

17-4 PH STAINLESS STEEL

UNS S17400



AK Steel 17-4 PH® is a martensitic precipitation-hardening stainless steel that provides an outstanding combination of high strength, good corrosion resistance, good mechanical properties at temperatures up to 600°F (316°C), good toughness in both base metal and welds, and short-time, low-temperature heat treatments that minimize warpage and scaling. This versatile material is widely used in the aerospace, chemical, petrochemical, food processing, paper and general metalworking industries.

COMPOSITION

	%
Carbon	0.07 max.
Manganese	1.00 max.
Phosphorus	0.040 max.
Sulfur	0.030 max.
Silicon	1.00 max.
Chromium	15.00 - 17.50
Nickel	3.00 - 5.00
Copper	3.00 - 5.00
Columbium plus Tantalum	0.15 - 0.45

AVAILABLE FORMS

AK Steel produces 17-4 PH Stainless Steel sheet and strip in thicknesses from 0.015" to 0.125" (0.38 to 3.18 mm) in Condition A.

Condition A

Solution Treated
1900°F ± 25°F
(1038°C ± 14°C)
Air cool below
90°F (32°C)

STANDARD HEAT TREATMENTS

As supplied from the mill in Condition A, AK Steel 17-4 PH Stainless Steel can be heat treated at a variety of temperatures to develop a wide range of properties. Eight standard heat treatments have been developed.

Condition	Heat To ± 15°F (8.4°C)	Time at Temperature, hour	Type of Cooling
H 900	900°F (482°C)	1	Air
H 925	925°F (496°C)	4	Air
H 1025	1025°F (551°C)	4	Air
H 1075	1075°F (580°C)	4	Air
H 1100	1100°F (593°C)	4	Air
H 1150	1150°F (621°C)	4	Air
H 1150+1150	1150°F (621°C)	4	Air
	1150°F (621°C)	4 <i>followed by</i>	Air
H 1150-M	1400°F (760°C)	2	Air
	1150°F (621°C)	4 <i>followed by</i>	Air

FORMABILITY

Because this alloy in Condition A is hard, forming normally should be limited to mild operations. However, formability can be greatly improved by heat treating before cold working or by use of hot-forming methods.

CORROSION RESISTANCE

AK Steel 17-4 PH Stainless Steel withstands corrosive attack better than any of the standard hardenable stainless steels and is comparable to Type 304 in most media.

MECHANICAL PROPERTIES

Typical Mechanical Properties*

Property	A	H 900	H 925	Condition H 1025	H 1075	H 1150	H 1150-M
UTS, ksi (MPa)	160 (1103)	210 (1448)	200 (1379)	185 (1276)	175 (1207)	160 (1103)	150 (1034)
0.2% YS, ksi (MPa)	145 (1000)	200 (1379)	195 (1345)	170 (1172)	165 (1148)	150 (1034)	130 (896)
Elongation, % in 2" (50.8 mm)	5.0	7.0	8.0	8.0	8.0	11.0	12.0
Hardness, Rockwell	C35	C45	C43	C38	C37	C35	C33

*Cold-flattened sheets and strip.

PHYSICAL PROPERTIES

	Condition A (Magnetic)	Condition H 900 (Magnetic)	Condition H 1075 (Magnetic)	Condition H 1150 (Magnetic)
Density, lbs/in ³ (g/cm ³)	0.28 (7.78)	0.282 (7.80)	0.283 (7.81)	0.284 (7.82)
Electrical Resistivity, microhm-cm	98	77	—	—
Specific Heat BTU/lb/°F (32 - 212°F) kJ/kg•K (0 - 100°C)	0.11 (0.46)	0.11 (0.46)		
Thermal Conductivity BTU/hr/ft ² /in/F (W/m•K)				
300°F (149°C)		124 (17.9)		
500°F (260°C)		135 (19.5)		
900°F (482°C)		157 (22.6)		
Mean Coefficient of Thermal Expansion in/in/°F (µm/m•K)				
-100 - 70°F (-73 - 21°C)	—	5.8 x 10 ⁻⁶ (10.4)	—	6.1 x 10 ⁻⁶ (11.0)
70 - 200°F (21 - 93°C)	6.0 x 10 ⁻⁶ (10.8)	6.0 x 10 ⁻⁶ (10.8)	6.3 x 10 ⁻⁶ (11.3)	6.6 x 10 ⁻⁶ (11.9)
70 - 600°F (21 - 316°C)	6.2 x 10 ⁻⁶ (11.2)	6.3 x 10 ⁻⁶ (11.3)	6.6 x 10 ⁻⁶ (11.9)	7.1 x 10 ⁻⁶ (12.8)
70 - 800°F (21 - 427°C)	6.3 x 10 ⁻⁶ (11.3)	6.5 x 10 ⁻⁶ (11.7)	6.8 x 10 ⁻⁶ (12.2)	7.2 x 10 ⁻⁶ (13.0)

WELDABILITY

The precipitation hardening class of stainless steels is generally considered to be weldable by the common fusion and resistance techniques. Special consideration is

required to achieve optimum mechanical properties by considering the best heat-treated conditions in which to weld and which heat treatments should follow welding. This particular alloy is the most

common member of the class and is generally considered to have the best weldability. When a weld filler is needed, AWS E/ER 630 is most often specified. AK Steel 17-4 PH Stainless Steel is well known in reference literature and more information can be obtained in this way.

SPECIFICATIONS

Specifications are listed without revision indications. Contact ASTM Headquarters for latest ASTM revision. For AMS revision, contact AMS Division of SAE.

AMS 5604 Sheet, Strip and Plate

ASTM A 693 Plate, Sheet and Strip
(Listed as Grade 630-UNS S17400)

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

The information and data in this product data sheet are accurate to the best of our knowledge and belief, but are intended for general information only. Applications suggested for the materials are described only to help readers make their own evaluations and decisions, and are neither guarantees nor to be construed as express or implied warranties of suitability for these or other applications.

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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