

MONEL DATA

MONEL was invented in 1905 with approximately two thirds nickel and one third copper. MONEL alloys resist in a wide variety of environments & are used in sulfuric acid and hydrofluoric acid, and in various marine/naval applications involving contact with sea and fresh water. MONEL alloys are frequently utilized in heat exchangers due to good thermal conductivity and corrosion resistance.

MONEL applications include: marine, valves, pumps, shipbuilding, chemical & oil processing, heat exchangers, and electrical.

MONEL ALLOY R-405

The free-machining version of MONEL alloy 400. A controlled amount of sulfur is added to the alloy to provide sulfide inclusions that act as chip breakers during machining. Other characteristics are essentially the same as those of MONEL alloy 400. Used for meter and valve parts, fasteners, and screw-machine products. Standard product forms are round, hexagon, flats, and wire.

Limiting Chemical Composition, %

| | | | | | |
|-----------------|-----------|----|-------------|----|--------|
| Ni ^a | 63.0 min | Mn | 2.0 max | Si | 0.5max |
| Cu | 28.0-34.0 | C | 0.3 max | | |
| Fe | 2.5 max | S | 0.025-0.060 | | |

^aPlus Co.

Typical Mechanical Properties (Annealed)

| | | |
|------------------|-----|--------|
| Tensile Strength | psi | 80,000 |
| | Mpa | 550 |
| Yield Strength | psi | 35,000 |
| | Mpa | 240 |
| Elongation | % | 40 |

Specifications and Designations

| | |
|--------------------|---------------------------|
| UNS N04405 | ASTM B164 |
| ASME SB-164 | Boiler Code III, IV, VIII |
| SAE AMS 4674, 7234 | QQ-N-281 |
| MR-01-75 | |

Physical Constants and Thermal Properties

| | | |
|-------------------------------------|--|-----------|
| Density | | |
| lb/in ³ | | 0.318 |
| Mg/m ³ | | 8.80 |
| Melting Range | | |
| °F | | 2730-2460 |
| °C | | 1300-1350 |
| Specific Heat | | |
| Btu/lb·°F | | 0.102 |
| J/kg·°C | | 427 |
| Curie Temperature | | |
| °F | | 70-120 |
| °C | | 20-50 |
| Coefficient of Expansion | | |
| 70-200°F, 10 ⁻⁶ in/in·°F | | 7.6 |
| 21-93°C, μm/m·°C | | 13.7 |
| Thermal Conductivity | | |
| Btu·in/ft ² ·h·°F | | 151 |
| W/m·°C | | 21.8 |
| Electrical Resistivity | | |
| ohm·circ mil/ft | | 307 |
| μΩ·m | | 0.510 |

MONEL ALLOY 400

A nickel-copper alloy with high strength and excellent corrosion resistance in a range of media including sea water, hydrofluoric acid, sulfuric acid, and alkalis. Used for marine engineering, chemical and hydrocarbon processing equipment, valves, pumps, shafts, fittings, fasteners, and heat exchangers. Standard product forms are round, hexagon, flats, forging stock, pipe, tube, plate, sheet, strip, and wire.

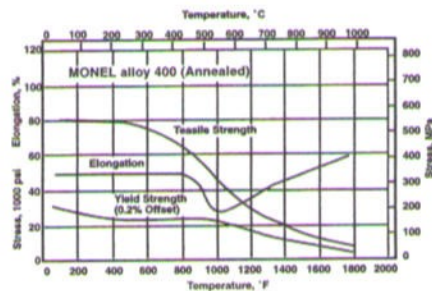
Limiting Chemical Composition, %

| | | | | | |
|-----------------|-----------|----|-----------|----|--------|
| Ni ^a | 63.0 min | Mn | 2.0 max | Si | 0.5max |
| Cu | 28.0-34.0 | C | 0.3 max | | |
| Fe | 2.5 max | S | 0.024 max | | |

^aPlus Co.

