

## Description

Stainless Steel Grade 321H/1.4878 is a high-carbon version of 321 stainless steel, specifically designed to improve creep resistance and for higher strength at elevated temperatures. It is an austenitic chromium-nickel stainless steel with titanium added to stabilize the structure against the formation of chromium carbides. The higher carbon content in 321H increases its high-temperature strength, making it suitable for applications involving prolonged exposure to temperatures in the 800-1500°F (427-816°C) range.

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## Chemical Composition

- Chromium (Cr): 17.0 - 19.0%
  - Nickel (Ni): 9.0 - 12.0%
  - Carbon (C): 0.04 - 0.10%
  - Manganese (Mn):  $\leq 2.0\%$
  - Silicon (Si):  $\leq 0.75\%$
  - Phosphorus (P):  $\leq 0.045\%$
  - Sulfur (S):  $\leq 0.030\%$
  - Titanium (Ti):  $4 * C - 0.70\%$
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## Mechanical Properties

- Tensile Strength: 515 MPa (75 ksi) min
  - Yield Strength: 205 MPa (30 ksi) min
  - Elongation: 40% min
  - Hardness: 217 HB max
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## Thermal and Physical Properties

- Density: 7.9 g/cm<sup>3</sup>
- Melting Range: 1400 - 1425°C (2550 - 2597°F)
- Specific Heat: 500 J/kg·K

- Thermal Conductivity: 16.0 W/m·K at 100°C
  - Coefficient of Thermal Expansion: 17.2  $\mu\text{m}/\text{m}\cdot\text{K}$  (0-100°C)
  - Electrical Resistivity: 0.72  $\mu\Omega\cdot\text{m}$  at 20°C
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## Other Designations

- ASTM: A276, A479
  - DIN: 1.4878
  - UNS: S32109
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## Fabrication and Heat Treatment

- Fabrication: Grade 321H/1.4878 can be easily welded and processed by standard shop fabrication practices. Care should be taken to ensure the material does not become sensitized during welding.
  - Heat Treatment: Solution treatment (annealing) should be carried out at 950-1120°C (1742-2048°F) followed by rapid cooling. This grade cannot be hardened by thermal treatment.
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## Applications

- Oil and Gas: Piping, tubing, and other components exposed to high temperatures and corrosive environments.
  - Aerospace: Engine components and exhaust systems requiring high strength at elevated temperatures.
  - Chemical Processing: Equipment and components subjected to high temperatures and harsh chemicals.
  - Thermal Expansion: Bellows and expansion joints.
  - Petrochemical: Refining equipment and catalytic converters.
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## Supplied Forms

- Bars: Round, square, hexagonal, and flat bars.

- Wires
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## Features

- High-Temperature Strength: Excellent strength at elevated temperatures, making it suitable for high-heat applications.
- Corrosion Resistance: Good resistance to oxidation and corrosion in a wide range of corrosive environments.
- Stabilized Composition: Titanium addition prevents carbide precipitation, ensuring material stability.
- Formability and Weldability: Easily fabricated and welded, maintaining strength and corrosion resistance in welded structures.
- Creep Resistance: Improved resistance to creep deformation, making it ideal for high-stress applications at high temperatures.

