



Mission Critical Metallics®

ATI AL-6XN® Stainless Steel Alloy

GENERAL

ATI AL-6XN® Stainless Steel Alloy (UNS N08367) is produced by ATI Allvac in “long” product forms: billet, bar, rod, coil, and wire. The AL-6XN alloy is a superaustenitic stainless steel that has resistance to chloride pitting, crevice corrosion, and stress-corrosion cracking that is much superior to that of the 300 series stainless steels. AL-6XN alloy is available from ATI Allvac in all long product forms, and is widely used in chemical processing and in related industries.

SPECIFICATIONS

- ASME SB-564, ASTM B 564 – forgings
- ASME SB-691, ASTM B 691 – rod, bar, and wire
- ASTM B 472 – billets and bars for reforging
- ASTM A 479 – bars and shapes
- NACE MRO175-95 – solution annealed and cold worked conditions

PHYSICAL PROPERTIES

Melting Range: 2,410-2,550° F; (1,320-1,400° C)
Density: 0.291 lbs/in³; (8.06 gms/cc)

HEAT TREATMENT

ATI AL-6XN alloy should be annealed between 2,025 and 2,250° F (1,107 and 1,232° C) followed by rapid cooling. Slow cooling rates increase the risk of precipitating unwanted secondary phases, such as sigma and chi phase.

HARDNESS

Hardness in the annealed condition is approximately HR_B 90.

CORROSION AND OXIDATION

The chromium, molybdenum, nickel, and nitrogen give AL-6XN alloy good corrosion resistance to many liquids and gas mixtures. The high chromium content gives the alloy excellent resistance in oxidizing or neutral environments. Resistance to pitting corrosion is provided by chromium, molybdenum, and nitrogen. Nitrogen also provides high strength and increased resistance to pitting. Molybdenum and nickel increase the resistance of the alloy to chloride stress-corrosion cracking. The low levels of carbon in ATI AL-6XN alloy make it resistant to intergranular corrosion.

FORGEABILITY

ATI AL-6XN alloy is generally forged between 1,830 and 2,300° F (999 and 1,260° C). Optimum corrosion resistance is obtained when the alloy is fully annealed followed by a rapid quench, and then followed by descaling and pickling if the anneal is performed in air.

FORMABILITY

ATI AL-6XN alloy can be cold worked and cold formed using techniques that are used for other austenitic stainless steels, although somewhat higher loads may be required.

WELDABILITY

It is recommended that more highly alloyed austenitic filler metals be used when welding ATI AL-6XN alloy, in order to provide the best corrosion resistance. Autogenous welds exhibit less corrosion than the base material due to segregation; however, the corrosion resistance can be improved by post-weld annealing.

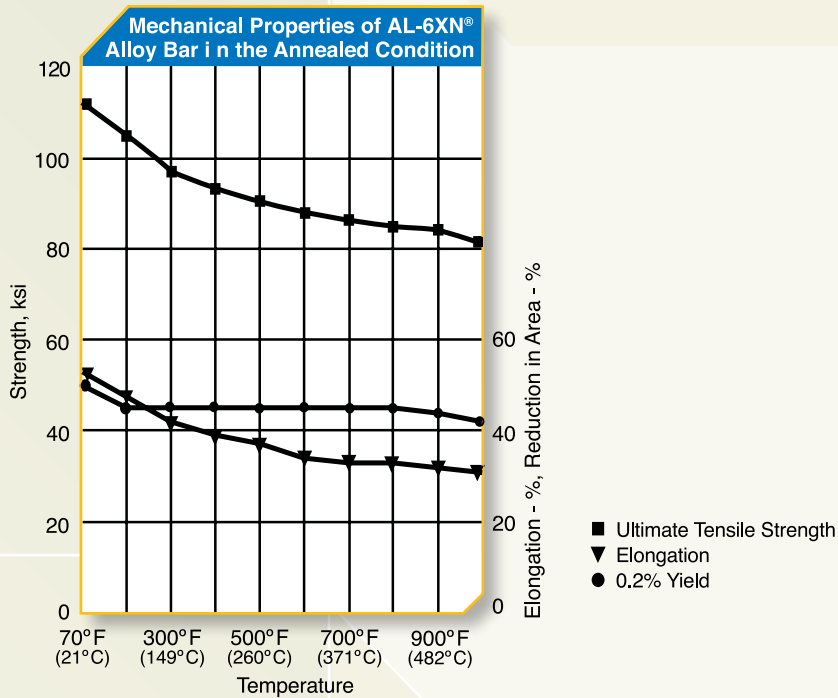
SPECIAL PRECAUTIONS

All lubricants and coolants, particularly those containing sulfur, should be removed prior to heat treating and welding.



ATI AL-6XN[®] Stainless Steel Alloy

Chemical Composition											
	AL	Mn	P	S	Si	Cr	Ni	Mo	N	Cu	Fe
wt %, min.	-	-	-	-	-	20.00	23.50	6.00	0.18	-	-
wt %, max.	0.03	2.0	0.04	0.03	1.00	22.00	25.50	7.00	0.25	0.75	Bal.



Effect of Cold Work on Mechanical Properties of AL-6XN [®] Alloy Bar*					
% Cold Work	UTS (ksi)	0.2% Y.S. (ksi)	% Elong	% R.A.	Hardness Rockwell C
10.1	121.0	73.8	47.2	81.4	20.5
14.0	123.7	84.2	42.3	80.1	21.4
17.9	127.8	98.3	37.4	79.3	25.2
21.9	135.3	111.0	32.3	79.5	29.5
27.3	146.1	132.6	26.4	77.3	31.9
31.6	153.9	138.8	22.4	75.4	31.7
36.5	166.4	146.2	19.8	74.6	36.0
42.2	179.2	158.6	18.5	73.1	34.9
47.0	182.5	163.6	16.2	69.2	36.9
52.6	191.4	164.6	16.0	66.3	35.7

* See Allegheny Ludlum technical literature on Stainless Steel AL-6XN[®] Alloy for information and data on other product forms.

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