. Some time it also used in precious watches e.g. from Audemars Piguet, Hublot, Montblanc, Omega and Panerai.

Characteristics

- Most corrosive resistant metal
- Excellent material of choice for the fabrication

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shaping exotic metals

TANTALUM

Machining
Tantalum has a tendency to gall, fundamentally the same to pure copper. This can cause welding of tooling to the workpiece if appropriate process is not followed. Heavy roughing cuts with M2 high speed or C2 carbide tooling is recommended. High speed tooling with generous lubricant flooding is recommended to minimize galling. Recommended speeds are 40-60 fpm.

Forming
With completely annealed material, punching, spinning, deep drawing and blanking can be effectively performed. The material has a relatively low work hardening rate.

Welding
Fusion and resistance welded done successfully by Tantalum. Under water resistance welding should be performed. When the material to be joined is absolutely clean, then fusion welding is done successfully.

Forging
Forge at 2200 down to 1500 F.

Heat Treatment
Tantalum is not heat treatable.

Annealing
Re-crystallization occurs in tantalum within 2000 and 2500 F. A high vacuum furnace is strongly recommended.

Hardening
Tantalum can only he hardened with the help of cold work.

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Chemical Properties

O	C	N	Si	Ti	Fe	Ni	Nb	Mo	Ta	W	H
0.0150 max (0.300 max for R05400)	0.010 max	0.010 max	0.0050 max	0.010 max	0.010 max	0.010 max	0.100 max	0.020 max	Balance	0.05 max	0.0015 max

Mechanical Properties

Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
30	20	20

Physical Properties

Properties	Units	Temperature in °C
Density	16.5 g/cm^3	Room
Specific Heat	0.141 Kcal/kg.C	20°
Melting Point	3017 °C	-
Modulus of Elasticity	186 KN/mm^2	20°
Coefficient of Expansion	6.48 µm/m °C	20-100°
Thermal Conductivity	55.3 W/m-°K	20°

ASTM Specifications

Welded & SMLS Tube	Sheet / Plate	Bar / Rod / Wire
B 521	B 708	B 365

Availability

MANUFACTURING
Fasteners
Custom Machining
Custom Fabrication
Stamped Parts
Flanges
Compression Fittings

RAW MATERIALS
Bars
Wires
Sheets
Plates
Tubes