



E STEEL SDN BHD (891338-A)

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MONEL 400 , ALLOY 400, UNS N04400, 2.4360, 2.4361

Monel 400 is a nickel-copper alloy (about 67% Ni – 23% Cu) that is resistant to sea water and steam at high temperatures as well as to salt and caustic solutions. Alloy 400 is a solid solution alloy that can only be hardened by cold working. This nickel alloy exhibits characteristics like good corrosion resistance, good weldability and high strength. A low corrosion rate in rapidly flowing brackish or seawater combined with excellent resistance to stress-corrosion cracking in most freshwaters, and its resistance to a variety of corrosive conditions led to its wide use in marine applications and other non-oxidizing chloride solutions. This nickel alloy is particularly resistant to hydrochloric and hydrofluoric acids when they are de-aerated. As would be expected from its high copper content, alloy 400 is rapidly attacked by nitric acid and ammonia systems.

Monel 400 has great mechanical properties at subzero temperatures, can be used in temperatures up to 1000° F, and its melting point is 2370-2460° F. However, alloy 400 is low in strength in the annealed condition so, a variety of tempers may be used to increase the strength.

Characteristics of Monel 400, N04400

- Resistant to seawater and steam at high temperatures
- Excellent resistance to rapidly flowing brackish water or seawater
- Excellent resistance to stress corrosion cracking in most freshwaters
- Particularly resistant to hydrochloric and hydrofluoric acids when they are de-aerated
- Offers some resistance to hydrochloric and sulfuric acids at modest temperatures and concentrations, but is seldom the material of choice for these acids
- Excellent resistance to neutral and alkaline salt
- Resistance to chloride induced stress corrosion cracking
- Good mechanical properties from sub-zero temperatures up to 1020° F
- High resistance to alkalis

Chemical Composition, %

C	Mn	S	Si	Ni	Cu	Fe
.30 max	2.00 max	.024 max	.50 max	63.0 min	28.0-34.0	2.50 max

ASTM Specifications

Pipe Smls	Pipe Welded	Tube Smls	Tube Welded	Sheet/Plate	Bar	Forging	Fitting	Wire
B165	B725	B163		B127	B164	B564	B366	



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Corrosion Resistant Monel 400, 2.4360

Alloy 400 is virtually immune to chloride ion stress corrosion cracking in typical environments. Generally, its corrosion resistance is very good in reducing environments, but poor in oxidizing conditions. It is not useful in oxidizing acids, such as nitric acid and nitrous. Nevertheless, it is resistant to most alkalis, salts, waters, food products, organic substances and atmospheric conditions at normal and elevated temperatures.

This nickel alloy is attacked in sulfur-bearing gases above approximately 700° F and molten sulfur attacks the alloy at temperatures over approximately 500° F.

Monel 400 offers about the same corrosion resistance as nickel but with higher maximum working pressures and temperatures and at a lower cost due to its superior ability to be machined.

Applications of Monel 400, N04400

- Marine engineering
- Chemical and hydrocarbon processing equipment
- Gasoline and freshwater tanks
- Crude petroleum stills
- De-aerating heaters
- Boiler feed water heaters and other heat exchangers
- Valves, pumps, shafts, fittings, and fasteners
- Industrial heat exchangers
- Chlorinated solvents
- Crude oil distillation towers

Mechanical Properties

Condition	Solution Annealed	Cold Worked	Hot Worked
Tensile Strength (Mpa)	559	686	637
0.2% Yield Strength (Mpa)	255	539	490
Elongation (%)	48	30	45
Hardness (HB)	135	110	190