



STAINLESS GROUP

High performance Alloys - Medical - Aerospace - Microtechnics - Motorsport - Industry

NIOBIUM C-103®

UNS R04295
ASTM B652
ASTM B654
ASTM B655
AMS 7852
AMS 7857

GENERALITIES

Composed of niobium, hafnium and titanium, **niobium C-103** provides a high-performance alloy solution for aerospace, spacecraft, missiles and launch vehicles. C-103 has high temperature and load-bearing characteristics while still being relatively easy to work with when compared to other materials. Niobium has the lowest density of the refractory metals and exhibits excellent thermal conductivity, high room-temperature ductility, low ductile-to-brittle transition temperature (giving it resistance to high frequency vibrations at cryogenic temperatures), and good weldability.

This alloy is melted and produced by MATERION in the USA.

Each batch is delivered with its original certificate of conformity to warranty a full traceability.

APPLICATIONS

This alloy is used for the production of parts exposed to high temperature up to 1480°C and high stresses.

Applications are typically high-thrust rocket nozzles, steering nozzles for missiles, rockets, satellites, or jet engine afterburner flap section.

STANDARDS AND DESIGNATIONS

Standards:

ASTM B652, B654, B655 – AMS 7852 (sheets and plates) - AMS 7857 (rods and wires)

Trademarks :

Niobium C-103 alloy

TYPICAL CHEMICAL ANALYSIS (mass %)

	Hafnium	Titanium	Tantalum	Tungsten	Zirconium	Carbon	Hydrogen	Nitrogen	Oxygen	Niobium
MIN	9.0	0.7	---	---	---	---	---	---	---	BALANCE
MAX	11.0	1.3	0.50	0.50	0.70	0.015	0.0010	0.0150	0.0225	

METALLURGY

Usual delivery temper is annealed with a fully recrystallized microstructure. Recrystallization is performed at 1260°C and microstructure is made of a single phase.

PHYSICAL PROPERTIES AT 20°C

Density.....	8.86 g.cm. ³
Coefficient of thermal expansion (linear between 93 and 1200°C).....	6,84 x 10 ⁻⁶ m/m.°C
Young's modulus at 20°C.....	90 x 10 ³ MPa
Thermal conductivity from 800 up to 1200°C.....	37,4 up to 42,4 W/m.°C
Melting point.....	2350 +/- 50°C

MECHANICAL PROPERTIES OF BARS

The grade is offered as standard in the solution annealed condition. Typical mechanical properties are :

	UTS (Mpa)	YS 0.2% (MPa)	E4d%
at 25°C	386	276	20
at 538°C	283	172	19
at 1093°C	172	124	30

MACHINABILITY

The grade can be machined and welded.

CORROSION RESISTANCE

This alloy has a high oxidation resistance at high temperatures. It can be used for engine applications at high temperature.

TYPICAL SHAPES

- Round bars (diameter 38 up to 165 mm), sheets (thickness 4,8 up to 6 mm) and plates (thickness 6 up to 25,4mm).
- Powders and wires for additive manufacturing
- Other shapes : *upon request*

The information, data and photos presented in this document are given in good faith and for guidance only. If you need more precise information, our technical department is at your disposal.
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