

Monel® 404 Copper-Nickel Alloy



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Typical Analysis of Monel 404	
Nickel	52-57%
Carbon	.15 max.
Manganese	.10 max.
Iron	.50 max.
Sulfur	.024 max.
Silicon	.10 max.
Copper	Balance
Aluminum	.05 max.

Monel's corrosion resistance makes it ideal for marine applications such as piping systems, pump shafts, trolling wire, and strainer baskets. Some alloys are completely non-magnetic and are used for anchor cable aboard minesweepers, housings for magnetic-field measurement equipment, and have applications in the oil drilling industry. Monel is used for water and fuel tanks, and for under water applications. It is also used for propeller shafts and for keel bolts.

Characteristics of Monel

- Highly resistant to corrosion. Monel is well known as a corrosion strong, rust-resistant material. It is resistant to corrosion and acids, and some alloys can withstand a fire in pure oxygen.
- Stronger than steel
- Malleable
- Low coefficient of thermal expansion
- Highly resistant to alkalis
- It can be welded, brazed and soldered

Physical Properties	Metric	English	Comments
Density	<u>8.91 g/cc</u>	<u>0.322 lb/in³</u>	
Mechanical Properties	Metric	English	Comments
Tensile Strength @ Break	<u>483 MPa</u>	<u>70000 psi</u>	Annealed
Tensile Strength @ Yield	<u>655 MPa</u>	<u>95000 psi</u>	Stress relieved
	<u>758 MPa</u>	<u>110000 psi</u>	Hard
	<u>172 MPa</u>	<u>25000 psi</u>	Annealed
	<u>517 MPa</u>	<u>75000 psi</u>	Stress relieved
Modulus of Elasticity	<u>689 MPa</u>	<u>100000 psi</u>	Hard
	<u>169 GPa</u>	<u>24500 ksi</u>	
Poissons Ratio	0.295	0.295	
Shear Modulus	<u>65.0 GPa</u>	<u>9430 ksi</u>	
Electrical Properties	Metric	English	Comments
Electrical Resistivity	<u>0.0000500 ohm-cm</u>	<u>0.0000500 ohm-cm</u>	
Magnetic Permeability	1.0017	1.0017	200 Oerstad; Annealed and Furnace-cooled
Curie Temperature	1.0047	1.0047	at 200 Oersted; As-Forged
	<u><= -85.0 °C</u>	<u><= -121 °F</u>	As-Forged
	<u><= -79.0 °C</u>	<u><= -110 °F</u>	Annealed and Furnace-cooled
Thermal Properties	Metric	English	Comments
CTE, linear	<u>13.3 µm/m-°C</u>	<u>7.39 µin/in-°F</u>	Mean
	@Temperature 21.0 - 93.0°C	@Temperature 69.8 - 199 °F	
	<u>15.3 µm/m-°C</u>	<u>8.50 µin/in-°F</u>	Mean
	@Temperature 21.0 - 300 °C	@Temperature 69.8 - 572 °F	
	<u>16.6 µm/m-°C</u>	<u>9.22 µin/in-°F</u>	Mean
@Temperature 21.0 - 538 °C	@Temperature 69.8 - 1000 °F		
<u>17.6 µm/m-°C</u>	<u>9.78 µin/in-°F</u>	Mean	
@Temperature 21.0 - 815 °C	@Temperature 69.8 - 1500 °F		
Specific Heat Capacity	<u>0.414 J/g-°C</u>	<u>0.0989 BTU/lb-°F</u>	
Melting Point	<u>1300 °C</u>	<u>2370 °F</u>	