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# 301SI STAINLESS STEEL, UNS S30116

## Strip, Coil, Foil & Wire, ASTM A666, ASTM A240

### Applications

Springs, Fasteners, Washers, Zippers, Clips, Clamps, Computer Parts, Stampings

### Description

Type 301Si is an austenitic stainless steel capable of attaining very high strengths while maintaining ductility through cold working. It is not hardenable by heat treatment. Type 301Si is non magnetic in the annealed condition and becomes increasingly magnetic when cold worked. 301Si has an increased silicon content over standard 301 and is typically used for “super” high strength applications. The extra silicon allows for even better ductility at high tensile strengths than standard 301. Both are produced to ASTM A666.

### Chemistry Typical

Carbon: 0.15 max  
Manganese: 2.00 max  
Silicon: 1.3 max  
Chromium: 16.00-18.00  
Nickel: 6.00-8.00  
Molybdenum: 0.75 max  
Phosphorus: 0.040 max  
Sulfur: 0.030 max  
Copper: 0.75 max  
Nitrogen: 0.10 max  
Iron: Balance

### Physical Properties

Density: 0.285 lbs/in<sup>3</sup> 7.88 g/cm<sup>3</sup>

Electrical Resistivity: microhm-in (microhm-cm): 68 °F (20 °C): 27.4 (69.5)

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

Thermal Conductivity: BTU/hr/ft<sup>2</sup>/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) –  $9.4 \times 10^{-6}$  (16.9)  
32 – 600 °F (0 - 315 °C) –  $9.9 \times 10^{-6}$  (17.8)  
32 – 1000 °F (0 - 538 °C) –  $10.2 \times 10^{-6}$  (18.4)  
32 – 1200 °F (0 - 649 °C) –  $10.4 \times 10^{-6}$  (18.7)

Modulus of Elasticity: ksi (MPa)  
 $28.0 \times 10^3$  ( $193 \times 10^3$ ) in tension  
 $11.2 \times 10^3$  ( $78 \times 10^3$ ) in torsion

Magnetic Permeability: H = 200 Oersteds: Annealed < 1.02

Melting Range: 2250 – 2590 °F (1399 – 1421 °C)

## Forms

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

## Mechanical Properties at Room Temperature

### Properties: Typical

Ultimate Tensile Strength: 75 KSI min (515 MPA min)  
Yield Strength: (0.2% offset): 30 KSI min (205 MPA min)  
Elongation: 40% Min  
Hardness: B92 or Equiv. Max

### Tempered Condition

301Si is available in the tempered condition. Consult Ulbrich Technical Services for properties.

## Additional Properties

### Corrosion Resistance

Refer to NACE (National Association of Corrosion Engineers) for recommendations.

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### Finishes – Strip & Foil

# 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.*

### Finishes – Wire

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 finishes.*

### Cold Forming

301Si is ductile (addition of Silicon makes it more ductile than standard 301) and easily formed but severe forming or multiple operations may require intermediate anneals due to its high work hardening rate. The higher silicon content makes it more ductile at higher strengths than 301 and can be preferred in spring applications.

### Heat Treatment

301Si 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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