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NITINOL

Strip & Foil (Rolled from Flat Wire), ASTM F2063 (Chemistry)

Nitinol is a shape-memory alloy. This nickel-titanium alloy “remembers” its original, cold-forged shape: returning the pre-deformed shape by heating.

Shape-memory alloys have applications in industries including medical and aerospace.

Applications

Heat engines, resilient glass frames, mechanical watch springs, temperature control system, couplings, golf club insert, biomedical and medical uses, cell-phone technology: retractable antenna, microphone boom

Description

Nitinol is well known for its thermo-mechanical properties of super elasticity and shape memory effect. Shape memory refers to the ability of Nitinol to undergo deformation at one temperature, then recover its original, under formed shape upon heating above its transformation temperature. Super elasticity occurs at a narrow temperature range just above its transformation temperature; in this case, no heating is necessary to cause the under formed shape to recover, and the material exhibits enormous elasticity, some 10-30 times that of ordinary metal.

Chemistry Typical

Nickel: 55 - 56%

Titanium: 44 - 45%

Physical Properties

Density: 0.2633 lbs/in³, 6.45 g/cm³

Electrical Resistivity: Ω-cm

Austenite: 82×10^{-6}

Martensite: 76×10^{-6}

Thermal Conductivity, W/cm°C

Austenite: 0.18

Martensite: 0.086

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Mean Coefficient of Thermal Expansion, in/in/°F (µm/m•K), 80 - 200 °F (27 - 93 °C)

Austenite: 6.1×10^{-6} (11)

Martensite: 3.6×10^{-6} (6.6)

Modulus of Elasticity, ksi (MPa)

Austenite: $10.08 - 12.04 \times 10^3$ (75 - 83 x 10³)

Martensite: $4.06 - 5.80 \times 10^3$ (28 - 40 x 10³)

Melting Point: 2930 °F (1310 °C)

Forms

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Annealed Typical

Ultimate Tensile Strength: 130 KSI (895 MPa)

Yield Strength (0.2 Offset):

Austenite: 28 - 100 KSI (195 - 690 MPa)

Martensite: 10 - 20 KSI (70 - 140 MPa)

Elongation: 25 - 50%

Properties: Tempered Typical

Ultimate Tensile Strength: 275 KSI (1900 MPa)

Elongation: 5 - 10%

** For more detailed information contact Ulbrich Shaped Wire Technical Service.*

Additional Properties

Corrosion Resistance

Refer to NACE (National Associate of Corrosion Engineers) for recommendations.

Finishes

Black Oxide

Custom Oxides

Oxide Free (Oxides removed mechanically or chemically)

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