Inconel 718 - Technical Specification

1. Product Description:-

Inconel 718 is a high-strength, corrosion-resistant nickel-chromium alloy designed for use at temperatures ranging from cryogenic to 700°C (1290°F). It is widely utilized in aerospace, nuclear reactors, and gas turbines due to its excellent mechanical properties and good weldability without post-weld cracking.

2.Chemical Composition:-

Element	Percentage (%)
Nickel (Ni)	50.0–55.0
Chromium (Cr)	17.0–21.0
Iron (Fe)	Balance
Molybdenum (Mo)	2.8–3.3
Niobium (Nb) + Tantalum (Ta)	4.75–5.5
Titanium (Ti)	0.65–1.15
Aluminum (Al)	0.2–0.8
Cobalt (Co)	≤1.0
Manganese (Mn)	≤0.35
Silicon (Si)	≤0.35
Carbon (C)	≤0.08
Sulfur (S)	≤0.015
Phosphorus (P)	≤0.015
Boron (B)	≤0.006

3. Mechanical Properties:-

Property	Value
Tensile Strength	~180 ksi (1240 MPa)
Yield Strength (0.2%)	~150 ksi (1035 MPa)
Elongation	12–15%
Hardness (Rockwell)	~36 HRC

4.Physical Properties:-

Property	Value
Density	8.19 g/cm^3
Melting Range	1260–1336°C (2300–2436°F)
Thermal Conductivity	~11.2 W/m·K (at 20°C)
Electrical Resistivity	~1.25 μΩ·m (at 20°C)

4. Heat Treatment:- Inconel 718 achieves its superior mechanical properties through precipitation hardening. Heat treatment processes include solution annealing at 980°C (1795°F) followed by aging at lower temperatures to form γ" and γ' phases, enhancing strength.

6. Applications:-

- **Aerospace**: Jet engines, turbine blades, and afterburners.
- **Energy**: Power generation turbines, nuclear reactors.
- **Oil & Gas**: Downhole tubing, valves, and seals.
- **Chemical Industry**: Pumps, heat exchangers, and chemical processing equipment.

7. Corrosion Resistance:-

- Excellent resistance to pitting and crevice corrosion in chloride-containing environments.
- Outstanding oxidation resistance at high temperatures.
- Resists stress-corrosion cracking under various conditions.