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DUPLEX ALLOY 2304, UNS S32304

Strip, Coil, Foil, Wire, ASTM A240

Applications

Pulp and paper industry, caustic solutions, organic acids, food industry, pressure vessels

Description

Duplex Alloy 2304 is a two-phase, ferritic, austenitic 23% chromium, 4% nickel, molybdenum-free duplex stainless steel. It has similar corrosion resistance properties to 316L. Furthermore, its mechanical properties are twice those of 304L/316L austenitic grades. This allows the designer to save weight, particularly for properly designed pressure vessel applications. The alloy is particularly suitable for applications covering the -50 °C/+300 °C temperature range.

Chemistry Typical

Carbon: 0.03 max
Manganese: 2.50 max
Phosphorus: 0.040 max
Sulfur: 0.030 max
Silicon: 1.00 max
Chromium: 21.50 – 24.50
Nickel: 2.00 – 5.50
Copper: 0.05 – 0.60
Molybdenum: 0.05 – 0.60
Nitrogen: 0.05 – 0.20
Iron: Balance

Physical Properties

Density: 0.284 lbs/in³ 7.86 g/cm³

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

At 68 - 212 °F (20 - 100 °C): 9.0 (17.0)

Mean Coefficient of Thermal Expansion: in/in/°F (µm/m·K):

32 - 212 °F: 6.97 x 10⁻⁶ (13.0)

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Modulus of Elasticity: ksi (MPa):
 29×10^3 (200×10^3) in tension

Magnetic Permeability: Ferromagnetic

Melting Point: 2570 - 2660 °F (1410 - 1460 °C)

Forms

Coil – Strip, Foil, Ribbon

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Annealed Nominal

Ultimate Tensile Strength: 110 KSI min (758 MPa min)

Yield Strength: (0.2% offset) 65 KSI min (448 MPa min)

Elongation: 30% min

Tempered

Duplex Alloy 2304 can be cold rolled to various tempers. Contact Ulbrich Technical Service for additional information.

Additional Properties

Corrosion Resistance

Refer to NACE (National Association 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 is not removed from tempered wire to act as a lubricant.

* *Contact Ulbrich Wire for custom wire finishes.*

Heat Treatment

Duplex Alloy 2304 cannot be hardened by heat treatment.

Welding

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

For Reference Only

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