Description

Stainless Steel Grade 321/1.4541 is an austenitic stainless steel that is stabilized with titanium. It is designed to resist intergranular corrosion and maintain strength and toughness at elevated temperatures. This grade is particularly useful in applications where exposure to higher temperatures is a concern. Grade 321 provides excellent resistance to oxidation and corrosion in a variety of environments, making it a preferred material for many industrial and aerospace applications.

Chemical Composition

- Chromium (Cr): 17.0 - 19.0%
- Nickel (Ni): 9.0 - 12.0%
- Titanium (Ti): 5 × C% min (typically 0.4% - 0.6%)
- Carbon (C): ≤ 0.08%
- Manganese (Mn): ≤ 2.0%
- Silicon (Si): ≤ 1.0%
- Phosphorus (P): ≤ 0.045%
- Sulfur (S): ≤ 0.030%

Mechanical Properties

- Tensile Strength: 515 - 750 MPa
- Yield Strength: 205 MPa
- Elongation: 40% (in 50 mm)
- Hardness: Max 201 HB

Thermal & Physical Properties

- Density: 7.9 g/cm³
- Melting Point: 1400 - 1450°C
- Thermal Conductivity: 16.2 W/m·K

- Specific Heat Capacity: 500 J/kg·K (at 25°C)
- Coefficient of Thermal Expansion: 16.0 x 10^-6 /K (20°C - 100°C)

Other Designations

- UNS Number: S32100
- AISI/SAE: 321
- DIN: 1.4541
- JIS: SUS321

Fabrication and Heat Treatment

- Annealing: Heat to 850 - 1050°C, followed by cooling in air or water. This process relieves stress and stabilizes the material.
- Welding: Grade 321 can be welded using standard techniques, with preheating and post-weld heat treatments often recommended to ensure optimal properties.
- Machining: It can be machined using conventional methods; however, its hardness may necessitate the use of carbide tools or advanced techniques.
- Forming: Good formability in both cold and hot conditions, making it suitable for a variety of shapes and products.

Applications

- Aerospace: Components subjected to high temperatures, such as exhaust systems and jet engine parts.
- Chemical Processing: Equipment and piping in corrosive environments.
- Oil & Gas: Parts in equipment exposed to high temperatures and corrosive environments.
- Power Generation: Heat exchangers and furnace components.
- Automotive: Exhaust systems and other high-temperature applications.

Supplied Forms

- Bars
- Coils

Features

- Stabilized Composition: Titanium addition prevents carbide precipitation and enhances resistance to intergranular corrosion.
- High Temperature Resistance: Maintains strength and toughness in high-temperature environments.
- Corrosion Resistance: Good resistance to oxidation and corrosion in many environments.
- Fabricability: Easily welded and formed, suitable for various applications.
- Durability: Long-term durability in demanding applications.