

NIOBIUM (COLUMBIUM)

Applications:

NRC® niobium metal is produced from electron beam melted ingots. Grain Stabilized Niobium (GSNb) is made by EB and VAR melting. Both materials are malleable, weldable, machineable and formable. GSNb is used in applications where a consistently finer grain size is required. Niobium is used in the manufacture of synthetic diamonds; in sputtering targets for fiber optic applications or architectural glass; in nickel based superalloys; and alloyed with titanium or tin, in superconductors. In nuclear reactors it has low thermal neutron cross section and superior corrosion resistance. It is an excellent getter and finds use in high temperature vacuum furnaces, and is resistant to attack by the molten alkali metals found in sodium vapor lamps.

Forms Available

Foil: 0.001" to 0.006" thick by widths up to 12" wide. Sheet: 0.006" to 0.1875" thick by widths up to 40" wide. Plate 0.1875" to 1" thick in common widths. Welded Tubing 0.015" to 0.035" wall x ½" to 2" diameter. Also, rod, plate, wire, bar and customer specified specialty sizes of all materials.

Physical Properties of Niobium

Atomic Number	41	
Atomic Weight	92.91	
Density	8.47	gms/cm ³
Melting Point	2468	°C
Coefficient of Expansion (20° – 100°)	7.1 X 10 ⁻⁶	°C ⁻¹
Specific Heat (27° C)	0.065	cal/gm/°C
Thermal Conductivity	0.125	cal/sec-cm-°C
Electrical Resistivity (0° - 100° C)	14.5	microhm-cm
Thermal Neutron Absorption (cross section)	1.1	barns/atom
Modulus of Elasticity	15 X 10 ⁶	PSI
Poisson's Ratio	0.38	
Annealed Hardness (Vickers)	50 - 80	
Crystal Structure	bcc	
Superconducting Transition Temperature	9.2	°K
% Elongation (TYP)	25	% minimum
Typical Ultimate Tensile Strength at 20° C (90% Re crystallized)	18	KSI minimum
Typical yield strength (20°C)	12.3	KSI minimum
Thermal Resistivity	1	

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Chemistry

Type I (R04200) – Reactor Grade 0.1% Ta Max.
Type II (R04210) – Commercial Grade 0.2% Ta Max.
GSNb – Per H. C. Starck Internal Specification

Metallurgical Characteristics

Material is single-phase niobium.
Stress relieve at 650°C
Re-crystallize at 950°C.

Hazards identification in Advertising (Directive 67/548/EEC Article 26, Directive 1999/45/EC Article 13 and REGULATION (EC) No 1272/2008 Article 48)
none.

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