



### Other common names: Alloy K500

Monel K-500 is a precipitation-hardening nickel-copper alloy that consolidates the magnificent corrosion resistance characteristic for Monel 400 with the additional point of preference of more noteworthy strength and hardness. These intensified properties, strength and hardness, are acquired by adding aluminium and titanium to the nickel-copper base and by thermal processing used to impact precipitation, usually called age hardening or aging. At the point when in the age-hardening condition, Monel K-500 has a more prominent propensity toward stress corrosion cracking splitting in a fewer situations than Monel 400. Alloy K-500 has around three times the yield strength and twofold the tensile when contrasted with alloy 400. In addition, it can be further reinforced by cold working preceding precipitation hardening. The strength of this nickel steel alloy is kept up to 1200° F however, stays ductile and extremely down to temperatures of 400° F. Monel K-500 melting range is 2400-2460° F. This nickel alloy is spark resistant and non-magnetic to -200° F. Be that as it may, it is conceivable to build up a magnetic layer on the surface of the material during handling. Aluminium and copper might be specifically oxidized during heating, leaving a magnetic nickel rich film all things considered. Pickling or bright dipping in acid can evacuate this magnetic film and restore the non-magnetic properties.

### Applications

- Sour-gas service applications
- Oil and gas production safety lifts and valves
- Oil-well tools and instruments like drill collars
- Oil well industry
- Doctor blades and scrapers
- Chains, cables, springs, valve trim, fasteners for marine service
- Pump shafts and impellers in marine service

### Characteristics

- Corrosion resistance in an extensive range of marine and chemical environments. From pure water to non-oxidizing mineral acids, salts and alkalis.
- Excellent resistance to high velocity sea water
- Resistant to a sour-gas environment
- Excellent mechanical properties from sub-zero temperatures up to about 480C
- Non-magnetic alloy

## Corrosion Resistant

The corrosion resistance of alloy K-500 is generously proportional to that of alloy 400 aside from that when in the age-hardened condition, nickel alloy K-500 has a more noteworthy inclination toward stress-corrosion cracking in a few situations. Monel K-500 has been observed to be resistant to a sour-gas environment. The blend of low corrosion rates in high-speed sea water and high strength make alloy K-500 especially suitable for shafts of divergent pumps in marine service. In stagnant or slow moving sea water, fouling might occur, followed by pitting but this yet these pitting backs off after a genuinely quick starting attack.

## Fabrication

Monel K-500 is promptly fabricated by the standard business methodology.

Welding alloy K-500 is best expert by the gas-tungsten-arc welding process. It is recommended that Monel K-500 be annealed when it is welded and that any weldments be pushed relieved prior to aging. Heavy machining of this alloy is best proficient when the material is in the tempered condition or hot-worked and extinguished conditioned. Age-hardened material however can be complete machined to close resilience and fine finishes. In this manner, the recommended practice is to machine somewhat larger than usual, age-harden, then complete to size. During aging, a slight lasting withdrawal happens, yet little war page happens as a result of the low temperatures and slow cooling rates included.

## Machining

The best machinability for this alloy is in the annealed condition. It might be machined in the aged condition, however the favored practice is too unpleasant machine as near completion as could be expected under the circumstances in the annealed condition. At that point aging and last machining might be finished. An extremely slight dimensional withdrawal happens after aging. Normally this alloy, in the strengthened condition, machines in a way like that of the austenitic (300 series) stainless steels.

## Forming

The alloy has very good ductility and is promptly formed in the annealed condition by standard means.

## Welding

The greater part of the standard welding methods might be utilized on this alloy. Be that as it may, it is best to weld with the alloy in the annealed condition and the completed weldments should then be stress-relief annealed. Introduction to temperatures in the age-hardening scope (900 F to 1100 F) should be evaded with the exception of when the last age-hardening treatment is to be an expert.

## Heat Treatment

The alloy might be annealed after cold working furthermore might be precipitation-hardened by an aging heat treatment.

## Forging

Forging should be done in the scope of 2100F to 1900F. Water extinguish quickly after forging.

## Hot Working

The hot work temperature scope is 2100F to 1600F. Water extinguishes promptly after hot working and don't permit to cool underneath 1600 F.

## Cold Working

The alloy has very good ductility and might be cool worked by standard means.

## Annealing

Anneal at 1900 F and water quench.

## Aging

For annealed, or marginally cold worked, material, age-hardening is done at 1125 F for 16 hours and after that furnace cooling at a rate of 15 F to 25 F for every hour down to a temperature of 900 F. Cooling rates from 900 F to room temperature is not basic. For extremely cold worked material aging should be done at 1000 F for no less than 6 hours and after that furnace cooled to 900 F at the 15 F to 25 F for every hour rate.

## Chemical Properties

C	Al	Si	S	Ti	Mn	Fe	Ni	Cu
0.18 max	2.30 - 3.15	0.5 max	0.01 max	0.35 - 0.85	1.5 max	2.0 max	63.0 min	27.0 - 33.0

## Mechanical Properties

Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
140	100	17

## Physical Properties

Properties	Units	Temperature in °C
Density	8.44 g/cm <sup>3</sup>	Room
Specific Heat	0.1 Kcal/kg.C	21°
Melting Range	1315 -1350 °C	-
Modulus of Elasticity	179 KN/mm <sup>2</sup>	Room
Electrical Resistivity	61.5 μΩ.cm	21°
Coefficient of Expansion	13.7 μm/m °C	20 - 100°
Thermal Conductivity	17.2 W/m -°K	21°

## ASTM Specifications

Sheet / Plate / Bar
B 865

## Availability

MANUFACTURING
Fasteners
Custom Machining
Custom Fabrication
Stamped Parts
Flanges

RAW MATERIALS
Bars
Sheets
Plates
-
-

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