

MATERIAL DATA SHEET · REFRACTORY METALS

Tantalum (Ta) & Niobium (Nb)

Ta: At. No. 73 | CAS 7440-25-7 · Nb: At. No. 41 | CAS 7440-03-1

Tantalum and niobium are related Group 5 refractory metals with similar chemical properties but different strengths. Tantalum stands out for its exceptional corrosion resistance and biocompatibility. Niobium is superconducting at 9.3 K, making it the basis for MRI magnets and particle accelerators. Refracore supplies both metals in all common forms and purities.

2,996 °C Melting Pt. Ta	2,477 °C Melting Pt. Nb	16.6 g/cm³ Density Ta	8.57 g/cm³ Density Nb
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Melting Point Compared to Standard Materials

Melting point in °C — both tantalum and niobium clearly exceed classic structural materials.

Aluminium		660 °C
Copper		1,085 °C
Nickel-Base Superalloy		1,336 °C
Stainless Steel 1.4301		1,450 °C
Structural Steel S235		1,500 °C
Titanium		1,668 °C
Niobium (Nb)		2,477 °C
Tantalum (Ta)		2,996 °C

Physical & Mechanical Properties

Melting Point Ta	2,996 °C	Melting Point Nb	2,477 °C
Density Ta	16.6 g/cm³	Density Nb	8.57 g/cm³
Young's Modulus Ta	186 GPa	Young's Modulus Nb	105 GPa
Thermal Conductivity Ta	57.5 W/(m·K)	Thermal Conductivity Nb	53.7 W/(m·K)
Superconducting Tc Ta	4.5 K	Superconducting Tc Nb	9.3 K
Corrosion Resistance Ta	excellent —	Biocompatibility Ta	ASTM F560 —

Standards & Specifications: ASTM B708 (Ta sheet), ASTM B521 (Ta tube), ASTM F560 (medical Ta), ASTM B393/B394 (Nb)

Available Alloys & Variants

DESIGNATION	COMPOSITION	SPECIAL FEATURE / ADVANTAGE
Pure Ta	≥ 99.95% Ta	Corrosion-resistant against all acids, including aqua regia
Ta-2.5W	Ta + 2.5% W	Increased tensile strength with unchanged corrosion resistance
Ta-10W	Ta + 10% W	Higher strength, for aerospace and high-pressure equipment
Pure Nb	≥ 99.9% Nb	Superconducting at 9.3 K, the lightest refractory metal
Nb-1Zr	Nb + 1% Zr	Increased high-temperature strength, nuclear reactors
NbTi / Nb3Sn	Alloys	Superconductors for MRI magnets, CERN accelerators

Delivery Forms & Dimensions

DELIVERY FORM	DIMENSIONS / DETAILS
Sheet / Foil Ta	0.025–10 mm thickness, width up to 600 mm
Rod / Tube Ta	Ø 3–60 mm / outer Ø 3–60 mm
Sputtering Target Ta	Round / rectangular, alpha or beta phase selectable
Custom Part Ta	Crucibles, vessels, flanges made to drawing
Medical-Grade Ta	Sheet, wire, rod to ASTM F560
Sheet / Tube Nb	0.1–50 mm thickness / outer Ø up to 100 mm
Sputtering Target Nb	Round / rectangular, ≥ 99.95% Nb

Applications & Industries

INDUSTRY / APPLICATION	TYPICAL COMPONENTS / PRODUCTS
Chemical Industry (Ta)	Heat exchangers, reaction vessels, piping, valves
Medical Technology (Ta)	Implants, surgical instruments, radiation shielding (ASTM F560)
Semiconductors (Ta)	Sputtering targets as diffusion barriers in Cu interconnects
Nuclear Energy (Nb)	Cladding tubes, structural parts, Nb-1Zr for nuclear reactors
Superconductors (Nb)	MRI magnets (NbTi), particle accelerators (Nb3Sn, CERN)
Optical Coatings (Nb)	Nb ₂ O ₅ layers for anti-reflective and filter coatings
Capacitors (Ta)	Ta electrolytic capacitors in electronics (market standard)

Note: Tantalum and niobium are often offered together but serve very different applications. For acid-resistant equipment and medical technology: tantalum. For superconductors and sputtering targets in optics: niobium. We're happy to advise at no cost.

Quality & Certificates

ISO 9001

3.1 Mill Certificate to EN 10204

RoHS-Compliant

REACH-Compliant

Consultation in German & English

Inquiry & Consultation

Material, alloy, dimensions, tolerances and certificates – we advise free of charge and prepare your quote within 1–2 business days.

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