



CORROSION MATERIALS

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ISO 9001:2015 Certified
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Description

Alloy 405 is a nickel-copper alloy that is an enhanced machining version of alloy 400. A controlled amount of sulfur is added to improve machinability. Corrosion resistance characteristics and physical properties are similar to alloy 400, but the mechanical property ranges differ slightly. Alloy 405 can be slightly magnetic at room temperature, like alloy 400.

Industries and Applications

Alloy 405 is used in the same industries as alloy 400. Both alloys are heavily used in the chemical processing, pollution control and marine industries. This enhanced machining version of alloy 400 is intended to be machined using automated equipment. Applications include screw-machine products, water meter and valve seat components, fittings and fasteners.

Resistance to Corrosion

Alloy 405 exhibits similar corrosion resistance to alloy 400. These alloys are resistant to corrosion in many reducing media. Like alloy 400, alloy 405 is one of the few alloys that can be used in contact with fluorine, hydrofluoric acid, hydrogen fluoride or their derivatives. Exceptional corrosion resistance has been proven in hydrofluoric acid in all concentrations up to the boiling point. Alloy 405 is also resistant to many forms of sulfuric and hydrochloric acids under reducing conditions. Corrosion resistance behavior in seawater is outstanding.

Fabrication and Heat Treatment

Alloy 405 was specifically designed for enhanced machinability and is recommended for use with automatic screw machines. The nickel copper sulfides that form due to the increased sulfur content aid in machining and act as chip breakers. These inclusions can have an effect on the surface finish, resulting in a slightly rougher finish than standard alloy 400. Alloy 405 can be fabricated and heat-treated using the same procedures as alloy 400. However, the alloy is not recommended for forging.

The information contained in this technical data sheet is intended to be used as a guide and may be revised at any time without prior notice. The information is believed to be reliable and accurate, however Corrosion Materials does not make any warranty or assume any legal liability with respect to the accuracy, completeness or usefulness of the information.

TECHNICAL DATA SHEET

ALLOY 405

UNS N04405 / W.NR. 2.4363

Chemical Composition (%)

(Ni) ¹ Nickel	63.0 min
(Cu) Copper	28.0-34.0
(Fe) Iron	2.50 max
(Mn) Manganese	2.0 max
(Si) Silicon	0.50 max
(C) Carbon	0.3 max
(S) Sulfur	0.025-0.060

¹ Includes Co

Physical Properties

Density @ 68°F	0.319 lb/in. ³
Elastic Modulus @ 70°F (tension)	26.0 ksi
Coefficient of Thermal Expansion @ 70°F to 200°F	7.7 µin/in•°F
Specific Heat @ 68°F	0.009 Btu/lb•°F
Poisson's Ratio	0.32
Thermal Conductivity @ 70°F	2.6 Btu•in/ft ² •h•°F
Electrical Resistivity @ 70°F	510 nΩ•m
Melting Range @ 70°F	2370°F -2460°F

Impact Strength

Condition	Impact Strength ¹ ft - lb	
	IZOD	Charpy
Hot Rolled	96	187
Cold Drawn	99	140
Annealed	120+	196

¹ Test results are at room temperature

Thermal Expansion

Temperature (°F)	Mean Linear Expansion in/in/°F x 10 ⁻⁶
200	7.6
400	8.4
600	8.7
800	9.0
1000	9.2
1200	9.4
1400	9.7
1600	9.9
1700	10.0
1800	10.1
2000	10.4

Mechanical Properties¹

Condition	Tensile (min. ksi)	0.2% Yield (min. ksi)	Elongation (min. %)	Hardness (HRB) ²
Bar (Annealed)	70	25	35	60-75
Bar (Cold Drawn Stress Relieved)	85	50	8-15	> 90
Bar (Hot Worked Stress Relieved)	75	35	30	> 90

¹ According to governing specifications ² for information only

² values listed as ranges are size dependent, see specification for more information.

Applicable Specifications*

Form	ASTM	ASME	Other
Bar	B164	SB164	QQ-N-281 Rev D ¹

*EN10204-3.1 applies to all product forms.

¹Class B, Form 1, Amendment II.

Please contact Corrosion Materials for a complete list of items available from our extensive inventory, as well as our value-added processing services.

We supply a complete range of items in many alloys, including C-276, 22, B-2, B-3®, 200/201, 400, 405, K-500, 625, 600, 800H/HT®, 20, F255, 6B, Titanium Gr. 2 and Titanium Gr. 5.

Our machine shop, welding shop and processing departments are equipped with state-of-the-art manufacturing equipment allowing Corrosion Materials the ability to provide the service you desire along with the economic and technical advantages you need and deserve.

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