



Grade	Code	EN	Precipitation-Hardening Stainless Steels
15-5PH	X5CrNiCu15-5	1.4545	

Steel Properties

15-5PH is a high-strength martensitic stainless steel that can be precipitation hardened. Developed as an advanced derivative of 17-4PH, its more homogeneous microstructure provides improved transverse toughness, ductility and forgeability. The material is generally supplied in the solution-treated condition, and the required balance of strength and toughness is obtained through a single-stage, low-temperature ageing treatment. By combining high mechanical strength with good corrosion resistance, dimensional stability and machinability, it is a preferred PH stainless steel for precision components exposed to high loads.

Chemical Analysis (15-5PH)

C %	Mn %	Si %	P %	S %	Cr %	Ni %	Cu %	Nb + Ta %
≤0.07	≤1.00	≤1.00	≤0.040	≤0.030	14.00 – 15.50	3.50 – 5.50	2.50 – 4.50	0.15 – 0.45

Mechanical Properties (Condition A)

Product form	Rp0.2 [MPa]	Rm [MPa]	Elongation [%]	Hardness [HB]	Density [g/cm ³]
Bar	827–903	931–1,007	14–17	≈286	7.75
Plate	≈963	≈1,110	≈8	≈327	7.78

Applications

Sector	Products
Aerospace	Aircraft structural fittings, engine components, flap tracks
Defence industry	Missile-system components, firearm mechanism components, high-strength fasteners
Oil and gas	Wellhead components, high-pressure valve bodies, pump shafts
Chemical and petrochemical	Process valves, pump components, high-pressure fittings
Energy and nuclear	Nuclear reactor components, turbine shafts, compressor components
Food processing	Mixer shafts, pump shafts, valve components
Pulp and paper	Roll shafts, pump shafts, valve components
General engineering	Gears, drive shafts, high-strength bolts



Description

15-5PH offers consistent mechanical properties, particularly in thick sections and parts loaded from different directions, due to the homogeneous microstructure and low delta-ferrite content achieved through controlled melting practices. In Condition A, the material can be machined and welded; subsequent single-stage ageing at low temperature forms copper-rich precipitates, producing high strength and hardness. This treatment allows the part to be machined close to its final dimensions while limiting the risk of distortion. **15-5PH** may undergo approximately 0.04–0.10% dimensional contraction during ageing, so close tolerances should be planned accordingly. The final heat-treatment condition should be selected by considering strength, toughness, fatigue performance and stress-corrosion requirements together.

Designations

15-5PH, 15Cr-5Ni, PH15-5, SAE 15-5, EN/DIN 1.4545, X5CrNiCu15-5, UNS S15500, ASTM XM-12

Standards

Product form	ASTM	AMS
Bar	ASTM A564/A564M – Grade XM-12	AMS 5659
Plate	ASTM A693/A693M – Grade XM-12	AMS 5862

Alternative Grades

- 13-8PH** – The closest alternative for components requiring high strength, toughness and resistance to stress-corrosion cracking.
- 17-7PH** – May be considered particularly for sheet and thin-plate applications requiring high strength and fatigue resistance.
- 1.4418** – Suitable for bars, shafts and thick-section components where high strength must be combined with impact toughness.