

17-7 PH Stainless (Type 631, UNS S17700) — Material Data Sheet

ASTM A1082 bolting · ASTM A564 bar · UNS S17700 · Type 631 (17-7 PH®)

Semi-austenitic precipitation-hardening stainless steel, transformed and aged

The spring-and-sheet PH stainless — formable in the annealed condition, then transformed and aged to 185 ksi for springs, washers, clips and high-strength small fasteners.

TENSILE, RH950	185 ksi min	SOLUTION TREATMENT	1900 °F, water quench
TENSILE, TH1050	170 ksi min	ANNEALED HARDNESS	98 HRB / 229 HBW max
HARDNESS, RH950 / TH1050	41 / 38 HRC min	MAGNETIC	Yes after transformation

Nominal composition



Midpoints of the specification ranges, for orientation only. Limits are in the table.

Chemical composition — 17-7 PH (S17700) per ASTM A564 Table 1

Element	Symbol	Min %	Max %
Carbon	C	—	0.09
Manganese	Mn	—	1.00
Phosphorus	P	—	0.040
Sulfur	S	—	0.030
Silicon	Si	—	1.00
Chromium	Cr	16.00	18.00
Nickel	Ni	6.50	7.75
Aluminum	Al	0.75	1.50

Values per ASTM A564/A564M-19a Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.276 lb/in ³ (7.65 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
MAGNETIC	Yes after transformation

Heat treatment

Solution annealed at 1900 °F, formed or machined, then transformed and aged to RH950 or TH1050. The condition is recorded on the certificate.

Mechanical properties by condition — 17-7 PH per ASTM A1082 Table 3 and A564 Table 4

Condition	Treatment	Tensile strength, min (ksi)	Yield strength, min (ksi)	Elongation, min (%)	Reduction of area, min (%)	Hardness, min
RH950	1750 °F 10 min to 1 h, rapid cool; within 24 h cool to -100 °F, hold 8 h; warm; age 950 °F 1 h, air cool	185	150	6	10	41 HRC / 388 HBW
TH1050	1400 °F 90 min, cool to 55 °F within 1 h, hold 30 min; age 1050 °F 90 min, air cool	170	140	6	25	38 HRC / 352 HBW

Values per ASTM A1082/A1082M-16(2021) Table 3 and ASTM A564/A564M-19a Table 4 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Solution-annealed condition — 17-7 PH per ASTM A564 Table 2

Condition	Solution treatment	Hardness, max
A (annealed)	1900 ± 25 °F (1040 °C), water quench	98 HRB / 229 HBW

Values per ASTM A564/A564M-19a Table 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM A1082 / A1082M	High strength precipitation hardening and duplex stainless steel bolting (Type 631)
ASTM A564 / A564M	Age-hardening stainless bar (Type 631)
ASTM A693	Precipitation-hardening stainless plate, sheet and strip
AMS 5528 / 5529 / 5644	Aerospace 17-7 PH sheet and bar

Forms we supply in 17-7 PH

- Spring washers, Belleville washers and retaining rings
- Springs and clips
- Small high-strength bolts and studs to A1082
- Certified A564 bar and A693 strip

Typical applications

- Aerospace and defence springs and fasteners
- Belleville and lock washers for high-temperature bolting
- Instrument and valve springs
- Formed stainless hardware requiring high strength