



CORROSION MATERIALS

"Your Corrosion Alloy Specialist"



"ISO 9001-2008 Certified
ISO Registered Since 1993"

Alloy 625 is a Ni-Cr-Mo alloy that is used for its high strength, high toughness, and its oxidation and corrosion resistance. Strength of alloy 625 is derived from the stiffening effect of molybdenum and niobium on its nickel-chromium matrix. Although the alloy was developed for high temperature strength, its highly alloyed composition provides a high level of general corrosion resistance. Applications include and are not limited to: sea water applications, aerospace, chemical processing, and nuclear.

Resistance to Oxidation & Corrosion

Alloy 625 has good resistance to oxidation and scaling at high temperatures. At 1800 °F, scaling resistance becomes a significant factor in service. It is superior to many other high temperature alloys under cyclic heating and cooling conditions. The high alloy content of alloy 625 enables it to withstand a wide variety of severe corrosive environments. There is almost no attack in mild environments such as fresh and sea water, neutral pH environment, and alkaline media. The high molybdenum content makes the alloy very resistant to pitting and crevice corrosion.

Fabrication and Heat Treatment

Alloy 625 can be formed using various cold and hot working processes. Because the alloy is developed to retain high strength at elevated temperatures, it resists deformation at hot-working temperatures and higher loads are required to cause the material to deform. Hot forming should be performed within a temperature range of 1700° to 2150°F. During cold working, the material work hardens more rapidly than traditional austenitic stainless steel. Alloy 625 has three heat treatments: 1) solution annealing at 2000/2200°F and air quench or quicker, 2) annealing 1600/1900°F and air quenching or quicker, and 3) stress relieving 1100/1500°F and air quenching. Solution annealed material is commonly used for applications above 1500°F where resistance to creep is important. Annealed material is the most used and has the optimum combination of tensile and rupture properties.

Mechanical Properties

Product form	Condition	Tensile Min.	Yield min. (0.2% offset)	Elongation (%)
Gr 1 Bar up to 4"	Annealed	120 ksi	60 ksi	30
Gr 1 Bar 4" to 10"	Annealed	110 ksi	50 ksi	25
Gr 2 Bar all sizes	Solution Annealed	100 ksi	40 ksi	30
Gr 1 Sheet	CR/ Annealed	120 ksi	60 ksi	30
Gr 1 Sheet/ Plate (to 2.75")	HR/ Annealed	110 ksi	55 ksi	30
GR 1 Plate (to 0.375")	CR/ Annealed	110 ksi	55 ksi	30
Gr 2 Plate/ Sheet	CR/ Solution Annealed	100 ksi	40 ksi	30
Gr 2 Plate/ Sheet	HR/ Solution Annealed	100 ksi	40 ksi	30

*According to applicable ASTM specifications.

Alloy 625

UNS N06625

Chemical Composition

Ni	58.0 min	Nb (plus Ta)	3.15-4.15
Cr.....	20.0-23.0	C	0.10 max
Fe	5.0 max	Mn	0.50 max
Mo.....	8.0-10.0	Si	0.50 max
P	0.015 max	Ti.....	0.40 max
S.....	0.015 max	Co*	1.0 max
Al.....	0.40 max		

* If determined

Physical Properties

Melting Temperature	2350-2460°F
Density @ Room Temp.	0.305 lb/in. ³
Specific Heat @ 70°F	0.098 Btu/lb•°F
Curie Temperature	<-320°F
Magnetic Permeability	1.0006 @ 200 Oersted

Ductility & Toughness

Temp. (°F)	Orientation	Impact Strength	
		ft*lb	J
85	Longitudinal	48, 49, 50	65, 66, 68
	Transverse	46, 49, 51.5	62, 66, 70
-110	Longitudinal	39, 44, 49	53, 57, 60
	Transverse	39, 42, 44	53, 57, 60
-320	Longitudinal	35, 35, 35.5	47, 47, 48
	Transverse	31, 32, 36	42, 43, 49

Thermal & Electrical Properties

Temp. °F	Mean Linear Expansion* 10 ⁻⁶ in/in*°F	Thermal Conductivity** Btu•in./ ft ² •h•°F	Electrical Resistivity** ohm-cir mil/ft
-250	--	50	--
-100	--	58	--
0	--	64	--
70	--	68	776
100	--	70	780
200	7.1	75	794
400	7.3	87	806
800	7.6	109	818
1200	8.2	132	830
1600	8.8	158	818
1800	--	175	812
2000	--	--	806

*From 70°F to temperature shown **Material annealed 2100°F f/ 1 hr.

Aqueous Corrosion Data

Media	Common Name	Temp. °F (°C)	Corrosion Rate (mpy)
99% C ₂ H ₄ O ₂	Acetic Acid	Boiling	<1
1% HCl	Hydrochloric Acid	Boiling	1
2% HCl	Hydrochloric Acid	Boiling	557
5% HF	Hydrofluoric Acid	158 (70)	16
10% HNO ₃	Nitric Acid	Boiling	<1
65% HNO ₃	Nitric Acid	Boiling	21
10% H ₂ SO ₄	Sulfuric Acid	Boiling	37
20% H ₂ SO ₄	Sulfuric Acid	Boiling	<1
30% H ₂ SO ₄	Sulfuric Acid	174 (79)	<1

Applicable Specifications

Alloy 625 – Form	ASTM	ASME	AMS
Bar	B446	SB446	5666
Sheet & Plate	B443	SB443	5599
Seamless Pipe & Tube	B444/B829	SB444/SB829	
Welded Tube	B704/B751	SB704/SB751	
Welded Pipe	B705/B775	SB705/SB775	

1. EN10204-3.1 applied to all product forms.

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, F-255, 200/201, Alloy 400, 405 and 600. Bar products are also available in Alloy 20, 22, 625, K500, 800H/HT[®], and Alloy 6B as well as various Ti grades.

(800HT[®] is a registered trademark of Special Metals Corporation a PCC Company.)

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.

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