



ATI 625™ Alloy

High Strength Nickel-Base Alloy

(UNS N06625)

INTRODUCTION

ATI 625™ alloy (UNS N06625) is a high strength nickel-base alloy that combines good strength and toughness with excellent oxidation and corrosion resistance. The addition of molybdenum and niobium results in the solid solution strengthening of the alloy and providing the outstanding corrosion resistance. Initially regarded as a purely solid solution strengthened alloy, a low carbon version of the alloy can be age hardened by the precipitation that allows significant strengthening. This is a valuable tool that can be used in heavy sections where cold working is not possible. ATI 625™ alloy is easily welded which permits its use in a wide variety of fabricated products. The alloy is produced by vacuum induction melting followed by electroslag remelting. ATI 625™ alloy is widely used in aerospace for airframe and jet engine applications as well as in the chemical, nuclear, and marine industries because of its combination of high tensile and creep strengths and oxidation and corrosion resistance.

SPECIFICATIONS

- AMS 5599 and ASTM B 443 - Sheet, Strip, and Plate
- AMS 5666, MIL-N-24687, MIL-DTL-24799 - Bars, Forgings, Extrusions and Rings
- AMS 5837 - Welding wire

PHYSICAL PROPERTIES

Melting Range: 2,350-2,450° F (1,288 - 1,343°C)
Density: 0.305 lb/in³ (8.44 g/cm³)

HEAT TREATMENT

Annealing at 1,600-1,900° F (927 - 1,038° C) is done where high hardness, tensile and fatigue strength are desired. A solution anneal at 2,000-2,200° F (1,093 - 1,204° C) is used where optimum creep-rupture strength is desired.

Lower carbon versions of the alloy can be precipitation strengthened by aging up to 120 hours at temperatures from 1,050° F to 1,350° F (566 - 732° C).

HARDNESS

Hardness in the annealed condition varies from Rockwell B 88 to Rockwell C 25 depending upon annealing temperature. Hardness in the aged condition can be as high as Rockwell C 40. Cold working the alloy from 30 to 60 percent can increase the hardness to Rockwell C 36 to 42.

OXIDATION RESISTANCE

ATI 625™ alloy shows excellent oxidation resistance up to 2,000°F (1,093°C).



Technical Data Sheet

The alloy shows good corrosion resistance in a wide variety of environments including most salt solutions and to chloride ion stress corrosion cracking. The high molybdenum content makes the alloys resistant to pitting and crevice corrosion.

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FORMABILITY

The alloy can be readily formed in the annealed condition utilizing convention forming techniques.

FORGEABILITY

ATI 625™ alloy has good hot workability characteristics within the 1,250 to 1,850°F (677 - 1,010°C) range. Reductions of 15 to 20 percent at temperatures approaching 1,850°F (1,010°C) are recommended for good grain refinement.

MACHINEABILITY

The alloy is best machined in the annealed condition using practices developed for other high strength nickel-base alloys.

WELDABILITY

ATI 625™ alloy has excellent weldability. It can be welded by inert gas-shielded arc, submerged arc, and shielded-metal-arc processes.

SPECIAL PRECAUTIONS

All lubricants, particularly sulfur-bearing, should be removed prior to heat treating and pickling.

Technical Data Sheet
Chemical Composition

	C	Mn	Si	S	P	Cr	Ni	Co	Fe	Mo	Ti	Al	Cb+Ta
% w/w, min.	-	-	-	-	-	20.0	Bal.	-	-	8.0	-	-	3.15
% w/w, max.	0.10	0.50	0.50	0.015	0.015	23.0	-	1.0	5.0	10.0	0.40	0.40	4.15

