

Alloy F53-Technical Specification

1. Product Description:- Alloy F53, also known as UNS S32750, is a super duplex stainless steel with high strength and excellent corrosion resistance. Its dual-phase structure (50% austenite and 50% ferrite) provides superior resistance to pitting, crevice corrosion, and stress-corrosion cracking in aggressive environments, especially those containing chlorides. It is widely used in chemical processing, marine, and oil & gas applications.

2. Chemical Composition:-

Element	Percentage (%)
Chromium (Cr)	24.0–26.0
Nickel (Ni)	6.0–8.0
Molybdenum (Mo)	3.0–5.0
Nitrogen (N)	0.24–0.32
Manganese (Mn)	1.2 max
Silicon (Si)	0.8 max
Carbon (C)	0.03 max
Phosphorus (P)	0.035 max
Sulfur (S)	0.02 max
Iron (Fe)	Balance

3. Mechanical Properties:-

Property	Value
Tensile Strength	~116 ksi (800 MPa)
Yield Strength (0.2%)	~80 ksi (550 MPa)
Elongation	~15–25%
Hardness (Rockwell)	~C25–C32

4. Physical Properties:-

Property	Value
Density	7.8 g/cm ³
Melting Range	~1350°C (2462°F)
Thermal Conductivity	~14 W/m·K (at 20°C)

Electrical Resistivity	~0.85 $\mu\Omega\cdot\text{m}$ (at 20°C)
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5. Heat Treatment: - **Solution Annealing:** Heat to 1020–1100°C (1868–2012°F) and rapidly quench to retain a balanced ferrite-austenite microstructure.

6. Applications:-

- **Marine Industry:** Offshore platforms, subsea components, and seawater handling systems.
- **Chemical Processing:** Heat exchangers, pressure vessels, and storage tanks.
- **Oil & Gas:** Piping, valves, pumps, and risers.
- **Desalination Plants:** High-pressure piping and brine heaters.

7. Corrosion Resistance:-

- **Pitting Resistance:** Excellent due to high chromium, molybdenum, and nitrogen content (PREN ≥ 42).
- **Stress-Corrosion Cracking:** Highly resistant, especially in chloride-rich environments.
- **General Corrosion:** Superior resistance to both oxidizing and reducing environments.