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ALLOY 42, UNS N94100

Strip, Coil, Foil & Wire, ASTM F-30

Applications

Semiconductor lead frames, thermostat bi-metal strips, metal to glass sealing applications in micro-electronic components

Description

Alloy 42 is a nickel-iron alloy that has a low, and normally constant, coefficient of thermal expansion up to 570 °F (300 °C).

Chemistry Typical

Nickel: 41.00 nominal *

Iron: Balance

Carbon: 0.05 max

Silicon: 0.30 max

Manganese: 0.60 max

Chromium: 0.50 max

Phosphorus: 0.025 max

Sulfur: 0.025 max

Aluminum: 0.10 max

* The nickel listed may be adjusted so that the alloy meets the specified requirements for coefficient of thermal expansion.

Physical Properties

Density: 0.291 lb/in³, 8.11 g/cm³

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

At 68 °F (20 °C): 72.8 (10.5)

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Electrical Resistivity: ohm-cir-mil/ft, microhm-cm:

At 68 °F (20 °C): 367 (61)

At 212 °F (100 °C): 421 (70)

At 392 °F (200 °C): 523 (87)

At 572 °F (300 °C): 608 (101)

At 752 °F (400 °C): 662 (110)

At 932 °F (500 °C): 698 (116)

At 1112 °F (600 °C): 722 (120)

Mean Coefficient of Thermal Expansion: $\mu\text{in/in-}^\circ\text{F}$ ($\mu\text{m/m-}^\circ\text{C}$): Annealed

68 - 572 °F (20 - 300 °C): 2.9 (5.3)

68 - 662 °F (20 - 350 °C): 3.0 (5.4)

68 - 752 °F (20 - 400 °C): 3.4 (6.2)

68 - 842 °F (20 - 450 °C): 3.9 (7.1)

68 - 932 °F (20 - 500 °C): 4.4 (8.0)

Modulus of Elasticity: ksi (MPa)

21.8×10^3 (150×10^3) in tension

Melting Range: 2615 °F (1435 °C)

Forms

Coil – Sheet, Strip, Ribbon

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Annealed Typical

Ultimate Tensile Strength: 71 KSI nom (490 MPa nom)

Yield Strength: 36 KSI nom (248 MPa nom)

Elongation: 43% nom

Properties: Tempered

Alloy 42 can be cold worked 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 for all alloys – Consult Sales for applicable finishes.*

Wire Finishes

XC – Extra clean. Bright annealed or bright annealed and cold rolled

Grease – Ultra bright finish for decorative applications

Soap – Soap is not removed from tempered wire to act as a lubricant.

** Contact Ulbrich Wire with special finish requests.*

Heat Treatment

Alloy 42 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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