CNC MACHINING

Stainless Steel 17-4 PH

Precipitation Hardening Stainless Steel

Stainless steel 17-4 PH combines corrosion resistance with aerospace-grade strength. CNC machining delivers high precision mechanical components that can be heat treated to meet demanding performance specifications.



MACHINING ENVELOPE	LEAD TIME	TOLERANCE	PROCESS
1000 × 600 × 500 mm	5-7 business days	±0.025 mm typical	CNC Machining

MECHANICAL PROPERTIES

Stainless Steel 17-4 PH delivers exceptional mechanical performance, effectively handling demanding load conditions for high strength shafts and couplings, aerospace latch and hinge mechanisms, and fixtures and mold components.

Read the strength rows by condition. Every value is for an aged part, because producers advise against putting solution-treated bar into service.

PROPERTY	VALUE	TEST STANDARD
Tensile Strength, H900	**1340 MPa**	ATI 17-4 alloy data
Yield Strength Rp0.2, H900	**1240 MPa**	ATI 17-4 alloy data
Elongation at Break (in 50 mm), H900	**10 %**	ATI 17-4 alloy data
Hardness, H900	**43 HRC**	ATI 17-4 alloy data
Tensile Strength, H1075	**1070 MPa**	ATI 17-4 alloy data
Yield Strength Rp0.2, H1075	**930 MPa**	ATI 17-4 alloy data
Hardness, H1075	**36 HRC**	ATI 17-4 alloy data
Tensile Strength, H1150	**1000 MPa**	ATI 17-4 alloy data
Yield Strength Rp0.2, H1150	**860 MPa**	ATI 17-4 alloy data
Hardness, H1150	**31 HRC**	ATI 17-4 alloy data
Modulus of Elasticity	**196 GPa**	ATI 17-4 alloy data
Modulus of Rigidity	**77.2 GPa**	ATI 17-4 alloy data
Poisson's Ratio	**0.272**	AK Steel 17-4 PH bulletin

THERMAL PROPERTIES

Stainless Steel 17-4 PH maintains dimensional stability through temperature swings, and the expansion rows show how much a fit changes as a part warms across each range.

Design to the maximum service temperature, the point up to which the alloy keeps its high strength. Long exposure above it costs toughness, and short exposures should stay well below the aging temperature. Like other stainless steels it conducts heat poorly, and its conductivity rises with temperature.

PROPERTY	VALUE	TEST STANDARD
Thermal Conductivity, H900 (21–100 °C)	**17.8 W/m·K**	ATI 17-4 alloy data
Thermal Conductivity, H900 (21–500 °C)	**22.7 W/m·K**	ATI 17-4 alloy data
Coefficient of Thermal Expansion (H900, 21–93 °C)	**10.8 ×10⁻⁶/K**	AK Steel 17-4 PH bulletin
Coefficient of Thermal Expansion (H900, 21–316 °C)	**11.3 ×10⁻⁶/K**	AK Steel 17-4 PH bulletin
Coefficient of Thermal Expansion (H900, 21–427 °C)	**11.7 ×10⁻⁶/K**	ATI 17-4 alloy data
Specific Heat (0–100 °C)	**0.46 kJ/kg·K**	AK Steel 17-4 PH bulletin
Maximum Service Temperature (high strength retained)	**316 °C**	ATI 17-4 alloy data

PHYSICAL PROPERTIES

Consistent density and a uniform wrought structure keep critical features in tolerance and downstream finishing predictable.

The contraction row shows how much a part shrinks when aged from the solution-treated condition to H900. It is small and predictable, so finish allowances on tight features are set before machining, or the critical features are finished after aging. The composition rows are the ASTM A564 Type 630 limits.

