

410S STAINLESS STEEL



AK Steel 410S Stainless Steel is a non-hardening modification of Type 410. A small titanium addition minimizes austenite formation at high temperatures, thereby restricting the alloy's ability to harden. The result is a soft, ductile condition when the material is rapidly cooled from above the critical temperature. This non-hardening characteristic also retards formation of hardening cracks when the steel is welded. The alloy is completely ferritic in the annealed condition.

Because AK Steel 410S cools from elevated temperatures without marked hardening, it is particularly useful for annealing boxes, quenching racks, oxidation-resistant partitions and other high-temperature units.

MECHANICAL PROPERTIES

Typical Mechanical Properties*

UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Hardness Rockwell	Izod V-Notch ft-lbs (J)
65 (448)	40 (276)	25	B75	30 (42)

*Annealed - room temperature.

COMPOSITION

	%
Carbon	0.08 max.
Manganese	1.00 max.
Phosphorus	0.040 max.
Sulfur	0.030 max.
Silicon	1.00 max.
Chromium	11.5 - 14.50
Titanium	0.20 max.

AVAILABLE FORMS

AK Steel 410S is available in thicknesses from 0.015" to 0.100" (0.38 to 2.54 mm) in widths up to 48" (1219 mm). For other sizes, inquire.

PHYSICAL PROPERTIES

Density, 0.28 lbs/in³
7.73 g/cm³

Electrical Resistivity,
microhm-in (microhm-cm)
68°F (21°C) – 23.7 (60)

Specific Heat, BTU/lb/°F (kJ/kg•K)
32 - 212°F (0 - 100°C) – 0.11 (0.46)

Thermal Conductivity,
BTU/hr/ft²/ft/°F (W/m•K)
212°F (100°C) – 15.6 (26.9)

Mean Coefficient of Thermal Expansion,
in/in/°F (µm/m•K)
32 - 212°F (0 - 100°C) – 6.0 x 10⁻⁶ (10.8)
32 - 600°F (0 - 315°C) – 6.4 x 10⁻⁶ (11.5)
32 - 1000°F (0 - 538°C) – 6.7 x 10⁻⁶ (12.2)
32 - 1200°F (0 - 649°C) – 7.5 x 10⁻⁶ (13.5)

Modulus of Elasticity, ksi (MPa)
29 x 10³ (200 x 10³)

Melting Range, °F (°C)
2700 - 2790 (1482 - 1532)

Magnetic Characteristic,
Ferro-magnetic

CORROSION RESISTANCE

The corrosion resistance of AK Steel 410S Stainless Steel is similar to Type 410. It provides adequate resistance to atmospheric corrosion, fresh water, mild acids and alkalies, and some other chemicals.

OXIDATION RESISTANCE

The oxidation resistance of AK Steel 410S Stainless Steel is good. It can be up to 1300°F (705°C) in continuous service. Scaling becomes excessive above about 1500°F (811°C) in intermittent service.

FORMABILITY

AK Steel 410S Stainless Steel can be easily formed by drawing, spinning, bending and roll forming.

WELDABILITY

This ferritic class of stainless steels is generally considered to be weldable by the common fusion and resistance techniques. Special consideration is required to avoid brittle weld fractures during fabrication by minimizing discontinuities, maintaining low weld heat input, and occasionally warming the part somewhat before forming. This particular alloy is generally considered to have slightly poorer weldability than the most common alloy of the stainless class, Type 409. A major difference is addition of aluminum to control hardening, which results in the need for higher heat input to achieve penetration during arc welding. When a weld

filler is required, AWS E/ER 309L or 430 filler material is most often specified. Type 410S is well known in reference literature and more information can be obtained in this way.

HEAT TREATMENT

AK Steel 410S is not hardenable by heat treatment. It is annealed in the 1600 - 1650°F (871 - 899°C) range and then air cooled, mainly to relieve cold working strains. Care should be exercised to avoid exposure at temperatures of 2000°F (1093°C) or above because of possible embrittling effects. If excessively large grains are found after annealing mildly cold-worked material, the annealing temperature should be decreased to the 1200 - 1350°F (649 - 732°C) range.

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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Data referring to mechanical properties and chemical analyses are the result of tests performed on specimens obtained from specific locations with prescribed sampling procedures; any warranty thereof is limited to the values obtained at such locations and by such procedures. There is no warranty with respect to values of the materials at other locations.

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