CORROSION MATERIALS

Worldwide Corrosion Resistant Alloy Specialists

Login | Request a Quote

ISO 9001:2015 Certified
ISO Registered Since 1993

TECHNICAL DATA SHEET

ALLOY 625

UNS N06625 / W.NR. 2.4856

Description

Alloy 625 is a nickel-chromium-molybdenum alloy that is used for its high strength, high toughness and excellent corrosion resistance. The 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 also provides a significant level of general corrosion resistance.

Industries and Applications

Alloy 625 is used in a variety of industries, including automotive, marine, aerospace, oil and gas, chemical processing and nuclear. Typical end use applications include heat exchangers, bellows, expansion joints, exhaust systems, fasteners, quick connect fittings and many other applications requiring strength and resistance against aggressive corrosive environments.

Resistance to 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 combination of the alloyed elements in 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 seawater, neutral pH environments, and alkaline media. The chromium content of this alloy results in superior resistance to oxidizing environments. The high molybdenum content makes alloy 625 very resistant to pitting and crevice corrosion.

Fabrication and Heat Treatment

Alloy 625 can be formed using various cold and hot working processes. Alloy 625 resists deformation at hot working temperatures, therefore higher loads are required to form the material. 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 steels. 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 at 1100/1500°F and air quenching. Solution annealed (grade 2) material is commonly used for applications above 1500°F where resistance to creep is important. Soft-annealed material (grade 1) is commonly used for lower temperatures and has the optimum combination of tensile and rupture properties.

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.

Chemical Composition (%)

(Ni) Nickel	58.0 min
(Cr) Chromium	20.0 to 23.0
(Fe) Iron	5.0 max
(Mo) Molybdenum	8.0 to 10.0
(Nb+Ta) Niobium+Tantalum	3.15 to 4.15
(Co) Cobalt*	1.0 max
(Mn) Manganese	0.50 max
(Si) Silicon	0.50 max
(Al) Aluminum	0.40 max
(Ti) Titanium	0.40 max
(C) Carbon	0.10 max
(P) Phosphorus	0.015 max
(S) Sulfur	0.015 max

**If determined*

Physical Properties

Density @ Room Temp.	0.305 lb/in.^{3}
Elastic Modulus	30.1 x 10^3 ksi
Melting Range	2350 to 2460°F
Specific Heat @ Room Temp.	0.098 Btu/lb•°F
Curie Temperature	<-320°F
Magnetic Permeability	1.0006 @ 200 Oersted

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.*

ALLOY 625

UNS N06625 / W.NR. 2.4856

Mechanical Properties

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

**According to applicable ASTM specifications.*

Ductility & Toughness

Temp. (°F)	Orientation	Impact Strength* (ft*lb)	(J)
85	Longitudinal	50	68
	Transverse	51.5	70
-110	Longitudinal	49	60
	Transverse	44	60
-320	Longitudinal	35.5	48
	Transverse	36	49

**Results listed are typical values.*

Aqueous Corrosion Data

Media	Common Name	Temp. °F (°C)	Corrosion Rate (mpy)
99% $C_2H_4O_2$	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% $H2SO_4$	Sulfuric Acid	Boiling	37
20% $H2SO_4$	Sulfuric Acid	Boiling	<1
30% $H2SO_4$	Sulfuric Acid	174 (79)	<1

Applicable Specifications[1]

Form	ASTM	ASME	AMS
Bar	B446	SB446	5666
Sheet & Plate	B443	SB443	5599
Seamless Pipe & Tube	B444/B829	SB444/SB829	5581
Welded Pipe	B704/B751	SB704/SB751	5581
Welded Tube	B705/B775	SB705/SB775	5581

[1]EN10204-3.1 applied to all product forms.

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.

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.

Baker
2262 Groom Rd.
Baker, Louisiana 70714
800.535.8032 toll free
225.775.3675 phone
225.774.0514 fax

Houston
12305 Cutten Rd.
Houston, Texas 77066
800.455.2276 toll free
713.939.0364 phone
713.939.1126 fax

Bolingbrook
400 Quadrangle Drive, Ste C
Bolingbrook, Illinois 60440
800.706.7471 toll free
630.226.1043 phone
630.226.1044 fax

Auburn
9 Saint Mark Street
Auburn, MA 01501
844.442.0818 toll free
774.321.6212 phone
774.321.6206 fax

Shanghai
333 Jiujiang Road
Shanghai, China 200001
86-21-6045 2221 phone
86-21-6045 2225 fax

CM036-19, Rev 0.