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

301 STAINLESS STEEL

UNS S30100

AK Steel

AK Steel Type 301 is an austenitic chromium-nickel stainless steel that provides high strength and good ductility when cold worked. It is a modification of Type 302 in which the chromium and nickel contents are lowered to increase the cold work-hardening range. This permits higher tensile strengths to be achieved by rolling with a lower loss of ductility than with Type 302.

The grade is essentially non-magnetic when annealed. However, when the grade is cold worked, it becomes slightly more magnetic than other standard austenitic stainless steels.

High strength and excellent corrosion resistance make Type 301 Stainless Steel useful for a wide variety of applications. Typical uses include aircraft structural parts, trailer bodies, diaphragms, utensils, architectural and automotive trim, automobile wheel covers, roof drainage products, tablewear, storm door frames and conveyor belts.

COMPOSITION

	%
Carbon	0.15 max.
Manganese	2.00 max.
Phosphorus	0.045 max.
Sulfur	0.030 max.
Silicon	0.75 max.
Chromium	16.00 - 18.00
Nickel	6.00 - 8.00
Nitrogen	0.10 max.
Iron	Balance

AVAILABLE FORMS

AK Steel produces Type 301 Stainless Steel 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.

SPECIFICATIONS

Type 301 Stainless Steel is covered by the following specifications:

ASTM A 666
ASTM A 240

MECHANICAL PROPERTIES

Room Temperature Properties*

	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Hardness Rockwell
Annealed (Typical)	110 (758)	40 (276)	60	B85
1/4 Hard	125 (862)*	75 (517)*	25*	C25
1/2 Hard	150 (1034)*	110 (758)*	18*	C32
3/4 Hard	175 (1207)*	135 (931)*	12*	C37
Full Hard	185 (1276)*	140 (965)*	9*	C41

* Minimum - standard practice is to produce to either minimum tensile strength, minimum yield strength or minimum hardness, but not to combinations of these properties.

AK STEEL 301 STAINLESS STEEL DATA SHEET

PHYSICAL PROPERTIES

Density, 0.285 lbs/in^3
7.88 g/cm^3

Electrical Resistivity, microhm-in (microhm-cm)

68°F (20°C) – 27.4 (69.5)

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)

Mean Coefficient of Thermal Expansion, in/in/°F (µm/m•K)
32 - 212°F (0-100°C) - 9.4 x 10^{-6} (16.9)
32 - 600°F (0-315°C) - 9.9 x 10^{-6} (17.8)
32 - 1000°F (0-538°C) -10.2 x 10^{-6} (18.4)
32 - 1200°F (0-649°C) -10.4 x 10^{-6} (18.7)

Modulus of Elasticity, ksi (MPa)
28.0 x 10^3 (193 x 10^3) in tension
11.2 x 10^3 (78 x 10^3) in torsion

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

Melting Range, °F (°C) – 2250 - 2590 (1399 - 1421)

CORROSION RESISTANCE

Type 301 exhibits corrosion resistance comparable to Types 302 and 304 in the milder service conditions. Resistance to atmospheric corrosion, food, juices and road de-icing salt is excellent. The best corrosion resistance is obtained in the cold worked then annealed condition. When Type 301 is heated or cooled through a temperature range of 800 - 1600°F (427 - 871°C) without subsequent annealing, it may undergo carbide precipitation that may result in intergranular corrosion.

OXIDATION RESISTANCE

The maximum temperature to which Type 301 can be exposed continuously without appreciable scaling is about 1600°F (871°C). For intermittent exposure, the maximum exposure temperature is about 1450°F (788°C).

HEAT TREATMENTS

Type 301 is non-hardenable by heat treatment.

Annealing: Heat to 1900 - 2050°F (1038 - 1121°C), then water quench.

Stress Relief Annealing: Heat to 500 - 900°F (260 - 482°C), then air cool.

FORMABILITY

Type 301 can be readily formed and drawn. Due to its high work-hardening rate, intermediate annealing may be necessary for severe drawing and forming operations.

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. This particular alloy is generally considered to have similar weldability than the most common alloy of this stainless class, Type 304L Stainless Steel. A major difference is the high C content for this alloy, which causes the weld heat-affected-zones to be susceptible to accelerated corrosion (I.G.C.) in certain environments. When a weld filler is needed, AWS E/ER 308 is most often specified. Type 301 Stainless Steel is 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

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

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

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Stainless Steel The Value Option

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