

Description

17-4 PH/1.4548 is a martensitic precipitation-hardening stainless steel known for its excellent mechanical properties, high strength, and good corrosion resistance. It is suitable for applications requiring reliability under challenging conditions, making it a popular choice in various industries.

Chemical Composition

The nominal chemical composition of 17-4 PH is as follows:

- Chromium (Cr): 15.00 - 17.50%
- Nickel (Ni): 3.00 - 5.00%
- Copper (Cu): 3.00 - 5.00%
- Manganese (Mn): 1.00% max
- Silicon (Si): 1.00% max
- Carbon (C): 0.07% max
- Phosphorus (P): 0.04% max
- Sulfur (S): 0.03% max
- Columbium + Tantalum (Cb + Ta): 0.15 - 0.45% max

Mechanical Properties

Typical mechanical properties of 17-4 PH in the solution-annealed condition (Condition A) are:

- Ultimate Tensile Strength (UTS): 160 ksi (1103 MPa)
- Yield Strength (0.2% Proof): 145 ksi (1000 MPa)
- Elongation: 5% in 2 inches (51 mm)
- Hardness: Rockwell C 35

Thermal & Physical Properties

- Density: 0.2820 lb/in³ (7850 kg/m³)
- Melting Range: 2560 - 2625°F (1404 - 1440°C)
- Electrical Resistivity: 98 microhm-cm
- Linear Coefficient of Thermal Expansion:
 - 21-93°C: 10.8 µm/m·°C
 - 21-204°C: 10.8 µm/m·°C
 - 21-316°C: 11.2 µm/m·°C

- 21-427°C: 11.2 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$
- Thermal Conductivity:
 - At 149°C: 17.9 W/m·K
 - At 260°C: 19.5 W/m·K
 - At 460°C: 22.5 W/m·K

Other Designations

- UNS: S17400
- AMS: 5604
- ASTM: A693
- W. Nr./EN: 1.4548

Fabrication and Heat Treatment

17-4 PH can be fabricated using standard methods, including welding and machining. It is typically supplied in the solution-annealed condition (Condition A) and can undergo various aging treatments (H900, H1025, H1075, H1100, H1150) to enhance its mechanical properties.

Heat Treatment Conditions:

- Condition A: Solution treated at 1038 ± 14 °C (1900 ± 25 °F)
- Aging:
 - H900: 482 °C (900 °F) for 1 hour
 - H1150: 621 °C (1150 °F) for 4 hours

Applications

17-4 PH is widely used in:

- Aerospace components
- Chemical processing equipment
- Oil and petroleum refining equipment
- Food processing machinery
- Nuclear components
- Fasteners and base plates

Supplied Form

17-4 PH is available in various forms, including:

- Coil: Thickness from 0.029" to 0.130"
- Bar: Diameter from 0.250" to 5.000"

Features

- Excellent corrosion resistance, comparable to Type 304 stainless steel.
- High strength and hardness after heat treatment.
- Good weldability and ease of fabrication.

DIN Number

The DIN number for 17-4 PH stainless steel is 1.4548.

This datasheet provides a comprehensive overview of 17-4 PH stainless steel, highlighting its properties, applications, and specifications relevant for engineering and industrial use.