PROPERTY	VALUE	TEST STANDARD
Density, H900	**7.81 g/cm³**	ATI 17-4 alloy data
Density, H1150	**7.86 g/cm³**	ATI 17-4 alloy data
Contraction on Aging, Condition A to H900	**0.04–0.06 %**	Carpenter and NAS bar data
Chromium (Cr)	**15.00–17.50 wt%**	ASTM A564 Type 630
Nickel (Ni)	**3.00–5.00 wt%**	ASTM A564 Type 630
Copper (Cu)	**3.00–5.00 wt%**	ASTM A564 Type 630
Niobium + Tantalum (Nb + Ta)	**0.15–0.45 wt%**	ASTM A564 Type 630
Carbon (C)	**≤ 0.07 wt%**	ASTM A564 Type 630
Manganese (Mn)	**≤ 1.00 wt%**	ASTM A564 Type 630
Silicon (Si)	**≤ 1.00 wt%**	ASTM A564 Type 630
Phosphorus (P)	**≤ 0.040 wt%**	ASTM A564 Type 630
Sulfur (S)	**≤ 0.030 wt%**	ASTM A564 Type 630

ELECTRICAL PROPERTIES

Stainless Steel 17-4 PH conducts electricity, so it suits grounded housings, fixtures and electrically integrated metal components, and its resistivity gives engineers reliable inputs for current flow and grounding models.

It is strongly ferromagnetic in every condition, including the solution-treated state, so it holds on magnetic fixtures and works with magnetic sensors, but it is not a choice for non-magnetic hardware.

PROPERTY	VALUE	TEST STANDARD
Electrical Resistivity, H900	**7.7×10^{-7} Ω·m**	ATI 17-4 alloy data
Electrical Resistivity, H1150	**8.6×10^{-7} Ω·m**	ATI 17-4 alloy data
Electrical Conductivity, H900	**1.30 MS/m**	Calculated from ATI resistivity
Magnetic Response	**Strongly ferromagnetic in all conditions**	ATI 17-4 alloy data

CHEMICAL PROPERTIES

The table gives AK Steel immersion corrosion rates for 17-4 PH bar across the H925, H1025 and H1150 aged conditions, beside annealed Type 304. Lower is better. Where the range is wide, H1150 sits at the high end in sulfuric and hydrochloric acid and H925 in nitric acid. Use the rates to screen candidates before application testing.

It resists rural and mild industrial atmospheres in every aged condition, and seacoast exposure brings only light rusting and pitting, much like Type 304. AK Steel rates it well suited to many marine valve and pump parts, although stagnant sea water causes crevice attack. Passivate machined parts, and remove aging heat tint by polishing, blasting or pickling.

CHEMICAL	17-4 PH, H925 TO H1150 (MM/A)	TYPE 304 ANNEALED (MM/A)
Sulfuric acid 1%, 35 °C	**< 0.03**	**0.71**
Sulfuric acid 5%, 35 °C	**0.10–0.23**	**6.1**
Hydrochloric acid 0.5%, 35 °C	**0.05–0.41**	**0.84**
Nitric acid 25%, boiling	**0.15–0.36**	**0.05**
Nitric acid 65%, boiling	**2.0–3.2**	**0.25**
Formic acid 10%, 80 °C	**0.05–0.13**	**2.5**
Acetic acid 33%, boiling	**0.10–0.15**	**7.6**
Phosphoric acid 20%, boiling	**0.03–0.05**	**0.05**
Sodium hydroxide 30%, 80 °C	**0.13–0.20**	**< 0.03**
Ammonium hydroxide 10%, boiling	**< 0.03**	**< 0.03**
Cola soft drink syrup, 35 °C	**< 0.03**	**< 0.03**
Salt, sugar and vinegar, boiling	**< 0.03**	**< 0.03**

COMPLIANCE

Producers make 17-4 PH bar to ASTM A564 Type 630, which sets the minimum properties for each aged condition, and to AMS 5643, its aerospace counterpart for bar and forgings.

STANDARD	STATUS
ASTM A564 / ASME SA-564 (Type 630, UNS S17400) Bar, wire and shapes specification for 17-4 PH; H900 minimums 1310 MPa UTS, 1170 MPa yield, 10% elongation	ATI / Carpenter listed specification

AMS 5643 Aerospace specification for 17-4 PH bars, forgings, tubing and rings	ATI listed specification

MANUFACTURING

Colours & finishes	**Deburring, passivation and grinding**
Surface finish	**As-machined Ra 1.6-3.2 µm; precision finish Ra 0.4 µm**
Heat treatment	**Aging heat treatment**