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

316/316L STAINLESS STEEL

UNS S31600 AND UNS S31603

AK Steel

Type 316 is an austenitic chromium-nickel stainless steel containing molybdenum. This addition increases general corrosion resistance, improves resistance to pitting from chloride ion solutions, and provides increased strength at elevated temperatures. Properties are similar to those of Type 304 except that this alloy is somewhat stronger at elevated temperatures. Corrosion resistance is improved, particularly against sulfuric, hydrochloric, acetic, formic and tartaric acids; acid sulfates and alkaline chlorides.

Type 316L is an extra-low carbon version of Type 316 that minimizes harmful carbide precipitation due to welding.

Typical uses include exhaust manifolds, furnace parts, heat exchangers, jet engine parts, pharmaceutical and photographic equipment, valve and pump trim, chemical equipment, digesters, tanks, evaporators, pulp, paper and textile processing equipment, parts exposed to marine atmospheres and tubing. Type 316L is used extensively for weldments where its immunity to carbide precipitation due to welding assures optimum corrosion resistance.

COMPOSITION

	Type 316 %	Type 316L %
Carbon	0.08 max.	0.03 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	16.00 - 18.00	16.00 - 18.00
Nickel	10.00 - 14.00	10.00 - 14.00
Molybdenum	2.00 - 3.00	2.00 - 3.00
Nitrogen	0.10 max.	0.10 max
Iron	Balance	Balance

AVAILABLE FORMS

AK Steel produces Types 316 and 316L Stainless Steels in thicknesses from 0.01" to 0.25" (0.25 to 6.35 mm) max. and widths up to 48" (1219 mm). For other thicknesses and widths, inquire.

MECHANICAL PROPERTIES

Typical Room Temperature Properties

	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Hardness Rockwell
Type 316	84 (579)	42 (290)	50	B79
Type 316L	81 (558)	42 (290)	50	B79

AK STEEL 316/316L STAINLESS STEEL DATA SHEET

SPECIFICATIONS

Types 316 and 316L Stainless Steel sheet and strip are covered by the following specifications:

Type 316	Type 316L
AMS 5524	AMS 5507
ASTM A 240	ASTM A 240
ASTM A 666	ASTM A 666

PHYSICAL PROPERTIES

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

Electrical Resistivity, microhm-in (microhm-cm) 68°F (20°C) – 29.4 (74)

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

Thermal Conductivity, BTU/hr/ft^2/ft/°F (W/m•K)
at 212°F (100°C) – 9.4 (16.2)
at 932°F (500°C) – 12.4 (21.4)

Modulus of Elasticity, ksi (MPa)
28.0 x 10^3 (193 x 10^3) in tension
11.2 x 10^3 (77 x 10^3) in torsion

Mean Coefficient of Thermal Expansion, in/in/°F (μm/m•K)
32 - 212°F (0 - 100°C) – 8.9 x 10^6 (16.0)
32 - 600°F (0 - 315°C) – 9.0 x 10^6 (16.2)
32 - 1000°F (0 - 538°C) – 9.7 x 10^6 (17.5)
32 - 1200°F (0 - 649°C) – 10.3 x 10^6 (18.5)
32 - 1500°F (0 - 871°C) – 11.1 x 10^6 (19.9)

Magnetic Permeability, H = 200 Oersteds, Annealed – 1.02 max.

Melting Range, °F (°C) – 2500 - 2550 (1371 - 1399)

CORROSION RESISTANCE

Types 316 and 316L Stainless Steels exhibit better corrosion resistance than Type 304. They provide excellent pitting resistance and good resistance to most chemicals involved in the paper, textile and photographic industries.

HEAT TREATMENTS

Types 316 and 316L are non-hardenable by heat treatment.

Annealing: Heat to 1900 - 2100°F (1038 - 1149°C), then rapidly quench.

FORMABILITY

Types 316 and 316L can be readily formed and drawn.

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 avoid weld "hot cracking" by assuring formation of ferrite in the weld deposit. These particular alloys are generally considered to have poorer weldability than Types 304 and 304L. A major difference is the higher nickel content for these alloys which requires slower arc welding speed and more care to avoid hot cracking. When a weld filler is needed, AWS E/ER 316L and 16-8-2 are most often specified. Types 316 and its low-carbon "L" version are well known in reference literature and more information can be obtained in this way.

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

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

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