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309 STAINLESS STEEL, UNS S30908

Strip, Coil, Foil & Wire, AMS 5523, ASTM A167

Applications

Furnace parts, Heat Exchangers, Paper Mills

Description

Type 309 is an austenitic chromium nickel stainless steel (.08% max carbon). Type 309 is employed for parts requiring both corrosion and heat resistance and oxidation resistance up to 2000 ºF. Strength at elevated temperatures is similar to that of 18-8 Stainless Steels. This alloy posses excellent resistance to oxidation as well as high tensile and creep strengths at elevated temperatures. It is more resistant to marine atmospheres than Type 304. It is generally considered as a heat-resisting alloy.

Chemistry Typical

Carbon: 0.08 max
Manganese: 2.00 max
Silicon: 1.00 max
Chromium: 22.00- 24.00
Nickel: 12.00- 15.00
Molybdenum: 0.75 max
Phosphorus: 0.040 max .
Sulphur: 0.030 max
Copper: 0.75 max
Iron: Balance

Physical Properties

Density: 0.289 lbs/in^3 9.01 g/cm^3

Electrical Resistivity: microhm-in (microhm-cm):
68 °F (20 °C): 30.7 (78.0)

Specific Heat: BTU/lb/°F (kJ/kg•K):
32 - 212 °F (0 - 100 °C): 0.12 (0.50)

Thermal Conductivity: BTU/hr/ft²/ft/°F, (W/m•K)
At 212 °F (100 °C) – 9.0 (15.6)
At 932 °F (500 °C) – 10.8 (18.7)

Mean Coefficient of Thermal Expansion: in/in/°F (µm/m•K)
32 – 212 °F (0 – 100 °C) – 8.3 x 10^{-6} (14.9)
32 – 600 °F (0 – 315 °C) – 9.3 x 10^{-6} (16.7)
32 – 1000 °F (0 – 538 °C) –9.6 x 10^{-6} (17.3)
32 – 1200 °F (0 – 649 °C) –10.0 x 10^{-6} (18.0)

Modulus of Elasticity: ksi (MPa)
29 x 10^3 (200 x 10^3) in tension
11.2 x 10^3 (78 x 10^3) in torsion

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

Melting Range: 2550 - 2590 °F (1399 - 1454 °C)

Forms

Coil – Strip, Foil, Ribbon
Wire – Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Typical

Ultimate Tensile Strength: 75 KSI min (620 MPa min)
Yield Strength (0.2% Offset): 30 KSI min (205 MPa min)
Elongation: 40% min
Hardness: Rb 95 max

Tempered:

309 can be supplied in a rolled tempered condition. Contact Ulbrich Technical Service for details.

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.*

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 wire finishes.*

Cold Forming

Type 309 can be rolled formed, stamped and drawn readily. In-process annealing is usually required to reduce hardness and increase ductility.

Heat Treatment

Type 309 can only be hardened by cold working.

Welding

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