

## **Nimonic 90 - Technical Specification**

- Product Description:-** Nimonic 90 is a nickel-chromium-cobalt-based superalloy reinforced with titanium and aluminum. It is specifically designed for high-strength applications in extreme environments, offering excellent oxidation resistance, creep strength, and mechanical properties at elevated temperatures. It is widely used in aerospace, power generation, and automotive industries.

### **1. 2. Chemical Composition:-**

Element	Percentage (%)
Nickel (Ni)	53.0–57.0
Chromium (Cr)	18.0–21.0
Cobalt (Co)	15.0–21.0
Titanium (Ti)	2.0–3.0
Aluminum (Al)	1.0–1.8
Iron (Fe)	1.5 max
Manganese (Mn)	1.0 max
Silicon (Si)	1.0 max
Carbon (C)	0.08–0.15
Boron (B)	0.003–0.02
Zirconium (Zr)	0.05–0.15
Sulfur (S)	0.015 max

### **3. Mechanical Properties:-**

Property	Value
Tensile Strength	~140 ksi (965 MPa)
Yield Strength (0.2%)	~100 ksi (690 MPa)
Elongation	15–25%
Hardness (Rockwell)	~B95

## 4. Physical Properties:-

Property	Value
Density	8.18 g/cm <sup>3</sup>
Melting Range	1315–1370°C (2399–2498°F)
Thermal Conductivity	~11.3 W/m·K (at 20°C)
Electrical Resistivity	~1.25 μΩ·m (at 20°C)

**5. Heat Treatment :-** • **Solution Annealing:** 1080–1120°C (1976–2048°F), followed by rapid air cooling.

• **Aging:** Aged at 700–750°C (1292–1382°F) to precipitate strengthening phases ( $\gamma'$  and  $\gamma''$ ) and enhance mechanical properties.

- **6. Applications:-** • **Aerospace:** Turbine blades, discs, and combustion chamber components.
- **Power Generation:** Gas turbines, steam turbines, and high-temperature components.
- **Automotive:** Exhaust valves and turbocharger components for high-performance engines.
- **Nuclear Industry:** High-temperature structural components.

7. **7. Corrosion Resistance:- Corrosion and Oxidation Resistance:**

- **Oxidation Resistance:** Excellent up to 920°C (1688°F), making it ideal for high-temperature environments.
- **Creep Resistance:** Outstanding resistance to creep and stress-related deformation.
- **General Corrosion:** Good resistance to scaling and general atmospheric corrosion.