



CORROSION MATERIALS

"Your Corrosion Alloy Specialist"



"ISO 9001-2008 Certified
ISO Registered Since 1993"

Alloy 600 is a nickel-chromium-iron, solid solution strengthened alloy used for applications that require corrosion and high temperature resistance. Service temperatures for Alloy 600 can be from cryogenic to 2000°F. Application of the alloy is useful in the chemical, pulp and paper, aerospace and heat treating industries to name a few.

Fabrication and Heat Treatment

Alloy 600 can both hot formed and cold form using typical processes. Hot working should be performed between 1600°F and 2250°F avoiding any work between 1200°F and 1600°F as the ductility decreases in this temperature range. The cold work hardening rate is less than that of 304 stainless steel yet higher than that of mild steel. Welding Alloy 600 can be achieved via shielded metal-arc welding using AWS ENiCrFe-3 electrode. Filler metal AWS ERNiCr-3 can be used when TIG and MIG welding. Alloy 600 is slightly more machinable compared to 304 stainless steel and should be performed with tools large enough to handle the loads. Typical of other nickel alloys, heavy-duty equipment should be used along with sharp tooling and more than adequate cooling. Annealing of Alloy 600 without excessive grain growth can be performed at 1850°F for 15 minutes at temperature. Fine grain material typically has better corrosion resistance as well as higher tensile, fatigue and impact properties.

Alloy 600

UNS N06600 / W.Nr. 2.4816

Chemical Composition

Ni + Co	72.0 Min.	Mn	1.00 Max.
Cr	14.0 to 17.0	S	0.015 Max.
Fe	6.00 to 10.00	Si	0.50 Max.
C	0.15 Max.	Cu	0.50 Max.

Physical Properties

Density@ Room Temp.	0.304 lb/in. ³
Melting Point	2470°F to 2575°F
Specific Heat @ 70°F	0.103 Btu/lb•°F
Linear Expansion from 70°F to 1000°F	8.4 μin./in. •°F
Linear Expansion from 70°F to 1600°F	9.1 μin./in. •°F
Electrical Resistivity @ 70°F	620 ohm•circ•mil/ft
Electrical Resistivity @ 2000°F	704 ohm•circ•mil/ft
Thermal Conductivity @ 70°F	103 Btu•in/ft ² •h•°F
Magnetic Permeability	1.010 @ 200 oersted
Curie Temperature	-192°F

Modulus of Elasticity

Temperature (°F)	Youngs Modulus (10 ³ ksi)	Shear Modulus (10 ³ ksi)
72	31.1	11.72
400	29.7	11.32
800	27.8	10.68
1000	26.7	10.29
1400	24.3	9.24
1800	21.0	7.85

Mechanical Properties

Room Temperature						
Product Form	Condition	Tensile (ksi)	0.2% Yield (ksi)	Elongation (%)	Hardness (HRB)	
Rod & Bar	Cold-Drawn/Annealed	80 to 100	25 to 50	35 to 55	65 to 85	
Rod & Bar	Hot-Finished/Annealed	80 to 100	30 to 50	35 to 55	65 to 85	
Tube & Pipe	Hot-Finished/ Annealed	75 to 100	25 to 50	35 to 55	-	
Tube & Pipe	Cold-Drawn/Annealed	80 to 100	25 to 50	35 to 55	88 Max.	
Plate	Hot-Rolled/Annealed	80 to 105	30 to 50	35 to 55	65 to 85	
Sheet	Cold-Drawn/Annealed	80 to 100	30 to 45	35 to 55	88 Max.	

100 hour Gas Carburization Tests

Alloy	Weight Gain, mg/cm ²	
	Hydrogen + 2% Methane at 1700 °F	Hydrogen + 2% Methane + 5% Ar at 2000 °F
Alloy 600	2.66	12.30
Alloy 800HT®	4.94	21.58
330 Stainless Steel	6.42	24.00

Thermal Properties

Temperature (°F)	Linear Expansion (µin./in. • °F)	Thermal Conductivity (Btu-in/ft ² •h•°F)
Room Temp.	5.8	103
200	7.4	109
400	7.7	121
600	7.9	133
1000	8.4	158
1400	8.9	186
1800	9.3	-

Resistance to Corrosion

With 72% minimum nickel, this alloy is resistant to many organic and inorganic compounds and provides good resistance in reducing conditions. Another advantage due to its high nickel content is a lower predisposition for stress corrosion cracking in the annealed condition. The chromium in the alloy offers high temperature resistance to sulfur compounds as well as resistance to oxidizing compounds at elevated temperatures or in corrosive media. Also, Alloy 600 has excellent resistance to alkalis and is one of the few materials suitable for use in strong solutions of magnesium chloride at elevated temperatures. Typical corrosion in MgCl₂ is roughly 1 mpy. When applicable, material for severe service should be fully stress relieved prior to use.

Corrosion Rates in Sulfuric Acid

H ₂ SO ₄ % Concentration	Corrosion Rate at Room Temp. (mpy)	Corrosion Rate at Boiling (mpy)
10	3.2	135
20	2.0	186
30	2.5	216
40	1.8	700
60	1.9	-
80	22.3	-
98	7.4	-

Applicable Specifications

Alloy 600 ¹ - Form	ASTM	ASME	British Standard	European Standard	Other
Rod & Bar	B166, B564 ²	SB166, SB564 ²	BS3076-NA14	EN 10204-3.1	AMS 5665 ³
Seamless Tube & Pipe	B167	SB167	BS3076-NA14 ⁴	EN 10204-3.1	/
Welded Tube	B516	SB516	/	EN 10204-3.1	/
Welded Pipe ⁵	B517	SB517	/	EN 10204-3.1	/

1. All Material to be supplied in the annealed condition. 2. Dual certified to ASTM B564 & ASME SB564 for product 3.500" diameter and larger. 3. Chemistry only. 4. BS3076-NA14 for Seamless pipe only. 5. All welded pipe ≥6.000" X-Ray inspected per ASME Section VIII, Division 1, #UW-51.

Please contact Corrosion Materials for a complete list of available items from inventory.

In-house machine and weld facilities help insure that the most common items will be in stock. Items not in stock can be fabricated in a short period of time either in-house or through our extensive, approved subcontractor and supplier network.

We also supply a complete range of items in the following alloys; Alloy C276, B2, B-3®, F-255, Alloy 22, 625, 200/201, Alloy 400, 405 and 600. Bar products are also available in K500, Alloy 800H/HT®, and Alloy 6B as well as various Ti grades.

(800HT® is a registered trademark of Special Metals Corporation. B-3® is a registered trademark of Haynes International Inc.)

The data and information contained in this pamphlet have been taken from open literature and is believed to be reliable. The information contained is intended to be used as a guide. Corrosion Materials does not make any warranty or assume any legal liability for its accuracy, completeness or usefulness.

Baker

2262 Groom Rd.
P.O. Box 630
Baker, Louisiana 70714
(800) 535-8032
(225) 775-3675
FAX: (225) 774-0514

Chicago

375 W. South Frontage Rd.
Bolingbrook, Illinois 60440
(800) 706-7471
(630) 226-1043
FAX: (630) 226-1044

Houston

12305 Cullen Rd.
Houston, Texas 77066
(800) 455-2276
(713) 939-0364
FAX: (713) 939-1126

Shanghai

Room 1202
333 Jiujiang Road
Shanghai, China 200001
86-21-6045 2221/2223
Fax: 86-21-6045 2225