316L STAINLESS STEEL, UNS S31603
Strip, Coil, Foil, Wire, AMS 5507, ASTM A666

Applications
Chemical Screens, Storage and Transportation Tanks, Chemical Tubing, Food Processing, Oil Refineries, Paper Mill Processing, Pharmaceutical, Gas Scrubbers, Photographic Handling, Textile Industry Parts, Marine Applications and Flexible Metal Hose

Description
Type 316L is a low carbon austenitic chromium-nickel stainless steel with corrosion resistance similar to type 316 but with resistance to intergranular corrosion following welding.

Chemistry Typical
Carbon: 0.030 max
Manganese: 2.00 max
Silicon: 1.00 max
Chromium: 16.00-18.00
Nickel: 10.00-14.00
Molybdenum: 2.00-3.00
Phosphorus: 0.040 max
Sulfur: 0.030 max
Copper: 0.75
Iron: Balance

Physical Properties
Density: 0.29 lbs/in³ 7.99 g/cm³
Electrical Resistivity: microhm-in (microhm-cm): 68 °F (20 °C): 29.4 (74.0)
Specific Heat: BTU/lb/°F (kJ/kg•K):
32 - 212 °F (0 - 100 °C): 0.12 (0.50)
316L STAINLESS STEEL

Thermal Conductivity: BTU/hr/ft²/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): 8.9 x 10⁻⁶ (16.0)
32 - 600 °F (0 – 315 °C): 9.0 x 10⁻⁶ (16.2)
32 - 1000 °F (0 – 538 °C): 9.7 x 10⁻⁶ (17.5)
32 - 1200 °F (0 – 649 °C): 10.3 x 10⁻⁶ (18.5)
32 - 1500 °F (0 – 871 °C): 11.1 x 10⁻⁶ (18.5)

Modulus of Elasticity: ksi (MPa)
28 x 10³ (193 x 10³) in tension
11.2 x 10³ (77 x 10³) in torsion

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

Melting Range: 2500 - 2590 °F (1371 - 1421 °C)

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

Mechanical Properties at Room Temperature

Properties: Annealed
Ultimate Tensile Strength: 70 KSI min (485 MPa min)
Yield Strength (0.2% Offset): 25 KSI min (170 MPa min)
Elongation: 40% min
Hardness: Rb 95 max

Properties: Tempered

1/16 Hard
Ultimate Tensile Strength: 85 KSI min (585 MPa min)
Yield Strength: (0.2% Offset) 45 KSI min (310 MPa min)
Elongation: 35% Min

1/8 Hard
Ultimate Tensile Strength: 100 KSI min (690 MPa min)
Yield Strength: (0.2% Offset) 55 KSI min (380 MPa min)
Elongation: 25% Min

1/4 Hard
Ultimate Tensile Strength: 125 KSI min (860 MPa min)
Yield Strength: (0.2% Offset) 75 KSI min (515 MPa min)
Elongation: 8% Min
Tempered:
Type 316L can be cold rolled to achieve the temper properties required by specific customers and/or manufacturing requirements. For tempers 1/2 hard or above consult Ulbrich Technical Services for more 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 in 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 wire finishes.

Cold Forming
Type 316L can be readily formed and drawn.

Heat Treatment
Type 316L is non hardenable by heat treatment.

Welding
Type 316L is weldable by common fusion and resistance methods.
For best results refer to: SSINA’s “Welding of Stainless Steels and Other Joining Methods”.

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