

329-Technical Specification

1. Product Description:- Duplex Stainless Steel 329 is a two-phase alloy containing both austenitic and ferritic microstructures. This dual-phase structure provides excellent corrosion resistance, high strength, and good weldability, making it ideal for use in challenging environments such as marine and chemical applications.

2. Chemical Composition:-

Element	Composition (Weight %)
Chromium (Cr)	23.0 - 28.0
Nickel (Ni)	2.0 - 5.0
Molybdenum (Mo)	0.75 - 2.0
Manganese (Mn)	2.0 max
Silicon (Si)	1.0 max
Carbon (C)	0.08 max
Nitrogen (N)	0.20 max
Phosphorus (P)	0.04 max
Sulfur (S)	0.03 max
Iron (Fe)	Balance

3. Mechanical Properties:-

Property	Value
Tensile Strength (UTS)	620 MPa (90 ksi) min
Yield Strength (YS)	450 MPa (65 ksi) min
Elongation	25% min
Hardness (Brinell)	260 max
Impact Energy	Good toughness at low temperatures

4. Physical Properties:-

Property	Value
Density	7.8 g/cm ³
Melting Point	1350 - 1400°C (2462 - 2552°F)
Thermal Conductivity	15 W/m·K at 20°C

Specific Heat Capacity	500 J/kg·K
Electrical Resistivity	0.85 $\mu\Omega\cdot\text{m}$
Modulus of Elasticity	200 GPa

5. Heat Treatment:-

- Solution Annealing
 - Temperature: 1020°C - 1100°C (1868°F - 2012°F)
 - Cooling: Rapid quenching (water or air).
 - Purpose: Restore ferrite-austenite balance, improve corrosion resistance, and relieve stresses.
- Stress Relieving
 - Temperature: 300°C - 600°C (572°F - 1112°F).
 - Cooling: Air cooling.
 - Purpose: Reduce residual stresses and minimize stress corrosion cracking risk.
- Avoid Harmful Phases
 - Critical Range: 600°C - 950°C (1112°F - 1742°F).
 - Avoid prolonged exposure to prevent sigma phase and carbide formation.
- Post-Weld Heat Treatment (PWHT)
 - Temperature: 1020°C - 1100°C (1868°F - 2012°F).
 - Cooling: Rapid quenching to restore properties after welding.
- Service Temperature
 - Max Operating Temp: 300°C (572°F).
 - Performs well at cryogenic temperatures.

6. Applications:-

- **Marine Industry:**Used in seawater systems, heat exchangers, and shipbuilding due to its corrosion resistance.
- **Chemical Processing:**Ideal for tanks, piping, and reactors exposed to aggressive chemicals.
- **Oil and Gas Industry:**Suitable for offshore drilling components, pipelines, and equipment in chloride environments.
- **Pulp and Paper Industry:**Used in digesters, bleaching equipment, and other high-corrosion areas.

7. Corrosion Resistance:-

- **Pitting and Crevice Corrosion:**
Resistant to pitting and crevice corrosion due to high chromium and molybdenum content.
- **Stress Corrosion Cracking (SCC):**
Excellent resistance to stress corrosion cracking, particularly in chloride-rich environments.