



# Nitinol (Nickel-Titanium)

Shaped, Flat, Square, Round, Fine Wire, Black Oxide, Custom Oxides and Oxide Free (Oxides removed mechanically or chemically) Wire

ASTM F2063 (Chemistry)

\* Rolled from flat wire

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## Nitinol Wire Description

Nitinol is a nickel-titanium alloy with super elasticity and shape

memory properties. 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.

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## Applications

Heat engines

Resilient glass frames

Orthodontic arc wire

Medical devices

Actuators

High reliability couplings

Temperature control system couplings

## **Chemistry: Typical**

Nickel: 55-56%

Titanium: 44-45%

## **Physical Properties**

Density, 0.2633 lbs/in<sup>3</sup>, 6.45 g/cm<sup>3</sup>

Electrical Resistivity:  $\Omega$ -cm

Austenite:  $82 \times 10^{-6}$

Martensite:  $76 \times 10^{-6}$

Thermal Conductivity, W/cm<sup>2</sup>°C

Austenite : 0.18

Martensite: 0.086

Mean Coefficient of Thermal Expansion, in/in/°F ( $\mu\text{m}/\text{m}\cdot\text{K}$ ) 80- 200°F (27- 93°C)

Austenite:  $6.1 \times 10^{-6}$  (11)

Martensite:  $3.6 \times 10^{-6}$  (6.6)

Modulus of Elasticity, KSI (MPa)

Austenite:  $10.08\text{-}12.04 \times 10^3$ , ( $75\text{-}83 \times 10^3$ )

Martensite:  $4.06\text{-}5.80 \times 10^3$ , ( $28\text{-}40 \times 10^3$ )

Melting Point: 2930°F (1310°C)

## **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 Wire

### **Properties Tempered**

Nitinol can be cold rolled to achieve the temper properties required by specific customers and/or manufacturing requirements. Contact Ulbrich Wire for details.

## **Additional Properties**

### **Nitinol Wire Finishes**

Black Oxide

Custom Oxides

Oxide Free (Oxides removed mechanically or chemically)

*Special finishes are available: Contact Ulbrich Wire Sales with special finish and plating requests.*

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