17-7 PH® Stainless Steel, UNS S17700

Shaped, Flat, Square, Round, Fine Wire, Plated and Bare Wire
AMS 5528 (COND A), AMS 5529 (COND C), ASTM A693, MIL-S25043

17-7PH® Alloy Description

Alloy 17-7 PH® precipitation hardening stainless steel alloy. It is a semi-austenitic being austenitic in the annealed condition and martensitic in the hardened condition. Alloy 17-7 PH® provides high strength and hardness, excellent fatigue properties, good corrosion resistance and minimum distortion upon heat treatment. It is easily formed in the annealed condition, then hardened to high strength levels by simple heat treatments to Conditions RH 950 and TH 1050. The exceptionally high strength of Condition CH 900 offers many advantages where limited ductility and workability are permissible. In its heat treated condition, this alloy provides exceptional mechanical properties at temperatures up to 900°F (482°C).

Applications

Springs, washers and clips
Surgical instruments
Aerospace components
Blades

Chemistry Typical

Carbon: 0.090 max
Manganese: 1.00 max
Silicon: 1.00 max
Chromium: 16.00-18.00
Nickel: 6.50-7.75
Aluminum: 0.75-1.50
Phosphorus: 0.040 max
Sulfur: 0.030 max
Iron: Balance

**Physical Properties**

Density: (Cond. A), 0.282lbs/in³, 7.80 g/cm³

Electrical Resistivity: (microhm-cm) (all conditions):
68°F (20°C): 80

Thermal Conductivity: BTU/hr/ft²/ft/°F (W/m•K):
At 300°F (149°C): 9.5 (16.5)

Mean Coefficient of Thermal Expansion: in/in/°F (μm/m•K): (Cond. A)
70-200°F (21-93°C): 8.5 x 10⁻⁶ (15.3)
70-400°F (21-204°C): 9.0 x 10⁻⁶ (16.2)
70-600°F (21-315°C): 9.5 x 10⁻⁶ (17.1)
70-800°F (21-427°C): 9.6 x 10⁻⁶ (16.0)

Magnetic Permeability:
Annealed: Weakly ferromagnetic
Heat treated: Strongly ferromagnetic

Modulus of Elasticity: KSI (MPa)
29.0 x 10³ (200 x 10³) in tension

**Mechanical Properties at Room Temperature**

Properties: Annealed

Gauge Range: < .010 inches
Ultimate Tensile Strength: 150 KSI max (1035 MPa max)
Yield Strength (0.2% offset): 65 KSI max (450 MPa max)
Elongation: Consult Ulbrich Wire

**Gauge Range: > .010 inches**
Ultimate Tensile Strength: 150 KSI max (1035 MPa max)
Yield Strength (0.2% offset): 55 KSI max (380 MPa max)
Elongation: 20% min
Hardness: Rb 92 max

**Typical Condition C**
Ultimate Tensile Strength: 200 KSI min (1380 MPa min)
Yield Strength (0.2% offset): 175 KSI min (1205 MPa min)
Elongation: 1% min
Hardness: Rc 41 min (aim)

**Additional Rolled Tempers:**
Consult Ulbrich Wire if tempers other than Condition C are required.

**Heat Treat Capabilities**

**TH1050 Typical**
Ultimate Tensile Strength: 180 KSI min (1240 MPa min)
Yield Strength: (0.2% Offset) 150 KSI min (1034 MPa min)
Elongation: Consult Ulbrich Technical Services
Hardness: Rc 38 min

**RH950 Typical**
Ultimate Tensile Strength: 210 KSI min (1450 MPa min)
Yield Strength: (0.2 Offset) 190 KSI min (1310 MPa min)
Elongation: Consult Ulbrich Technical Services
Hardness: Rc 44 min

**CH900 Typical**
Ultimate Tensile Strength: 240 KSI min (1655 MPa min)
Yield Strength: (0.2% Offset) 230 KSI min (1586 MPa min)
Elongation: 1% min
Hardness: Rc 46 min (aim)

Additional Properties

Corrosion Resistance
Refer to NACE (National Association of Corrosion Engineers) for recommendations.

Standard Wire Finishes
Extra Clean: (XC) Extra clean is also referred to as “bright annealed” or “bright annealed and cold rolled”
Grease (round wire only): Drawn in a heavy grease produces an “Ultra bright” finish for decorative applications
Soap (round wire only): Soap is used as a lubricant in the drawing process and is not removed. It acts as a lubricant during customer part forming operation. A soap finish is available in tempered products.
Plated: Many plating options are available.
*Special finishes are available: Contact Ulbrich Wire Sales with special finish and plating requests.

Forms
Continuous Coils
Cut to lengths
Precision cutting

Hardening:
Alloy 17-7 PH® can be hardened by:
Heat treatment from “Condition A” (RH950 or TH1050)
Cold rolling: Condition 1/2 C, 3/4 C, C
Heat treatment of Condition C (CH900)

Welding
For best results refer to: SSINA’s “Welding of Stainless Steels and Other Joining Methods

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