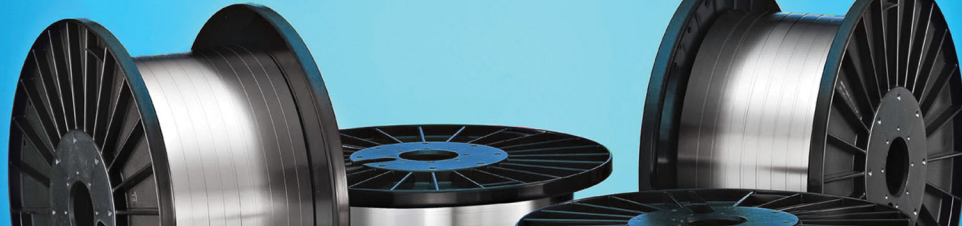




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## **MONEL® 400, UNS N04400**

**Strip, Coil, Foil, Wire, AMS 4544, QQN 2810D, ASTM B127**

### **Applications**

Marine engineering, chemical equipment, hydrocarbon processing, valves, pumps, fittings, fasteners, heat exchangers, flexible metal hose

### **Description**

Monel® 400 is a ductile Nickel-Copper alloy with resistance to a wide variety of corrosive conditions. This alloy is most frequently applied in a range of environments going from mildly oxidizing through neutral and to moderately reducing conditions. Additional application area of this material is in marine environments and other non-oxidizing chloride solutions. Like with commercially pure Nickel, Monel® 400 is low in strength in the annealed condition, for this reason a variety of tempers are used to achieve higher strength levels.

### **Chemistry Typical**

Nickel + Cobalt: 63.0 - 70.0

Manganese: 2.0 max

Silicon: 0.50 max

Cobalt: 1.00 max

Iron: 2.5 max

Sulfur: 0.024 max

Carbon: 0.30 max

Copper: Balance

### **Physical Properties**

Density: 0.319 lbs/in<sup>3</sup>, 8.8 g/cm<sup>3</sup>

Electrical Resistivity: 51.0 microhm-cm @ 68 °F

Thermal Conductivity: BTU/hr/ft<sup>2</sup>/ft/°F (W/m•K):

212 °F (100 °C): 14.0 (24.1)

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Mean Coefficient of Thermal Expansion: in/in/°F, (µm/m•C):  
32 - 212 °F (0 - 100 °C):  $7.7 \times 10^{-6}$  (13.9)

Modulus of Elasticity: ksi (MPa) in Tension  
 $26 \times 10^3$  ( $179 \times 10^3$ )

Magnetic Permeability: Annealed: moderately

Melting Point: 2460 °F (1350 °C)

## Forms

Coil – Strip, Foil, Ribbon

Wire – Profile, Round, Flat, Square

## Mechanical Properties at Room Temperature

### Properties: Annealed

Gauges: > .003 inches

Ultimate Tensile Strength: 70 - 85 KSI (483 - 586 MPa)

Yield Strength (0.2% offset): 28 KSI min (193 MPa min)

Elongation: 35% min

Hardness: Rb 68 max

Gauges: ≤ .003"

Ultimate Tensile Strength: Report

Yield Strength (0.2% offset): 28 - 48 KSI (193 - 331 MPa)

Elongation: Report

Hardness: Report

### Spring Temper:

Ultimate Tensile Strength: 100 KSI min (690 MPa min)

Yield Strength (0.2% offset): 90 KSI min (620 MPa min)

Elongation: 2% min

### Properties: Tempered

Monel® 400 can be cold rolled to various tempers. Contact Ulbrich Technical Service for additional information.

## Additional Properties

### Corrosion Resistance

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

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## Finishes

#1 – Hot rolled annealed and descaled. It is available in strip, foil and ribbon. It is used for applications where a smooth decorative finish is not required.

#2D – Dull finish produced by cold rolling, annealing and descaling. Used for deep drawn parts and those parts that need to retain lubricants in the forming process.

#2B – Smooth finish produced by cold rolling, annealing and descaling. A light cold rolling pass is added after anneal with polished rolls giving it a brighter finish than 2D.

#BA – Bright annealed cold rolled and bright annealed

#CBA – Course bright annealed cold rolled matte finish and bright anneal

#2 – Cold Rolled

#2BA – Smooth finish produced by cold rolling and bright annealing. A light pass using highly polished rolls produces a glossy finish. A 2BA finish may be used for lightly formed applications where a glossy finish is desired in the formed part.

Polished – Various grit finish for specific polish finished requirements.

*\* Not all finishes are available in all alloys – Contact Ulbrich Sales for more information.*

## Wire Finishes

XC – Extra Clean Bright Annealed or Bright Annealed and Cold Rolled

Grease – Ultra bright finish (for decorative applications)

Soap – Soap coating on tempered wire to act as lubricant.

*\* Contact Wire Sales for custom wire finishes.*

## Heat Treatment

Monel® 400 is non hardenable by heat treatment.

## Welding

For best results refer to: SSINA's "Welding of Stainless Steels and Other Joining Methods".

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