

## F51 Technical Specification

**1. Product Description:-** F51 is a duplex stainless steel grade that combines high strength and excellent corrosion resistance, making it ideal for demanding applications, especially in marine, chemical, and oil & gas industries. It has a balanced microstructure of ferrite and austenite, providing superior mechanical properties and resistance to stress corrosion cracking.

### 2. Chemical Composition:-

Element	Composition
Chromium (Cr)	21.0 - 23.0
Nickel (Ni)	4.5 - 6.5
Molybdenum (Mo)	2.5 - 3.5
Manganese (Mn)	Max 2.0
Silicon (Si)	Max 1.0
Carbon (C)	Max 0.03
Nitrogen (N)	0.08 - 0.20
Phosphorus (P)	Max 0.03
Sulfur (S)	Max 0.02
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)	Max 290 HB
Impact Toughness	High, even at low temperatures

### 4. Physical Properties:-

Property	Value
Density	7.8 g/cm <sup>3</sup>
Melting Point	1350°C - 1400°C (2462°F - 2552°F)
Thermal Conductivity	19 W/m·K at 20°C
Electrical Resistivity	0.8 μ

**5. Heat Treatment:-** Solution Annealing: Heat to 1020°C - 1100°C (1868°F - 2012°F) and quench rapidly. Restores duplex structure and corrosion resistance.

Avoidance of Critical Temperatures: Prevent exposure to 475°C - 900°C (887°F - 1652°F) to avoid embrittlement or sigma phase formation.

## **6. Applications:-**

- Marine: Offshore platforms, seawater systems, and propellers.
- Oil & Gas: Pipelines, pressure vessels, and heat exchangers.
- Chemical Processing: Storage tanks, agitators, and reactors.
- Desalination Plants: Piping and pumps for saltwater applications.

## **7. Corrosion Resistance:-**

- Excellent resistance to pitting, crevice corrosion, and stress corrosion cracking, especially in chloride-rich environments.
- Performs well in both oxidizing and reducing media.