

Monel K 500 - Technical Specification

1. Product Description:- Monel K-500 combines the corrosion resistance of Monel alloys with the high strength and hardness achieved through aging heat treatment. It is widely used for its ability to perform well in extreme conditions such as high temperatures, corrosive environments, and high-stress situations. Monel K-500 exhibits excellent resistance to seawater, acids, alkalis, and many industrial chemicals. It is typically found in products such as valves, pumps, propellers, shafts, and fasteners.

2. Chemical Composition:-

Property	Value
Nickel (Ni)	63-70%
Copper (Cu)	28-34%
Iron (Fe)	2.5-3.5%
Manganese (Mn)	1.0-2.0%
Titanium (Ti)	0.35-0.85%
Aluminum (Al)	0.2-0.5%
Carbon (C)	0.3% max
Silicon (Si)	0.5% max
Sulfur (S)	0.01% max
Phosphorus (P)	0.03% max

3. Mechanical Properties:-

Property	Value
Tensile Strength (Ultimate)	120-150 ksi (827-1034 MPa)
Yield Strength	80-105 ksi (552-724 MPa)
Elongation (in 2 inches or 50mm)	20% min
Hardness (Rockwell B)	90-95 HRB
Modulus of Elasticity	160,000 ksi (1,103 GPa)
Poisson's Ratio	0.32

4. Physical Properties:-

Property	Value
Density	8.80 g/cm ³ (0.318 lb/in ³)
Melting Point	1300-1350°C (2372-2462°F)
Thermal Conductivity	27 W/m·K at 100°C

Specific Heat Capacity	0.43 J/g·K
Electrical Resistivity	0.50 $\mu\Omega\cdot\text{cm}$ at 20°C

5. Heat Treatment:-

- **Solution Annealing:** Heat the material to 1121-1204°C (2050-2200°F) for 1 to 2 hours and then air-cool.
- **Aging:** After solution annealing, Monel K-500 is aged at temperatures between 510-620°C (950-1150°F) for 2 to 8 hours to develop the desired mechanical properties and hardness.

6. Applications:-

Monel K-500 is widely used in applications where high strength and resistance to corrosion are crucial. It is commonly found in the following sectors:

- **Marine Industry:** Propellers, pump shafts, seawater valves, and other parts exposed to seawater.
- **Aerospace and Defense:** Components in aircraft and missile systems that are exposed to aggressive environments.
- **Chemical Processing:** Valves, pumps, and other equipment handling corrosive chemicals.
- **Oil & Gas:** Parts in turbines, compressors, and pumps that need resistance to high temperatures and corrosive environments.

7. Corrosion Resistance:-

Monel K-500 offers excellent resistance to a variety of corrosive environments:

- **Seawater:** Outstanding resistance to seawater and marine atmospheres.
- **Acids:** Resistant to sulfuric acid, hydrochloric acid, and other aggressive chemicals.
- **Alkalis:** Good resistance to alkalis and alkaline salts.
- **Oxidation:** Excellent resistance to oxidation at high temperatures.
- **Stress Corrosion Cracking:** Offers significant resistance to stress corrosion cracking in chloride environments, unlike many other alloys.
- **Localized Corrosion:** While resistant to most forms of corrosion, Monel K-500 can be susceptible to localized pitting in highly concentrated acids, especially hydrochloric acid.