

17-7PH Stainless Steel (UNS S17700) - Technical Specification

AISI 631 Stainless Steel, also known as 17-7PH or UNS S17700

17-7PH is a precipitation-hardening stainless steel with excellent strength, hardness, and corrosion resistance, combined with good formability and minimal distortion during heat treatment. It is ideal for applications requiring high strength and moderate corrosion resistance.

Chemical Composition (% by weight)

Element	Composition (%)
Carbon (C)	≤ 0.09
Manganese (Mn)	≤ 1.00
Silicon (Si)	≤ 1.00
Phosphorus (P)	≤ 0.040
Sulfur (S)	≤ 0.030
Chromium (Cr)	16.0 - 18.0
Nickel (Ni)	6.50 - 7.75
Aluminum (Al)	0.75 - 1.50
Iron (Fe)	Balance

Mechanical Properties (Typical Values)

Condition A (Annealed)

Property	Value
Tensile Strength	≥ 1035 MPa (150 ksi)
Yield Strength (0.2%)	≥ 690 MPa (100 ksi)
Elongation (%)	≥ 20
Hardness (HB)	≤ 363

Condition TH 1050 (Peak Aged)

Property	Value
Tensile Strength	~ 1310 MPa (190 ksi)

Property	Value
Yield Strength	~1170 MPa (170 ksi)
Elongation (%)	~6 - 10
Hardness (HRC)	~43 - 48

Other common conditions: RH 950, CH 900, TH 1150, depending on the application.

Heat Treatment Conditions

Condition	Description
A	Solution Annealed (~1950° F / 1065° C), air cooled
RH 950	Annealed, cold reduced, aged at 950° F (~510° C)
CH 900	Annealed, cold reduced, aged at 900° F (~482° C)
TH 1050	Direct aging at 1050° F (~565° C)
TH 1150	Over-aging at 1150° F (~620° C), for improved toughness

Product Forms Available

- Round Bars / Rods (Ø6 mm - Ø200 mm)
- Sheets & Plates
- Strips & Foils (used in springs and aerospace components)
- Wire (cold drawn, annealed, or spring temper)
- Forged Discs / Rings / Flats
- Custom Machined Parts

Standards & Specifications

Organization	Standard
ASTM	A564, A693, A705
AMS	5644, 5528 (bar, forging, wire)
UNS	S17700
EN	1.4568
ISO / NACE	NACE MR0175 / ISO 15156

Corrosion Resistance

- Comparable to Type 304 in most environments
- Better resistance to stress corrosion cracking than martensitic grades
- Not suitable for marine chloride environments without post-aging passivation

Applications

- Aerospace components (bellows, diaphragms, fasteners)
- Springs and washers
- Heat exchangers and pressure vessels
- Nuclear and chemical processing equipment
- Medical and surgical tools (non-implantable)