Technical Data Sheet

ATI 59™

Nickel Alloy: Corrosion Resistant

(UNS N06059)

GENERAL PROPERTIES

ATI 59™ alloy is a nickel-chromium-molybdenum alloy with excellent corrosion resistance and high mechanical strength. The alloy has excellent resistance to both oxidizing and reducing media, and possesses superior resistance to chloride pitting and stress corrosion cracking. The alloy is widely used in the most severe environments. Some applications include: flue gas scrubber components, bleach plant and digester components for the pulp and paper industry, sour gas handling equipment, sulfuric acid coolers, waste incinerators, and seawater equipment.

PRODUCT FORMS

ATI 59 alloy is available as discrete plate and sheet in the solution annealed condition from ATI.

TYPICAL COMPOSITION

Element	Weight %
Ni	Balance
Cr	22.0 – 24.0
Mn	0.50 max
Mo	15.0-16.5
Al	0.1-0.4
Cu	0.50 max
Si	0.10 max
Fe	1.5 max
C	0.010 max
Co	0.30 max
P	0.015 max
S	0.010 max

PHYSICAL PROPERTIES

Density	0.311 lb/in^3 (8.60 g/cm^2)
Modulus	30.5 x 10^6 psi (210 GPa)
Magnetic Permeability	< 1.001
Coefficient of Thermal Expansion	6.6 µin/in°F (68 - 212°F) 11.9 µm/m°C (25 - 100°C)

SPECIFICATIONS

The N06059 alloy has extensive specification coverage as shown below. It is also included in the ASME Boiler and Pressure Vessel Code for Section III, VIII-1, VIII-2, and XII services. Maximum permitted service temperatures are 800, 1400, 1400 and 650 °F (427, 760, 760, and 343 °C), respectively. It is also covered by ASME B31.3 and NACE MR0175/ISO 15156.

Product Form	Specification	
	ASTM	ASME
Plate, sheet, strip	B 575	SB 575
Tubing and Pipe (welded)	B 619	SB 619
Forgings	B 564	SB 564
Bar and Rod	B 574	SB 574
Tubing and Pipe (seamless)	B 622	SB 622

MECHANICAL PROPERTIES

The minimum room temperature mechanical properties per ASTM B 575 are listed in the following table. The alloy is authorized for pressure vessel use at wall temperatures of -196°C to 450°C (-320°F to 840°F).

Yield Strength, Min. (0.2% offset)	45 ksi (310 MPa)
Tensile Strength, Min.	100 ksi (690 MPa)
Elongation, Min. (in 2 inches or 51mm)	45%

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CORROSION RESISTANCE

ATI 59 alloy has outstanding corrosion resistance in a multitude of aggressive environments. The low silicon, carbon, and iron content make this alloy very resistant to precipitation of deleterious phases. The corrosion properties of N06059 alloy are well documented and references are available on request.

FORMABILITY

Hot working should be performed in the range of 1740-2150°F (950-1180°C). The material should be water quenched to avoid precipitation. Annealing after hot working is recommended to restore maximum corrosion resistance. If cold working is performed, interstage annealing may be required to soften the material.

HEAT TREATMENT

ATI 59 alloy should be solution annealed between 2010 and 2150°F (1100-1180°C) and cooled quickly. Water quenching is preferred to obtain maximum corrosion resistance.

WELDING

ATI 59 alloy can be welded by conventional processes, including GTAW, wire GTAW, plasma arc, SMAW, and MIG. Matching filler metals are typically used. Care should be taken that the interpass temperature does not exceed 300°F (150°C).