



17-4PH DATA SHEET
(UNS S17400) W. Nr. 1.4542 Type 630

PRODUCT DESCRIPTION

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.

Composition

Carbon	0.07 max.
Manganese	1.00 max.
Phosphorus	0.04 max.
Sulfur	0.03 max.
Silicon	1.00 max.
Chromium	15.00-17.50
Nickel	3.00-5.00
Copper	3.00-5.00
plus Tantalum	0.15-0.45

Metric Practice

The values shown in this bulletin were established in U.S. customary units. The metric equivalents of U.S. customary units shown may be approximate. Conversion to the metric system, known as the International System of Units (SI) has been accomplished in accordance with ASTM E 380.

Standard Heat Treatments

As supplied from the Mill in Condition A, 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. The following chart outlines the times and temperatures required.

This alloy exhibits useful mechanical properties in Condition A. Tests at Kure Beach, NC, after 14 years show excellent stress corrosion resistance. Condition A material has been used successfully in numerous applications. The hardness and tensile properties fall within the range of those for Conditions H 1100 and H 1150.

However, in critical applications, the alloy is used in the precipitation-hardened condition, rather than Condition A. Heat treating to the hardened condition, especially at the higher end of the temperature range, stress relieves the structure and may provide more reliable resistance to stress corrosion cracking than in Condition A.

Condition A

	Condition	Heat To ±15°F(8.4°C)	Time at Temperature, hours	Type of Cooling
Solution Treated 1900°F ± 25°F (1038°C ± 14°C) Air cool below 90 °F (32°C)	H 900	1900°F (482°C)	1	Air
	H 925	1925°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	Air
	H 1150-M	1400°F (760°C)	2	Air
1150°F (621°C)		4	Air	

Mechanical Properties

17-4 PH Stainless Steel provides excellent mechanical properties. For applications requiring high strength and hardness plus corrosion resistance, this alloy is an outstanding choice. In addition, it is more cost effective than many high-nickel, non-ferrous alloys.

Condition A

Density

0.28 lbs/in³
7.75 g/cm³

Specific Heat

0.11 BTU/lb-°F @70°F
460 J/kg-°C @20°C

Electrical Resistivity

29.5 Microhm-in at 75°F
75 Microhm-cm at 24°C

Modulus of Elasticity

28.5x10⁶ psi
196 GPa

Melting Range

2560–2625°F
1404–1440°C

Thermal Conductivity 212°F(100°C)

10.6BTU-in/ft²-hr-°F
18.3 W/m-°C

Heat treatment in the 900°F (482°C) range produces the highest strength.

CONDITION	0.20% fset Yield Strength	Tensile Strength	Elongation in 2 in.	Reduction of Area	Hardness	Charpy V-Notch Impact Strength
	(ksi)	(ksi)	(%)	(%)	(Rc)	(ft.-lb.)
H900	198	183	15	52	44	16
H1025	168	162	16	58	38	40
H1075	164	148	17	59	36	45
H1150	144	126	20	60	33	55
H1150M	123	87	22	66	29	100
H1150D	150	110	20	60	29	50

Hot Forming

Heat uniformly at 1742 – 2192°F (950 – 1200°C). A full solution anneal, cooling lower than 76°F (25°C) and aging at the required temperature must occur after hot forming. The post forming heat treatment should be a function of the desired mechanical properties.

Cold Forming

Alloy 17-4PH has limited cold forming properties. Cold forming can only be undertaken on plates in the fully annealed condition. Stress corrosion resistance is enhanced by re-aging at the precipitation hardening temperature after cold working.

Cutting

Thermal cutting operations such as plasma cutting should be avoided. Mechanical cutting operations such as bandsaw, abrasive waterjet, shearing and machining are preferred.

Welding

Alloy 17-4PH can be readily welded by most standard processes including SMAW, GTAW, PAW and GMAW.

Corrosion Resistance

The corrosion resistance of Alloy 17-4PH is comparable to 304 stainless steel in most environments, and is generally superior to the 400 series stainless steels. It is used in applications where the combination of moderate corrosion resistance and unusually high strength are required. Alloy 17-4PH has corrosion resistance comparable to 304L in some chemical, dairy, food, paper and petroleum applications.

Alloy 17-4PH in the solution-annealed condition (Condition A) should not generally be put in service. The alloy is subject to brittle fractures and more sensitive to chloride stress corrosion cracking than the aged material.

If risks of chloride stress corrosion cracking are present the higher aging temperatures should be selected over 1022°F (550°C), preferably 1094°F (590°C). 1022°F (550°C) is the recommended tempering temperature in chloride service. 1094°F (590°C) is preferred in H₂S media.

Alloy 17-4PH is subject to crevice corrosion and pitting attack when exposed to stagnant seawater for a duration of time.

Applications

- Aerospace — structural and parts
- Biomedical — hand tools
- Chemical Processing
- Food Process Equipment
- Gate Valves
- Mechanical Components
- Nuclear Waste Processing and Storage
- Oil and Gas Production -- foils, helicopter deck platforms, etc.
- Pulp and Paper — paper mill Applications

Contact: Mr. Yuly Lee

ADD: Jiangdong Road, Sanhe Town, 621700, Jianguyou, SC, China

Email: sales@jhacer.com

Tel: +86-(0)816-3260757

Fax: +86-(0)816-3260757

Cell: +86-13658128897