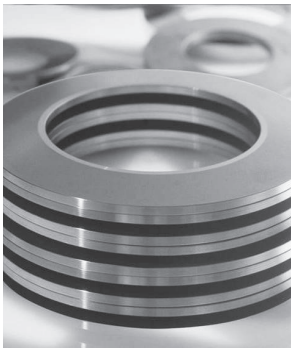
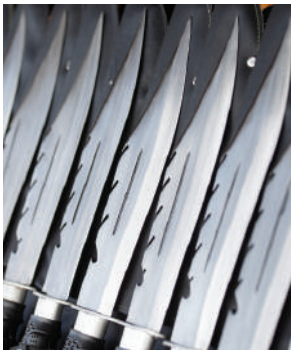
410 STAINLESS STEEL

AK Steel

DATA SHEET





Magnetic **Excellent Corrosion Resistance**

High Strength **Hardness**

AK Steel Type 410 is a martensitic stainless steel that provides excellent corrosion resistance plus high strength and hardness. It is magnetic in both the annealed and hardened conditions. A wide range of properties can be developed with different heat treatments.

Applications requiring moderate corrosion resistance and high mechanical properties are ideal for this alloy. Typical uses include flat springs, knives, kitchen utensils and hand tools.

PRODUCT DESCRIPTION

SPECIFICATIONS

AK Steel Type 410 Stainless Steel sheet and strip is covered by the following specifications:
AMS 5504
ASTM A240

AVAILABLE FORMS

Type 410 Stainless Steel is produced in coils and cut lengths in thicknesses 0.01 – 0.125 in. (0.25 – 3.18 mm) and widths up to 36 in. (914 mm).

Values shown in this bulletin were established in U.S. customary units. The metric equivalents may be approximate.

COMPOSITION	(wt %)
Carbon	0.15 max.
Manganese	1.00 max.
Phosphorus	0.040 max.
Sulfur	0.030 max.
Silicon	1.00 max.
Chromium	11.50 – 13.50

PHYSICAL PROPERTIES

Density, lbs./in^3 (g/cm^3)	0.28 (7.74)
Electrical Resistivity, μΩ•in. (μΩ•cm) 70 °F (21 °C)	22.50 (57)
Thermal Conductivity, BTU/hr./ft./°F (W/m/K)	
212 °F (100 °C)	14.4 (24.9)
932 °F (500 °C)	16.6 (28.7)
Mean Coefficient of Thermal Expansion, in./in./°F (μm/m/K)	
32 – 212 °F (0 – 100 °C)	5.5 x 10^{-6} (9.9)
32 – 1200 °F (0 – 649 °C)	6.5 x 10^{-6} (11.6)
Modulus of Elasticity	
ksi. (MPa)	29 x 10^3 (200 x 10^3)
Specific Heat, BTU/lbs./°F (kJ/kg/K) 32 – 212 °F (0 – 100 °C)	0.11 (0.46)

PROPERTIES

TABLE 1 – TYPICAL ANNEALED MECHANICAL PROPERTIES

UTS ksi. (MPa)	0.2% YS ksi. (MPa)	Elongation % in 2" (50.8 mm)	Rockwell Hardness
75 (517)	45 (310)	25	B80

TABLE 2 – FATIGUE STRENGTH*

Test Temperature °F (°C)	Endurance Limit ksi. (MPa) – 10^7 cycles
70 (21)	58.0 (400)
700 (371)	49.0 (338)
850 (454)	43.5 (298)
1000 (538)	27.0 (186)

**Heat treated to 110 ksi. (758 MPa) YS.*

CORROSION RESISTANCE

Heat treated AK Steel Type 410 provides good corrosion resistance to air, water and some mild chemicals. It shows satisfactory resistance to nitric acid, concentrated sulfuric acid, dilute acetic acid and naptha. Resistance to food acids is good. In the as annealed condition this grade will exhibit poor corrosion performance and is not recommended.

FORMABILITY

AK Steel Type 410 has reasonably good cold working properties and can be moderately drawn and formed in the annealed condition.

WELDABILITY

The martensitic class of stainless steels has limited weldability due to its hardenability. Preheating to 550 °F (260 °C) is generally not required for thin sheet sections of this lower chromium martensitic stainless steel. Post-weld heat treatment should be considered to achieve required properties. This particular alloy is generally considered to have the best weldability of this stainless class. A major difference is the lower carbon content for this alloy which eliminates the need for post-weld heat treating. When a weld filler is needed, AWS E/ER 410, 410 NiMo, and 309L are most often specified.
Type 410 is well known in reference literature and more information can be obtained in this way.

HEAT TREATMENT

Annealing: Heat slowly to 1500 – 1650 °F (816 – 899 °C), cool to 1100 °F (593 °C) in furnace, air cool.

Process Annealing: Heat to 1350 – 1450 °F (732 – 788 °C), air cool.

Hardening: Heat to 1700 – 1850 °F (927 – 1010 °C), air cool or oil quench.
Follow by stress-relief or temper.

Stress Relieving: Heat at 300 – 800 °F (149 – 427 °C) for 1 to 2 hours, air cool.

Tempering: Heat to 1100 – 1400 °F (593 – 760 °C) for 1 to 4 hours, air cool.

AK Steel
AK Steel Corporation
9227 Centre Pointe Drive
West Chester, OH 45069
800.331.5050
www.aksteel.com

05.30.14