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

304L STAINLESS STEEL, UNS S30403

Strip, Coil, Foil, Wire, AMS 5511, ASTM A240, ASTM A666

Applications

Medical Parts, Surgical Parts, Tubing, Flexible Metal Hose, Bellows

Description

304L has oxidation resistance to a maximum temperature of 1650°F (899°C) continuously without appreciable scaling. The maximum temperature for intermittent exposure is 1500°F (816°C). Since 304L is an extra low-carbon variation of 304 it can often be used in the “as-welded” condition (without annealing), even in severe corrosive conditions, except for applications specifying stress relief. 304L has good welding characteristics and can be welded by all standard methods but attention needs to be paid to avoid weld “hot cracking”. Welding may be followed by annealing to relieve stresses during severe forming or spinning.

Chemistry Typical

Carbon: 0.03 max
Chromium: 18.00 – 20.00
Manganese: 2.0 max
Nickel: 8.00 – 12.00
Phosphorus: 0.045 max
Silicon: 1.0 max
Sulphur : 0.03 max
Iron: Balance

Physical Properties

Density: 0.29 lbs/in³ 8.03 g/cm³

Electrical Resistivity: microhm-in (microhm-cm):

At 68 °F (20 °C): 28.4 (72)

At 1200 °F (659 °C): 45.8 (116)

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Specific Heat: BTU/lbs.-°F (kJ/kg•K):

32 - 212 °F (0 - 100 °C): 0.12 (0.50)

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

At 212 °F (100 °C) – 9.4 (16.2)

At 932 °F (500 °C) – 12.4 (21.4)

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

32 – 212 °F (0 – 100 °C) – 9.4×10^{-6} (16.9)

32 – 600 °F (0 – 315 °C) – 9.6×10^{-6} (17.3)

32 – 1000 °F (0 – 538 °C) – 10.2×10^{-6} (18.4)

32 – 1200 °F (0 – 649 °C) – 10.4×10^{-6} (18.7)

Modulus of Elasticity: ksi (MPa)

28×10^3 (193×10^3) in tension

11.2×10^3 (78×10^3) in torsion

Magnetic Permeability, H = 200 Oersteds: Annealed < 1.02 max

Melting Range: 2550 - 2650 °F (1399 - 1454 °C)

Forms

Coil – Strip, Foil, Ribbon

Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Annealed Condition Typical:

Ultimate Tensile Strength: 70 KSI (485 MPa)

Yield Strength: 25 KSI (170 MPa)

Elongation: 40%

Hardness: R 88

Tempered Condition:

304L 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.

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

** Contact Ulbrich Wire for custom finishes.*

Cold Forming

304L is ductile and can be cold worked by stamping, drawing, bending or forming methods.

Heat Treatment

304L cannot be heat treated for hardness. Hardness can only be achieved by cold working.

Welding

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

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