P R O D U C T D A T A S H E E T

309/309S STAINLESS STEEL

UNS S30900 AND UNS S30908

AK Steel

Types 309 and 309S are austenitic chromium-nickel stainless steels that provide excellent corrosion resistance and heat resistance plus good strength at room and elevated temperatures. Type 309S is identical to Type 309 except for a lower carbon content that minimizes carbide precipitation and improves weldability. They are essentially non-magnetic as annealed and become slightly magnetic when cold worked.

Typical uses include furnace parts, heating elements, aircraft and jet engine parts, heat exchangers, carburizing-annealing boxes, sulfite liquor handling equipment, kiln liners, boiler baffles, refinery and chemical processing equipment, and auto exhaust parts.

COMPOSITION

	Type 309 %	Type 309S %
Carbon	0.20 max.	0.08 max.
Manganese	2.00 max.	2.00 max.
Phosphorus	0.045 max.	0.045 max.
Sulfur	0.030 max.	0.03 max.
Silicon	0.75 max.	0.75 max.
Chromium	22.00 - 24.00	22.00 - 24.00
Nickel	12.00 - 15.00	12.00 - 15.00
Iron	Balance	Balance

AVAILABLE FORMS

AK Steel produces Types 309 and 309S Stainless Steels in thicknesses from 0.01" to 0.1874" (0.25 to 4.76 mm) and widths up to 48" (1219 mm). For other thicknesses and widths, inquire.

SPECIFICATIONS

Type 309	Type 309S
ASTM A 167	AMS 5523 ASTM A 240

PHYSICAL PROPERTIES

Density, 0.29 lbs/in^3
9.01 g/cm^3

Electrical Resistivity, microhm-in (microhm-cm) 68°F (28.4°C) - 39.8 (78)

Thermal Conductivity, BTU/hr/ft^2/ft/°F (W/m•K)
212°F (100°C) - 9.0 (15.6)
932°F (500°C) - 10.8 (18.7)

Mean Coefficient of Thermal Expansion, in/in/°F (µm/m•K)
32 - 212°F (0 - 100°C) 8.3 x 10^{-6} (14.9)
32 - 600°F (0 - 315°C) 9.3 x 10^{-6} (16.7)
32 - 1000°F (0 - 538°C) 9.6 x 10^{-6} (17.3)
32 - 1200°F (0 - 649°C) 10.0 x 10^{-6} (18.0)

Modulus of Elasticity, ksi (MPa)
29.0 x 10^3 (200 x 10^3)

Magnetic Permeability, (H = 200 Oersteds), Annealed 1.02 max.

Specific Heat, BTU/lb/°F (kJ/kg•K)
0.12 (0.50) 32 - 212°F (0 - 100°C)

Melting Range, °F (°C) - 2550 - 2650 (1399 - 1454)

AK STEEL 309/309S STAINLESS STEEL DATA SHEET

MECHANICAL PROPERTIES

Table 1
Typical Mechanical Properties*

Condition	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Hardness Rockwell	Impact Strength Izod V-Notch ft-lbs (J)
Annealed	90 (621)	45 (310)	45	B85	110 (140)

*Room temperature.

Table 2
Elevated Temperature Properties

Test Temperature °F (°C)	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)
400 (204)	79.0 (545)	38.0 (262)	46
600 (316)	75.0 (517)	34.5 (238)	43
800 (427)	71.0 (490)	32.0 (221)	40
1000 (538)	64.0 (441)	29.0 (200)	38
1200 (649)	52.0 (359)	25.0 (172)	37
1400 (760)	35.0 (241)	21.5 (148)	39
1600 (871)	21.0 (145)	17.5 (120)	50
1800 (982)	10.5 (72)	– –	–

CORROSION RESISTANCE

Types 309 and 309S provide excellent general corrosion resistance. They are more resistant to marine atmospheres than Type 304. They exhibit high resistance to sulfite liquors and are useful for handling nitric acid, nitric-sulfuric acid mixtures, and acetic, citric, and lactic acids.

These materials are generally considered heat-resisting alloys. Their destructive scaling temperature is about 2000°F (1093°C). They exhibit good scaling resistance in both continuous and intermittent service, but the alloys should not be used above 1800°F (982°C) for intermittent service.

FABRICATION

Types 309 and 309S Stainless Steels can be roll formed, stamped and drawn readily. In-process annealing is usually required to reduce hardness and increase ductility.

WELDABILITY

The austenitic class of stainless steels is generally considered to be weldable by the common fusion and resistance techniques. Special consideration is required to compensate for a higher co-efficient of thermal expansion to avoid warping and distortion. Type 309 is generally considered to have weldability nearly equivalent to the most common alloys of this class, Types 304 and 304L. When a weld filler is needed, AWS E/ER 309 and 310 are most often specified. Types 309 and 309S are well known in reference literature and more information can be obtained in this way.

HEAT TREATMENT

These alloys are not hardenable by heat treatment.

Annealing: Anneal at 1900 - 2050°F (1038 - 1121°C), then water quench or rapidly air cool.

METRIC CONVERSION

Data in this publication are presented in U.S. customary units. Approximate metric equivalents may be obtained by performing the following calculations:

Length (inches to millimeters) – Multiply by 25.4

Strength (ksi to megapascals or meganewtons per square meter) – Multiply by 6.8948

Temperature (Fahrenheit to Celsius) – (°Fahrenheit - 32) - Multiply by 0.5556

Density (pounds per cubic inch to kilograms per cubic meter) – Multiply by 27,670

AK Steel

Customer Service 800-331-5050

AK Steel Corporation
9227 Centre Pointe Drive
West Chester, OH 45069

www.aksteel.com

Stainless Steel The Value Option

7100-0096 7/07