

MONEL® nickel-copper alloy 404 (UNS N04404) is used primarily in specialized electrical and electronic applications.

The composition of MONEL alloy 404 (see Table 1) is carefully adjusted to provide a very low Curie temperature, low permeability, and good brazing characteristics.

Table 1 - Limiting Chemical Composition, %, of MONEL Alloy 404

| | |
|----------------------------|------------|
| Nickel (plus Cobalt) | 52.0-57.0 |
| Carbon | 0.15 max. |
| Manganese | 0.10 max. |
| Iron | 0.50 max. |
| Sulfur | 0.024 max. |
| Silicon | 0.10 max. |
| Copper | Balance |
| Aluminum | 0.05 max. |

*Reference to the 'balance' of a composition does not guarantee this is exclusively of the element mentioned but that it predominates and others are present only in minimal quantities.

Physical Constants, Thermal & Mechanical Properties

Alloy 404's permeability (measured at 27°F with a field strength of 0.5 oersted) will not exceed 1.1. Because its low permeability is not significantly affected by processing and fabrication, the alloy is particularly suitable for electronic parts.

Also, much of the strength of alloy 404 is retained at out-gassing temperatures. Its thermal expansion characteristics are sufficiently close to those of many other alloys to permit the firing of composite metal tubes with negligible distortion.

Some physical constants and thermal properties of MONEL alloy 404 are shown in Table 2. Magnetic properties are in Table 3. Effect of temperature on modulus of elasticity is shown in Table 4. Figure 1 shows high-temperature tensile properties of annealed material.

Table 2 - Physical Constants and Thermal Properties of MONEL Alloy 404

| | |
|--|-------|
| Density, lb/in. ³ | 0.322 |
| g/cm ³ | 8.91 |
| Specific Heat, Btu/lb•°F, at 70°F | 0.099 |
| J/kg•°C | 414 |
| Thermal Expansion, in./in./°F x 10 ⁻⁶ | |
| 70°-200°F (21-93°C) | 7.4 |
| 70°-500°F (21-260°C) | 8.5 |
| 70°-1000°F (21-539°C) | 9.2 |
| 70°-1500°F (21-816°C) | 9.8 |
| Thermal Conductivity, Btu•in/ft ² •h•°F | 133 |
| W/m•°C | 21.0 |
| Electrical Resistivity, ohm•circ mil/ft, at 70°F | 294 |
| μΩ•m | 0.498 |

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MONEL® alloy 404



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Table 3 - Magnetic Properties of MONEL alloy 404

| Condition | Permeability at 78°F, 200 Oersted | Curie Temperature, °F |
|-----------------------------|-----------------------------------|-----------------------|
| As-Forged | 1.0047 | -121 |
| Annealed and Furnace-Cooled | 1.0017 | -110 |

Table 4 - Modulus of Elasticity of MONEL Alloy 404

| Temperature, °F | Modulus in Tension, 10 ³ ksi | Shear Modulus, 10 ³ ksi | Poisson's Ratio |
|-----------------|---|------------------------------------|-----------------|
| 78 | 24.5 | 9.44 | 0.295 |
| 100 | 24.4 | 9.44 | 0.291 |
| 200 | 24.0 | 9.25 | 0.298 |
| 300 | 23.7 | 9.10 | 0.300 |
| 400 | 23.3 | 8.95 | 0.301 |
| 500 | 23.9 | 8.79 | 0.301 |

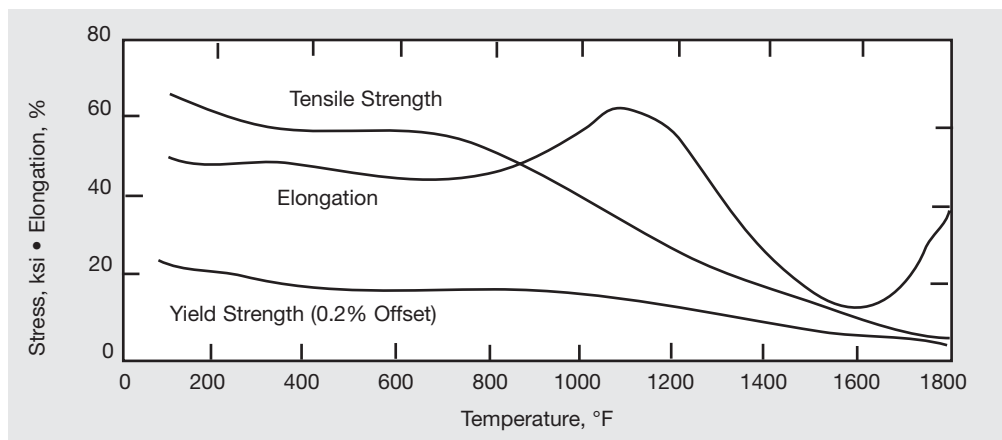


Figure 1. High-temperature tensile properties of cold-drawn MONEL alloy 404 rod annealed (1400°F/1 hr).

Joining

Most of the conventional welding processes may be used to join MONEL alloy 404 to itself or dissimilar alloys. The choice of welding product is dependent upon the materials being joined and the environment to which they will be exposed.

Information on welding, brazing, and soldering are found in the publication Special Metals “Joining” on the website, www.specialmetals.com.

Fabricating

MONEL alloy 404 is readily fabricated by standard processes. Additional information on fabricating is available in the Special Metals publication “Fabricating” on the website, www.specialmetals.com.

Available Products

MONEL alloy 404 is available in standard mill forms including sheet, round bar and wire. Popular forms and sizes are available from stock; specialty products are available from converters. Inquire for complete information.

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