

15-5 PH Stainless (XM-12, UNS S15500) — Material Data Sheet

ASTM A564 bar · AMS 5659 · UNS S15500 · XM-12 (15-5 PH®)

Martensitic precipitation-hardening stainless steel, the ferrite-free version of 17-4

17-4 PH strength with better transverse toughness — the premium PH stainless for forgings, pump shafts and aerospace and valve fasteners.

TENSILE, H900	190 ksi min	SOLUTION TREATMENT	1900 °F, cool below 90 °F
TENSILE, H1150	135 ksi min	CHARPY, H1150M	55 ft·lbf min
HARDNESS, H900 / H1150	40 / 28 HRC min	MAGNETIC	Yes

Nominal composition



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

Chemical composition — 15-5 PH (S15500) per ASTM A564 Table 1

Element	Symbol	Min %	Max %
Carbon	C	—	0.07
Manganese	Mn	—	1.00
Phosphorus	P	—	0.040
Sulfur	S	—	0.030
Silicon	Si	—	1.00
Chromium	Cr	14.00	15.50
Nickel	Ni	3.50	5.50
Copper	Cu	2.50	4.50
Niobium	Nb	0.15	0.45

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	0.283 lb/in ³ (7.83 g/cm ³)
MODULUS OF ELASTICITY	28.5 × 10 ⁶ psi (197 GPa)
MAGNETIC	Yes

Heat treatment

Solution treated at 1900 °F and cooled below 90 °F, then age hardened to the ordered condition after machining and threading.

Mechanical properties by condition — 15-5 PH (XM-12) per ASTM A564 Table 4, longitudinal, to 12 in.

Condition	Aging treatment	Tensile strength, min (ksi)	Yield strength, min (ksi)	Elongation, min (%)	Reduction of area, min (%)	Hardness, min	Charpy V-notch, min (ft·lbf)
H900	900 °F, 1 h	190	170	10	35	40 HRC / 388 HBW	—
H925	925 °F, 4 h	170	155	10	38	38 HRC / 375 HBW	5
H1025	1025 °F, 4 h	155	145	12	45	35 HRC / 331 HBW	15
H1075	1075 °F, 4 h	145	125	13	45	32 HRC / 311 HBW	20
H1100	1100 °F, 4 h	140	115	14	45	31 HRC / 302 HBW	25
H1150	1150 °F, 4 h	135	105	16	50	28 HRC / 277 HBW	30
H1150M	1400 °F, 2 h, air cool, then 1150 °F, 4 h	115	75	18	55	24 HRC / 255 HBW	55

Values per ASTM A564/A564M-19a Table 4 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Aging temperatures per A564 Table 4 are suggested values that may be varied to obtain the required properties; transverse values are lower and are listed in the specification.

Solution-treated condition — 15-5 PH per ASTM A564 Table 2

Condition	Solution treatment	Hardness, max
A (solution treated)	1900 ± 25 °F (1040 °C), cool to below 90 °F	38 HRC / 363 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 A564 / A564M	Hot-rolled and cold-finished age-hardening stainless bar (XM-12)
AMS 5659 / AMS 5862	Aerospace 15-5 PH bar and forgings
ASTM A705	Age-hardening stainless forgings
NACE MR0175 / ISO 15156	15-5 PH in double-aged conditions within hardness limits

Forms we supply in 15-5 PH

- Studs, bolts and cap screws in any A564 condition
- Pump shafts, impellers and valve stems machined to print
- Aerospace and defence components
- Certified A564 bar, solution treated or aged

Typical applications

- Aerospace structural fittings and fasteners
- Pump shafts and valve stems
- Oil-tool and wellhead components
- Nuclear and power-plant hardware
- Large forgings needing uniform through-section toughness