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17-7PH® STAINLESS STEEL, UNS S17700

**Strip, Coil, Foil, Wire, AMS 5528 (COND A), AMS 5529 (COND C),
ASTM A693, MIL-S25043**

Applications

Springs, Washers, Clips, Surgical parts, Blades, Bellows and Honeycomb

Description

Type 17-7PH® Precipitation Hardening Alloy is a semi-austenitic stainless steel which is austenitic in the annealed condition, but martensitic in the hardened condition. Type 17-7PH® 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).

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): 0.282 lbs/in³ 7.80 g/cm³

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

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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): 8.5×10^{-6} (15.3)

70 - 400 °F (21 - 204 °C): 9.0×10^{-6} (16.2)

70 - 600 °F (21 - 315 °C): 9.5×10^{-6} (17.1)

70 - 800 °F (21 - 427 °C): 9.6×10^{-6} (16.0)

Modulus of Elasticity: ksi (MPa)

29×10^3 (200×10^3) in tension

Magnetic Permeability:

Annealed: Weakly ferromagnetic

Heat treated: Strongly ferromagnetic

Forms

Coil – Strip, Foil, Ribbon

Wire – Profile, Round, Flat, Square

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 Technical Services

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 Technical Services if tempers other than Condition C are required.

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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.

Finishes

- # 1 – Hot rolled annealed and descaled. It is available in strip, foil and ribbon. It is used for applications where a smooth decorative finish is not required.
- # 2D – Dull finish produced by cold rolling, annealing and descaling. Used for deep drawn parts and those parts that need to retain lubricants in the forming process.
- # 2B – Smooth finish produced by cold rolling, annealing and descaling. A light cold rolling pass is added after anneal with polished rolls giving it a brighter finish than 2D.
- #BA – Bright annealed cold rolled and bright annealed
- #CBA – Course bright annealed cold rolled matte finish and bright anneal
- #2 – Cold Rolled
- # 2BA – Smooth finish produced by cold rolling and bright annealing. A light pass using highly polished rolls produces a glossy finish. A 2BA finish may be used for lightly formed applications where a glossy finish is desired in the formed part.
- Polished – Various grit finish for specific polish finished requirements.

** Not all finishes are available for all alloys – Contact Ulbrich Sales for more information.*

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Wire Finishes

XC – Extra clean bright annealed or bright annealed and cold rolled

Grease – Ultra-bright finish (for decorative applications)

Soap – Soap is not removed from tempered wire to act as a lubricant.

* *Contact Ulbrich Wire for custom wire finishes.*

Hardening

Type 17-7PH® 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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