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HASTELLOY® C-4, UNS N06455

(Alloy C-4) Strip, Coil, Foil & Wire, ASTM B 575

Applications

Chemical processing equipment, nuclear fuel processing

Description

Hastelloy® C-4 is a nickel-chromium-molybdenum alloy with outstanding high temperature stability. It has high ductility and corrosion resistance. Its high temperature resistance up to 1900 °F (1038 °C) makes it suitable for most chemical process application in the “as” welded condition.

Chemistry Typical

Nickel: Balance
Chromium: 14.00-18.00
Molybdenum: 14.00-17.00
Iron: 3.00 max
Cobalt: 2.00 max
Manganese: 1.00 max
Carbon: 0.015 max
Silicon: 0.08 max
Phosphorus: 0.04 max
Sulfur: 0.03 max
Titanium: 0.70 max

Physical Properties

Density: 0.312 lb/in³, 8.64 g/cm³

Electrical Resistivity: micro-ohm-in, (micro-ohm-m):

At 74 °F (23 °C): 49.1 (1.25)

At 212 °F (100 °C): 49.3 (1.25)

At 392 °F (200 °C): 49.6 (1.26)

At 572 °F (300 °C): 49.9 (1.27)

At 752 °F (400 °C): 50.2 (1.28)

At 932 °F (500 °C): 50.8 (1.29)

At 1112 °F (600 °C): 51.8 (1.32)

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Specific Heat: BTU/lb-°F (J/Kg-K)

At 32 °F (0 °C): 97 (406)

At 212 °F (100 °C): 102 (427)

At 392 °F (200 °C): 107 (448)

At 572 °F (300 °C): 111 (465)

At 752 °F (400 °C): 114 (477)

At 932 °F (400 °C): 117 (490)

At 1112 °F (500 °C): 120 (502)

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

At 74 °F (23 °C): 70 (10.1)

At 212 °F (100 °C): 79 (11.4)

At 392 °F (200 °C): 92 (13.2)

At 572 °F (300 °C): 104 (15.0)

At 752 °F (400 °C): 116 (16.7)

At 932 °F (500 °C): 128 (18.4)

At 1112 °F (600 °C): 142 (20.5)

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

68 – 200 °F (20 – 93 °C): 6.0 (10.8×10^{-6})

68 – 400 °F (20 – 204 °C): 6.6 (11.9×10^{-6})

68 – 600 °F (20 – 316 °C): 7.0 (12.6×10^{-6})

68 – 800 °F (20 – 427 °C): 7.2 (13.0×10^{-6})

68 – 1000 °F (20 – 538 °C): 7.4 (13.3×10^{-6})

68 – 1200 °F (20 – 649 °C): 7.5 (13.5×10^{-6})

68 – 1400 °F (20 – 760 °C): 8.0 (14.4×10^{-6})

68 – 1600 °F (20 – 871 °C): 8.3 (14.9×10^{-6})

68 – 1800 °F (20 – 982 °C): 8.7 (15.7×10^{-6})

Modulus of Elasticity: KSI (MPa)

30.8×10^3 (211×10^3) in tension

Melting Range: 2550 °F (1399 °C)

Forms

Coil – Sheet, Strip, Foil

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Annealed Typical

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

Yield Strength: 40 KSI min (276 MPa min)

Elongation: 40% min

Hardness: aim Rb 100 max

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Properties: Tempered

Hastelloy® C-4 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.

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 coating on tempered wire to act as lubricant.

** Contact Ulbrich Wire with special finish requests.*

Heat Treatment

Hastelloy® C-4 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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