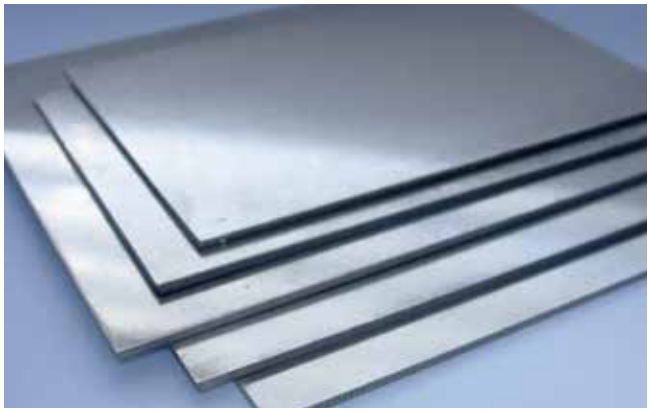
Data sheet

Niobium (Nb, NbZr1)



Significant Characteristics and Applications

- Excellent corrosion resistance in concentrated acids and liquid alkaline metals
- Very ductile and therefore very good chipless forming
- Good heat resistance and high melting point
- Under 9.26 K superconductive
- Low neutron capture cross section

Niobium and its alloys are used for chemical process technology, for electronics as a component of superconductors or capacitors and for nuclear technology as reactor components. Electrochemically produced Niobium-Oxide layers generate Newton's rings. Due to this fact, pure Niobium is also used for jewelry and coin metal.

Niobium-Zirconium (NbZr1)

NbZr1 is an alloy with approx. 0.8 – 1.0 % Zirconium and has a higher strength and hardness compared with pure Niobium. NbZr1 is used for higher requirements regarding mechanical characteristics.

Physical Properties	
Element Symbol	Nb
Atomic Number	41
Atomic Mass	92.91
Valency	2, 3, 4, 5
Density (20 °C)	8.57 g/cm³
Crystal Structure	body-centered cubic (bcc)
Melting Point	2468 °C
Boiling Point	4927 °C
Vapor Pressure	$1 \cdot 10^{-7}$ hPa (~1800 °C)
	$1 \cdot 10^{-5}$ hPa (~2000 °C)
Specific Electrical Resistivity	$0.15 \cdot 10^{-6}$ Ω · m (20 °C)
Coefficient of Thermal Expansion	$7.1 \cdot 10^{-6}$ K^{-1} (20 °C)
	$7.9 \cdot 10^{-6}$ K^{-1} (1000 °C)
Thermal Conductivity	52 W/m · K^{-1} (20 °C)
	65 W/m · K^{-1} (1000 °C)

Mechanical Properties	
Hardness	90-120 HV (typ.)
E-Modulus	103 GPa (20 °C)
Tensile Strength R_m	125 MPa (typ.)
Yield Strength $R_{p0.2}$	75 MPa (typ.)
Elongation A	25 % (typ.)

Important Alloys
Nb 99.8+ % (R04200 type 1 – Reactor grade unalloyed Nb, Ta ≤ 0.1 %)
Nb 99.6+ % (R04210 type 2 – Commercial grade unalloyed Nb, Ta ≤ 0.3 %)
NbZr1 (R04251 type 3 – Reactor grade Nb Alloy containing 1 % Zirconium)
NbZr1 (R04261 type 4 – Commercial grade Nb Alloy containing 1 % Zr)
NbHf10Ti1 (R04295)

ASTM Standard Specifications
ASTM B392 (Niobium and Niobium Alloy Bar, Rod and Wire)
ASTM B393 (Niobium and Niobium Alloy Strip, Sheet and Plate)
ASTM B394 (Niobium and Niobium Alloy Seamless and Welded Tubes)
ASTM B391 (Niobium and Niobium Alloy Ingots)
ASTM B652/B652M (Niobium-Hafnium-Alloy Ingots)
ASTM B655/B655M (Niobium-Hafnium-Alloy Bar and Wire)

Range of Products

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

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