

Description

15-5 PH stainless steel is a martensitic precipitation-hardening stainless steel that combines high strength with good corrosion resistance. It is particularly noted for its mechanical properties at elevated temperatures and is widely used in aerospace and other demanding applications.

Chemical Composition

The chemical composition of 15-5 PH stainless steel is as follows:

Element	Percent by Weight
Carbon (C)	0.07 max
Manganese (Mn)	1.00 max
Phosphorus (P)	0.040 max
Sulfur (S)	0.030 max
Silicon (Si)	1.00 max
Chromium (Cr)	14.00 - 15.50

Nickel (Ni)	3.50 - 5.50
Copper (Cu)	2.50 - 4.50
Columbium + Tantalum (Nb + Ta)	0.15 - 0.45

Mechanical Properties

The mechanical properties of 15-5 PH vary with heat treatment conditions:

Condition	UTS (ksi)	Yield Strength (ksi)	Elongation (%)	Hardness (Brinell)	Hardness (Rockwell)
A	161	145	6	388	C40
H900	209	170	6	388	C40
H1025	155	125	8	331	C35
H1075	145	125	9	311	C32
H1150	135	105	11	277	C28

Thermal & Physical Properties

Key thermal and physical properties include:

Property	Value
Density (g/cm ³)	7.75 - 7.86
Thermal Conductivity (W/m·K)	17.9 (at 300°F)
Coefficient of Thermal Expansion (µm/m·K)	6.0 - 6.6 (varies with temperature)

Other Designations

- UNS S15500
- AMS 5659
- ASTM A 639

Fabrication and Heat Treatment

15-5 PH stainless steel is supplied in the annealed condition (Condition A) and can be heat-treated to various conditions (H900, H1025, H1075, H1150, etc.) to achieve specific mechanical properties.

Heat Treatment Process

- Solution Annealing: Heat to 1900°F (1040°C) - 1950°F (1065°C) and cool to room temperature.
- Aging: Performed at lower temperatures (900°F to 1150°F) to enhance strength.

Applications

15-5 PH is commonly used in:

- Aerospace components
- Fasteners
- Oil and gas applications
- Power generation equipment
- Food processing machinery
- Valves, gears, and pumps

Supplied Form

15-5 PH stainless steel is available in various forms, including:

- Bars

Features

- High strength and hardness
- Excellent corrosion resistance
- Good toughness in both longitudinal and transverse directions
- Readily weldable with conventional methods

DIN Number

The DIN designation for 15-5 PH stainless steel is X5CrNiCuNb15-5.

This datasheet provides a detailed overview of 15-5 PH stainless steel, highlighting its composition, properties, and applications, ensuring a comprehensive understanding of this versatile material.