

Description

Stainless Steel Grade 446/1.4828 is a high-chromium ferritic stainless steel known for its excellent resistance to oxidation and high-temperature environments. It is commonly used in applications requiring resistance to severe oxidation, such as in combustion environments and high-temperature applications. Its high chromium content provides superior resistance to oxidation and corrosion, making it suitable for use in extreme conditions.

Chemical Composition

- Chromium (Cr): 23.0 - 27.0%
 - Nickel (Ni): $\leq 0.75\%$
 - Manganese (Mn): $\leq 1.00\%$
 - Silicon (Si): 1.0 - 1.5%
 - Carbon (C): $\leq 0.20\%$
 - Phosphorus (P): $\leq 0.040\%$
 - Sulfur (S): $\leq 0.030\%$
 - Nitrogen (N): $\leq 0.25\%$
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Mechanical Properties

- Tensile Strength: 310 MPa (45,000 psi)
 - Yield Strength: 175 MPa (25,000 psi)
 - Elongation: 25% (in 50 mm)
 - Hardness: 220 HB (Brinell Hardness)
 - Impact Toughness: Moderate impact resistance
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Thermal & Physical Properties

- Density: 7.8 g/cm³
- Thermal Conductivity: 25 W/m·K (at 100°C)

- Specific Heat Capacity: 460 J/kg·K
 - Melting Point: Approximately 1450°C (2642°F)
 - Thermal Expansion: 10.4×10^{-6} /K (0°C to 100°C)
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Other Designations

- DIN: X20Cr25
 - UNS: S44600
 - JIS: SUS 446
 - DIN: 1.4828
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Fabrication and Heat Treatment

- Welding: Generally weldable using conventional techniques; however, pre-heating and post-weld heat treatments may be required to avoid sensitization and to improve toughness.
 - Machining: Machinability is lower compared to austenitic stainless steels. Carbide tools are recommended for machining.
 - Heat Treatment: Annealing can be performed at temperatures between 1050°C and 1150°C (1922°F and 2102°F) to relieve stresses and improve mechanical properties. Avoid rapid cooling after heat treatment to prevent embrittlement.
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Applications

- Industrial Furnaces: Components exposed to high temperatures and corrosive environments.
 - Combustion Chambers: Parts subjected to severe oxidation and high-temperature environments.
 - Heat Exchangers: For use in harsh chemical environments.
 - Exhaust Systems: Parts in high-temperature exhaust systems in various industries.
 - Gas Turbines: Components in turbines that operate under high temperatures.
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Supplied Forms

- Bars
 - Wires
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Features

- High Oxidation Resistance: Excellent resistance to oxidation in high-temperature environments.
- Good Corrosion Resistance: Superior resistance to corrosion compared to many other ferritic stainless steels.
- Thermal Stability: Maintains its properties at elevated temperatures, making it suitable for high-heat applications.
- High Chromium Content: Provides improved resistance to scaling and high-temperature oxidation.
- Durability: Provides long-term durability in severe environments.

