



BROWN METALS COMPANY

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ALLOY TECHNICAL DATA SHEET

TYPE 17-7PH® STAINLESS STEEL

Precipitation-Hardening Stainless Steel · UNS S17700

GENERAL PROPERTIES

17-7PH® (S17700) is a chromium-nickel-aluminum precipitation-hardening stainless steel for applications requiring high strength and a moderate level of corrosion resistance, including aerospace components and springs.

It can be formed in a soft austenitic condition and hardened to high strength by low-temperature heat treatments, which cause far less distortion than conventional quench-and-temper hardening. Vacuum-arc or electroslag remelted material is available for added fatigue resistance in cyclically stressed parts.

CHEMICAL COMPOSITION

Percent by weight, maximum unless range is specified — ASTM A693

Element	17-7PH®
Carbon	0.09
Manganese	1.00
Phosphorus	0.040
Sulfur	0.030
Silicon	1.00
Chromium	16.00–18.00
Nickel	6.50–7.75
Aluminum	0.75–1.50
Iron	Balance

MECHANICAL PROPERTIES — CONDITION A (ANNEALED)

Typical room-temperature values, sheet & strip

Property	Annealed (A)	RH 950	TH 1050
Tensile, psi (MPa)	130,000 (900)	220,000 (1520)	190,000 (1310)
0.2% Yield, psi (MPa)	45,000 (310)	200,000 (1380)	160,000 (1100)
Elongation, %	30	9	10
Hardness, Rockwell	B85	C46	C42

Data are typical and do not necessarily represent minimum or maximum values. Each lot may vary.

MECHANICAL PROPERTIES — CONDITION C

Typical room-temperature values, sheet & strip

Property	Condition C	CH 900
Tensile, psi (MPa)	200,000 (1380)	240,000 (1655)
0.2% Yield, psi (MPa)	175,000 (1205)	230,000 (1585)

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Values are typical or specification minimums as noted, provided for information only, and should not be used as design limits or as a guarantee of properties for any particular lot or application. Certified test reports are supplied with each order. 17-7PH® is a registered trademark of Cleveland-Cliffs Steel Corporation.

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HEAT TREATMENT

Hardening from Condition A takes two steps: an austenite-conditioning treatment that lets the austenite transform to martensite, then a precipitation-hardening (aging) treatment.

- TH 1050: condition at 1400 °F (760 °C) — martensite forms on cooling to near room temperature — then age at 1050 °F (565 °C).
- RH 950: condition at 1750 °F (955 °C), complete the transformation by holding at –100 °F (–73 °C), then age at 950 °F (510 °C).
- CH 900: Condition C material, already transformed by heavy cold work, is aged directly at 900 °F (482 °C).

Aging can be driven past peak strength; higher temperatures or longer times produce lower strength.

PHYSICAL PROPERTIES

Melting range	2560–2625 °F (1404–1440 °C)
Density	0.282 lb/in ³ (7.80 g/cm ³)
Specific gravity	7.81
Modulus of elasticity (tension)	29 × 10 ⁶ psi (200 GPa)
Specific heat, 32–212 °F	0.12 Btu/lb·°F (500 J/kg·K)
Thermal conductivity, hardened, 70–300 °F	≈ 9.5 Btu/hr·ft·°F (16.5 W/m·K)
Electrical resistivity	≈ 80 microhm-cm, annealed or hardened

THERMAL EXPANSION, 70–200 °F (21–93 °C)

Condition	in/in/°F	cm/cm/°C
Annealed	8.5 × 10 ^{–6}	15.3 × 10 ^{–6}
RH 950	5.7 × 10 ^{–6}	10.3 × 10 ^{–6}
TH 1050	5.6 × 10 ^{–6}	10.1 × 10 ^{–6}

MAGNETIC PERMEABILITY

Weakly ferromagnetic when annealed; strongly ferromagnetic in Conditions RH 950 and TH 1050.

CORROSION RESISTANCE

Corrosion resistance is comparable to Type 304 in most media and generally superior to the hardenable 400 series stainless steels.