



List of Core values

Professional, Reliable, Efficient

17-7 PH

Stainless 17-7 PH Precipitation-Hardening Stainless Steel in sheet and strip forms provide valuable property combinations particularly well suited for aerospace applications. This special alloy also provides benefits for other applications requiring high strength and good corrosion resistance, as well as excellent properties for flat springs up to 600°F (316°C). 17-7PH provides high strength and hardness, excellent fatigue properties, good corrosion resistance and minimum distortion on heat treatment.

Applications

- Aerospace applications
- Chemical processing equipment
- Oil and petroleum refining equipment
- Food processing equipment

Available forms of 17-7 PH are seamless pipe, welded pipe, seamless tube, welded tube, bar, wire, sheet, plate, forgings, pipe fittings and flanges.



WIRE
(17-7 PH®)



BAR
(17-7 PH®)



SHEET / PLATE
(17-7 PH®)



TUBE
(17-7 PH®)



FORGINGS
(17-7 PH®)



WELD ROD
(17-7 PH®)

Features

- Provides valuable property combinations particularly well suited for aerospace applications
- Provides benefits for other applications requiring high strength and good corrosion resistance
- High strength and hardness
- Excellent fatigue properties
- General metalworking

Specifications

- AMS 5528 (Plate, Sheet, and Strip)
- AMS 5529 (Sheet and Strip)
- AMS 5568 (Tubing)
- AMS 5644 (Bar and Forging)



Chemical Composition, %

Element	min	max
Carbon, C	—	0.09
Manganese, Mn	—	1
Silicon, Si	—	1
Sulfur, S	—	0.03
Phosphorus, P	—	0.04
Chromium, Cr	16	18
Aluminum, Al	0.75	1.5
Nickel, Ni	6.5	7.75
Iron, Fe	—	*Balance

Resistance to Corrosion: Corrosion resistance of Type 17-7PH stainless steel in all heat-treated conditions, like other types of stainless steels – will develop superficial rust in some environments. However, after exposure of one or two years, the amount of rust present is little more than that present at six months. It may be subject to cracking when exposed under stress in environments containing hydrogen sulfide

Physical Properties

Property	Value
Tensile Strength	170000 psi
Yield Strength	140000 psi
Modulus of Elasticity	29600 ksi
Poisson's Ration	0.27 – 0.30
Elongation at Break	6%
Hardness, Rockwell C	38

Thermal properties

Property	Value
Thermal Conductivity	114 BTU in/hr.ft ² .°F
Thermal Expansion co-efficient	6.11 µm/m°C



Heat treatment

Stainless Steel 17-7PH can be heat treated and annealed in electric furnaces, radiant tube furnaces that work both on oil and gas, and vacuum furnaces. The use of furnaces that use oil or natural gas fire is not recommended. Given the fact that 17-7PH doesn't work well in reducing environments, heat treatment, and annealing in such atmospheres should be avoided. These atmospheres may be responsible for nitriding of the surface. If bright annealing is required, dry hydrogen, argon or helium atmosphere can be used at cooling rate of -65°F (-54°C).

Depending on the condition, different heat treatments of 17-7PH are recommended:

- Condition A – mill Annealed at $1950 \pm 25^{\circ}\text{F}$ ($1066 \pm 14^{\circ}\text{C}$).
- Condition A1750 – mill Annealed at $1950 \pm 25^{\circ}\text{F}$ ($1066 \pm 14^{\circ}\text{C}$), then heat to $1750 \pm 15^{\circ}\text{F}$ ($954 \pm 8^{\circ}\text{C}$) for 10 minutes and air cool to room temperature.
- Condition T – mill Annealed at $1950 \pm 25^{\circ}\text{F}$ ($1066 \pm 14^{\circ}\text{C}$), then heat to $1400 \pm 25^{\circ}\text{F}$ ($760 \pm 14^{\circ}\text{C}$) and hold for 90 minutes. Finally, cool to 60°F (16°C) within 1 hour and hold for 30 minutes.
- Condition TH 1050 – mill Annealed at $1950 \pm 25^{\circ}\text{F}$ ($1066 \pm 14^{\circ}\text{C}$), then heat to $1400 \pm 25^{\circ}\text{F}$ ($760 \pm 14^{\circ}\text{C}$) and hold for 90 minutes. Next, cool to 60°F (16°C) within 1 hour and hold for 30 minutes. Finally, heat to $1050 \pm 10^{\circ}\text{F}$ ($566 \pm 5.5^{\circ}\text{C}$) and hold for 90 minutes, then air cool to room temperature.
- Condition R 100 – mill Annealed at $1950 \pm 25^{\circ}\text{F}$ ($1066 \pm 14^{\circ}\text{C}$), then heat to $1750 \pm 15^{\circ}\text{F}$ ($954 \pm 8^{\circ}\text{C}$) for 10 minutes and air cool to room temperature. Within 1 hour, start cooling to $-100 \pm 10^{\circ}\text{F}$ ($73 \pm 5.5^{\circ}\text{C}$) and hold for 8 hours before air warming to room temperature.
- Condition RH 950 – the same as Condition R 100 only with added precipitation hardening at $950 \pm 10^{\circ}\text{F}$ ($510 \pm 5.5^{\circ}\text{C}$) for 60 minutes and then air cooling to room temperature.



Fabrication and working instructions

Stainless Steel 17-7PH hardens rapidly during heat treatment and requires intermediate annealing in deep drawing or in forming intricate parts. In some conditions, like Condition C, for example, this steel can be very hard and strong, which means that advanced fabrication techniques for such materials should be used.

As for machining, special care must be applied to the speed at which the parts are machined. 17-7PH Stainless Steel can display long gummy chips during machining, and therefore slower speeds are recommended, accompanied by constant feeds.

17-7PH Stainless Steel can be welded by all conventional fusion and resistance techniques. However, if optimum mechanical properties are wanted, special care is recommended to find the best heat-treated conditions that should be done during the welding. The following heat treatments of the welded part are also essential for excellent mechanical properties. More precisely, austenite conditioning and precipitation hardening are mandatory after the welding is finished to obtain high strength.

Overall, 17-7PH is not as weldable as 17-4PH Stainless Steel. The reason for this is the high concentration of Aluminum, which deteriorates penetration of the weld, thus creating a bond that is not as strong. Weld slug formation can also be worsened during arc welding, which is another area that requires special care.



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Collect steel pipes and fittings

