

17-4 PH, Type, 17-4 PH, WNR 1.4542, UNS S17400, AISI 630, Grade 17-4 PH, AFNOR Z6CNU17.04 - Stainless Steel

Introduction :

17-4PH stainless steel is a precipitation hardening martensitic stainless steel with an addition of niobium. It provides high hardness and strength with good corrosion resistance. In the solution annealed condition this alloy is furnished. It should not be used for cryogenic services or at the temperature above 572°F. By subjecting the alloy to age hardening heat treatment optimal mechanical properties can be obtained. 17-4PH grade stainless steel has high ductility and by using all conventional techniques it can be formed. Stainless steel 17-4PH is stronger than the regular stainless steel due to which powerful equipment's are required for forming it and during cold working heavy duty lubricants are used. It produces the highest strength at the range of 900°F in the heat treatment. In most environment corrosion resistance of alloy 17-4PH is comparable to 304 stainless steel. 17-4PH is commonly higher to the 400 stainless steel series and it is useful application where the combination of high strength and moderate corrosion resistance is required. It is widely used in food processing, chemical industry, aerospace, By standard fabrication methods alloy 17-4PH stainless steel can be easily welded.

Chemical Composition

	17-4 PH	TYPE 17-4 PH	WNR 1.4542	UNS S17400	AISI 630	GRADE 17-4 PH	AFNOR Z6CNU17.04
Carbon	0.07 max	0.07 max	0.07 max	0.07 max	0.07 max	0.07 max	0.07 max
Manganese	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max
Phosphorus	0.040 max	0.040 max	0.040 max	0.040 max	0.040 max	0.040 max	0.040 max
Sulfur	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max	0.030 max
Silicon	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max
Chromium	15.0-17.5	15.0-17.5	15.0-17.5	15.0-17.5	15.0-17.5	15.0-17.5	15.0-17.5
Nickel	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0
Copper	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-5.0
Columbium + Tantalum	0.15-0.45	0.15-0.45	0.15-0.45	0.15-0.45	0.15-0.45	0.15-0.45	0.15-0.45

Mechanical Properties

	17-4 PH	TYPE 17-4 PH	WNR 1.4542	UNS S17400	AISI 630	GRADE 17-4 PH	AFNOR Z6CNU17.04
Ultimate Tensile Strength, ksi[Mpa]	160[1103]	160[1103]	160[1103]	160[1103]	160[1103]	160[1103]	160[1103]
0.2% Yield Strength, ksi[Mpa]	145[1000]	145[1000]	145[1000]	145[1000]	145[1000]	145[1000]	145[1000]
Elongation % in 2" [50.8mm]	5%	5%	5%	5%	5%	5%	5%

Standard Available in forms :

- ASTM A182/ ASME SA182 Stainless Steel Pipe Fittings
- ASTM A213 / ASME SA213 Seamless Stainless Steel Pipes
- ASTM A240/ ASME SA240 Stainless Steels Sheets / Plates
- ASTM A249/ ASME SA249 Stainless Steel Welded Tubes
- ASTM A269/ ASME SA269 Stainless Steel Tubes
- ASTM A270/ ASME SA270 Stainless Steel Sanitary Tubes
- ASTM A312/ ASME SA312 Stainless Steel Pipes
- ASTM A403/ ASME SA403 Stainless Steel Pipe Fittings
- ASTM A554/ ASME SA554 Stainless Steel Welded Tubes
- ASTM A731/ ASME SA731 Stainless Steel Pipes
- ASTM A789/ ASME SA789 Stainless Steel Tubes
- ASTM A790/ ASME SA790 Stainless Steel Pipes
- ASTM A791/ ASME SA791 Stainless Steel Tubes

Products Available in forms :

- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Plates
- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Pipes
- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Round Bar
- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Tube
- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Flanges
- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Wire
- 17-4 PH, Type 17-4 PH, WNR 1.4542, UNS S17400, AISI 630 Fittings

Machinability

- Grade 17-4 stainless steel can be machined in the annealed condition.
- This alloy has long and gummy chips.
- Before final hardening, post machining solution treatment is needed if it is machined in the H1150M condition.

Forming

- Grade 17-4 stainless steel can be formed mildly.

Welding

- Grade 17-4 stainless steel can be welded using common fusion and resistance welding methods.
- Oxyacetylene welding method is not preferred for welding this alloy.

Heat Treatment

- Grade 17-4 stainless steel is soaked at 1038°C [1900°F] for 30 min and cooled below 16°C [60°F] for complete martensite transformation in the condition A.
- The condition A material is treated at 482°C [900°F] for 1 h followed by cooling.
- Solution treated material is soaked for 4 h at specific temperature in H925, H1025, H1075, H1100, and H1150 conditions followed by cooling in air.
- Solution treated material is soaked at 760°C [1400°F] for 2 h in the H1150M condition followed by cooling.
- It is again heated at 620°C [1150°F] for 4 h followed by cooling.

Forging

- Grade 17-4 stainless steel is forged at 1010°C [1850°F]. Before performing this process, it is soaked at 1177°C [2150°F].
- Post-work solution treatment should be performed before final hardening.

Hot Working

- Grade 17-4 stainless steel can be hot worked using common processes.
- It is treated at 1038°C (1900°F).
- Post-work solution treatment should be performed before final hardening.

Cold Working

- Grade 17-4 stainless steel can be cold worked using common techniques in spite of its high initial yield strength.

Annealing

- Grade 17-4 stainless steel is annealed at 1038°C (1900°F) for 0.5 h followed by cooling rapidly.

Hardening

- Grade 17-4 stainless steel has high ductility, and can be formed using all conventional techniques.
- Powerful equipments are required for forming this alloy because it is stronger than the regular steel.
- Heavy-duty lubricants are used during cold working.

Applications

- Nuclear reactor
- Aircraft and gas turbines
- Oil field
- Chemical process components
- Paper mill



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