Typical Mechanical Properties (Annealed)

| | | |
|------------------|-----|--------|
| Tensile Strength | psi | 80,000 |
| | Mpa | 550 |
| Yield Strength | psi | 35,000 |
| | Mpa | 240 |
| Elongation | % | 40 |



Specifications and Designations

| | |
|---|------------------------------|
| UNS N04400 | SAE AMS 4544, 4574, 4575 |
| BS 3072-3076 (NA 13) | 4675, 4730, 4731, 7233 |
| ASTM B 127, B 163-B 165, B564 | DIN 17743, 17750-17754 |
| ASME SB-127, SB-163-SB-165, SB-564, Boiler Code | Werkstoff Nr. 2.4360, 2.4361 |
| Sections III, IV, VII, IX | VdTUV 263 |
| AECMA Pr EN 3205 | MIL-T-1368, MIL-T-23520 |
| AFNOR NU30 | MIL-N-24106 |
| | QQ-N-281 |
| | NACE MR-01-75 |

Physical Constants and Thermal Properties

| | | |
|-------------------------------------|--|-----------|
| Density | | |
| lb/in ³ | | 0.318 |
| Mg/m ³ | | 8.80 |
| Melting Range | | |
| °F | | 2730-2460 |
| °C | | 1300-1350 |
| Specific Heat | | |
| Btu/lb·°F | | 0.102 |
| J/kg·°C | | 427 |
| Curie Temperature | | |
| °F | | 70-120 |
| °C | | 20-50 |
| Coefficient of Expansion | | |
| 70-200°F, 10 ⁻⁶ in/in·°F | | 7.7 |
| 21-93°C, μm/m·°C | | 13.9 |
| Thermal Conductivity | | |
| Btu·in/ft ² ·h·°F | | 151 |
| W/m·°C | | 21.8 |
| Electrical Resistivity | | |
| ohm·circ mil/ft | | 329 |
| μΩ·m | | 0.547 |

MONEL ALLOY K-500

A precipitation-hardenable nickel-copper alloy that combines the corrosion resistance of MONEL alloy 400 with greater strength and hardness. It also has low permeability and is nonmagnetic to under -150°F (101°C). Used for pump shafts, oil-well tools and instruments, doctor blades and scrapers, springs, valve trim, fasteners, and marine propeller shafts. Standard product forms are round, hexagon, flats, forging stock, pipe, tube, plate, sheet, strip, and wire.

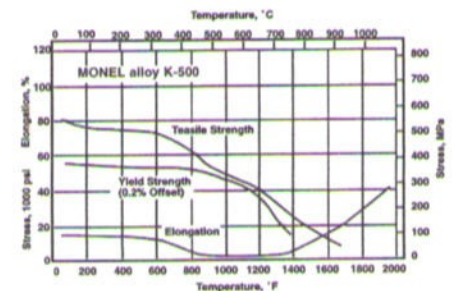
Limiting Chemical Composition, %

| | | | | | |
|-----------------|-----------|----|-----------|----|----------|
| Ni ^a | 63.0 min | Ti | 0.35-0.85 | Mn | 1.5max |
| Cu | 27.0-33.0 | Fe | 2.0 max | S | 0.01 max |
| Al | 2.30-3.15 | C | 0.25 max | Si | 0.5 max |

^aPlus Co.

Typical Mechanical Properties (Precipitation Hardened)

| | | |
|------------------|-----|---------|
| Tensile Strength | psi | 160,000 |
| | Mpa | 1,100 |
| Yield Strength | psi | 115,000 |
| | Mpa | 790 |
| Elongation | % | 20 |



Specifications and Designations

| | |
|-------------------------------|-------------------------|
| UNS N05500 | DIN 17743, 17752, 17754 |
| BS 3072-3076 (NA18) | Werkstoff Nr. 2.4375 |
| ASME Boiler Code Section VIII | QQ-N-286 |
| SAE AMS 4676 | NACE MR-01-75 |
| MIL-N-24549 | |

Physical Constants and Thermal Properties

| | | |
|-------------------------------------|--|-----------|
| Density | | |
| lb/in ³ | | 0.305 |
| Mg/m ³ | | 8.44 |
| Melting Range | | |
| °F | | 2400-2460 |
| °C | | 1315-1350 |
| Specific Heat | | |
| Btu/lb·°F | | 0.100 |
| J/kg·°C | | 4197 |
| Curie Temperature | | |
| °F | | -150 |
| °C | | -65 |
| Coefficient of Expansion | | |
| 70-200°F, 10 ⁻⁶ in/in·°F | | 7.6 |
| 21-93°C, μm/m·°C | | 13.7 |
| Thermal Conductivity | | |
| Btu·in/ft ² ·h·°F | | 121 |
| W/m·°C | | 17.5 |
| Electrical Resistivity | | |
| ohm·circ mil/ft | | 370 |
| μΩ·m | | 0.615 |