

NRC 76 Alloy

NRC[®] 76 tantalum alloy (Ta 2.5%W), also called Ta 140, combines the benefits of tantalum with a range of additional metals to create a material with superior corrosion resistance and high strength. When compared with titanium, nickel, zirconium or steels, this alloy offers significant improvements in corrosion resistance in hydrochloric and sulfuric acid applications (HCl and H₂SO₄ acids) using higher temperatures and concentrations.

Benefits:

- Improved corrosion resistance
- High strength
- Minimized hydrogen embrittlement
- Ability to stand up to increased operating temperatures
- Enables longer equipment life and less operating downtime

Applications:

- Heat exchangers, condensers and coils
- Columns, vessels and reactors
- Thermocouple protection sheaths
- Pump bodies, shafts and impellers
- Paddle stirrers and agitators
- Distillation columns and boilers
- Tantalum clad dip pipes
- Chemical plant equipment
- Bayonet heaters
- Furnace parts

Chemical Characteristics* (Mass Fraction in % [cg/g]; ppm [µg/g])

Element	ppm (max)	Element	ppm (max)
Carbon	50	Titanium	40
Oxygen	100	Nickel	50
Nitrogen	50	Molybdenum	200
Hydrogen	10	Silicon	25
Niobium	0.1% (1000)	Tungsten	2.0 – 3.5 wt %
Iron	50	Tantalum	Balance

*Information on testing methods available upon request.

Mechanical Properties (Design Minimum)

Temp °F	Yield Strength (0.2% Offset KSI)	Tensile Strength (KSI)	Elongation % (inches)
70	35	50	20
210	30	48	15
390	27.4	42	10
480	25.5	40	10

Metallurgical Characteristics

NRC 76 alloy is single-phase tantalum with tungsten in solid solution. Further metallurgical characteristics include:

- Recrystallized at 2500°F
- Stress relieved (available upon customer request)

Physical Properties

Property	Measurement
Density	0.602 lb./in ³
Melting Point	2996°C
Coefficient of Expansion (20° - 500°C)	3.6 × 10 ⁻⁶ °F ⁻¹
Specific Heat (at 100°C)	0.0336 BTU/lb.°F
Thermal Conductivity (20° - 100°C)	32 BTU/Hr-Ft °F
Electrical Resistivity (0° - 100°C)	14.7 Microhm-cm
Thermal Neutron Absorption Cross Section	21.3 Barns/atom
Typical Ultimate Tensile Strength at 20°C	45 - 55 KPSI
Typical Yield Strength at 20°C	35 - 45 KPSI
Modulus of Elasticity	27 × 10 ⁶ PSI
Hardness as Annealed (Typical)	Vickers 115 - 160 Rockwell B 50 - 80

Forms Available

NRC 76 alloy is available in foil, sheet, plate, welded tubing, rod, wire, bar and customer-specified specialty sizes.

Sizes Available for Specified Forms

NRC 76 Alloy Material	Dimensions (inches)	Dimensions (centimeters)
Foil	0.001" - 0.006" thick, up to 12" wide	0.0025 - 0.0152 cm thick, up to 30.5 cm width
Sheet	0.006" - 0.1875" thick, up to 40" wide	0.0152 - 0.48 cm thick, up to 102 cm width
Plate	0.1875" - 1" thick, common widths	0.48 - 2.54 cm thick, common widths
Welded Tubing	0.015" - 0.035" wall x ½" - 2" diameter	0.0381 - 0.0889 cm wall x 1.27 - 5 cm diameter

Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.