

Description

Stainless Steel Grade **318Si/1.4462** is an austenitic stainless steel alloy characterized by its high chromium and nickel content, with added silicon to enhance its mechanical properties and resistance to oxidation. The silicon addition improves the material's high-temperature strength and makes it suitable for applications requiring superior corrosion resistance and durability. This grade is often used in demanding environments where resistance to oxidation and high strength are critical.

Chemical Composition

- **Chromium (Cr):** 19.0 - 21.0%
 - **Nickel (Ni):** 13.0 - 15.0%
 - **Silicon (Si):** 0.8 - 1.2%
 - **Manganese (Mn):** 2.0 - 3.0%
 - **Carbon (C):** ≤ 0.08%
 - **Phosphorus (P):** ≤ 0.045%
 - **Sulfur (S):** ≤ 0.030%
 - **Nitrogen (N):** ≤ 0.10%
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Mechanical Properties

- **Tensile Strength:** 620 MPa (90 ksi) minimum
 - **Yield Strength:** 310 MPa (45 ksi) minimum
 - **Elongation:** 40% minimum
 - **Hardness:** 220 HV (Vickers Hardness)
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Thermal & Physical Properties

- **Density:** 8.0 g/cm³ (0.29 lb/in³)
 - **Melting Point:** Approximately 1400 - 1450°C (2552 - 2642°F)
 - **Thermal Conductivity:** 16.2 W/m·K (1.13 BTU-in/hr-ft²·°F) at 100°C (212°F)
 - **Specific Heat:** 500 J/kg·K (0.12 BTU/lb·°F)
 - **Coefficient of Thermal Expansion:** 16.0 x 10⁻⁶ /°C (8.9 x 10⁻⁶ /°F)
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Other Designations

- **UNS Number:** S31808
- **DIN:** 1.4462
- **AFNOR:** Z6CNDU17-12
- **JIS:** SUS318L

Fabrication and Heat Treatment

- **Cold Working:** Excellent. Grade 318Si can be cold worked using standard techniques, including rolling, bending, and stamping.
 - **Welding:** Good. Can be welded using conventional methods such as TIG and MIG welding. Preheating and post-weld heat treatments may be required to avoid potential issues such as cracking.
 - **Heat Treatment:** Annealing at temperatures of 1020 - 1150°C (1870 - 2100°F) followed by rapid cooling to restore its corrosion resistance and relieve internal stresses.
 - **Machinability:** Moderate. The addition of silicon can slightly affect machinability compared to other stainless steels.
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Applications

- **Chemical Processing:** Components and equipment used in chemical environments, particularly those involving high temperatures and corrosive substances.
 - **Marine Environments:** Parts and fittings exposed to seawater and other saline conditions.
 - **Oil & Gas:** Equipment and components in extraction and processing facilities, where resistance to oxidation and high strength are essential.
 - **Pulp and Paper:** Machinery and equipment that handle aggressive chemicals and high temperatures.
 - **Power Generation:** Parts used in turbines and other high-temperature applications.
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Supplied Forms

- **Bars**
 - **Fittings**
 - **Wires**
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Features

- **High Corrosion Resistance:** Provides excellent resistance to oxidation and corrosion, especially in harsh environments.
- **High Strength:** Offers superior tensile and yield strength, suitable for demanding applications.
- **Enhanced Heat Resistance:** Silicon content improves resistance to high temperatures, making it ideal for elevated temperature applications.
- **Good Weldability:** Can be welded using conventional methods with appropriate preparation and post-weld treatments.
- **Durability:** Long-lasting performance in extreme environments, reducing the need for frequent replacements.

