



We Deliver Precision®



Ulbrich Stainless Steels & Special Metals, Inc. • 153 Washington Avenue • North Haven, CT 06473 USA • 800-243-1676 • ULBRICH.com

MONEL® 401, UNS N04401

Strip, Coil, Foil, Wire, DIN 17471

Applications

Precision foils for electrical resistance heaters and circuits

Description

Monel® 401 is a ductile Nickel-Copper alloy with a very low coefficient of electrical resistivity and resistance to a wide variety of corrosive conditions. Like with commercially pure Nickel, Monel® 401 is low in strength in the annealed condition and can only be cold worked to a maximum of 120 KSI.

Chemistry Typical

Nickel + Cobalt: 43.0 - 45.0

Manganese: 2.25 max

Cobalt: 0.25 max

Iron: 0.75 max

Carbon: 0.10 max

Sulfur: 0.015 max

Silicon: 0.25 max

Copper: Balance

Physical Properties

Density: 0.321 lbs/in³, 8.88 g/cm³

Thermal Conductivity: BTU/hr/ft²/ft/°F (W/m•K)

70 °F (21 °C): 13.3 (21.0)

Electrical Resistivity, ohm•circ mil/ft (μΩ•m):

70 °F: 294

Mean Coefficient of Thermal Expansion: in/in/°F

70 - 200 °F: 7.6×10^{-6}

70 - 500 °F: 8.5×10^{-6}

70 - 1000 °F: 9.2×10^{-6}

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Modulus of Elasticity: ksi (MPa) in Tension
26 x 10³ (179 x 10³)

Melting Point: 2335 °F (1280 °C) approx.

Forms

Coil – Strip, Foil, Ribbon

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Annealed *

Ultimate Tensile Strength: 50 - 60 KSI (345 - 414 MPa)

Yield Strength (0.2% offset): 30 - 40 KSI (207 - 276 MPa)

Elongation: Report

Hardness: Rb 60-75

** These values are based on typical capability data and can be adjusted by control of process variables as needed. Consult Ulbrich Technical Service for desired values.*

Properties: Tempered

Monel® 401 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.

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 for all alloys – Contact Ulbrich Sales for more information.*

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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 Ulbrich Wire for custom finishes.*

Heat Treatment

Monel® 401 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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