

Monel 400 - Technical Specification

1. Product Description:-

Monel 400 is a versatile nickel-copper alloy with excellent resistance to various corrosive environments. It offers high strength, good weldability, and is non-magnetic. Commonly used in marine, chemical, and industrial applications, it performs well in harsh conditions, such as seawater and acidic or alkaline environments.

2. Chemical Composition (by weight):-

Property	Value
Tensile Strength	70-85 ksi (483-586 MPa)
Yield Strength (0.2% Offset)	25-50 ksi (172-345 MPa)
Elongation	20-40%
Hardness (Rockwell)	B75-B85

3. Mechanical Properties:-

Element	Percentage (%)
Nickel (Ni)	63.0 min
Copper (Cu)	28.0-34.0
Iron (Fe)	2.5 max
Manganese (Mn)	2.0 max
Carbon (C)	0.3 max
Silicon (Si)	0.5 max
Sulfur (S)	0.024 max

4. Heat Treatment:- Monel 400 does not undergo hardening through heat treatment. It can be annealed to enhance its mechanical properties by heating to 926–1038°C (1700–1900°F) and then cooling at a controlled rate. This improves ductility and relieves internal stresses.

5. Physical Properties:-

Property	Value
Density	8.80 g/cm ³
Melting Range	1300-1350°C (2370-2460°F)
Thermal Conductivity	21.8 W/m·K (at 20°C)

Electrical Resistivity	0.511 $\mu\Omega\cdot\text{m}$ (at 20°C)
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6. Applications:-

- **Marine Industry:** Pump shafts, propeller shafts, seawater valves.
- **Chemical Industry:** Heat exchangers, pressure vessels, chemical processing equipment.
- **Oil & Gas:** Pumps, piping, and offshore platforms.
- **Aerospace:** Fuel tanks and exhaust systems.
- **Electrical Industry:** Springs, connectors, and sensors.

7. Corrosion Resistance:-

- **Seawater Resistance:** Excellent resistance to saltwater and brine solutions, making it ideal for marine applications.
- **Acid Resistance:** Withstands hydrofluoric and sulfuric acids under reducing conditions.
- **Alkali Resistance:** Performs well in caustic environments.
- **Stress-Corrosion Cracking:** High resistance, especially in chloride-rich environments.