

Material Data Sheet

Stainless Steel - Grade 17-4 (UNS S17400)

Printer Process Specifications

Material	17-4 Stainless Steel (UNS17400, 1.4542)
Layer Thickness (µm)	30
Laser Power (W)	100
Additive Manufacturing System	XM200C
Print Parameters	17-4-C-30-210830

Material Description

Stainless Steel Grade 17-4 is the most widely used of the precipitation-hardening stainless steels. Its primary alloying elements are chromium (15-17.5%), nickel (3-5%), and copper (3-5%). 17-4 exhibits high toughness, strength, and corrosion resistance, making it useful for a range of applications. It has excellent processing flexibility, and can be hot or cold worked, and formed using all conventional means with relative ease.

Material Properties

- High toughness and strength
- Good corrosion resistance
- Precipitation hardening
- Versatile in processing

Applications

- Paper mill batch digesters
- Turbine blades
- Food processing equipment
- Marine applications

General Wrought Material Data ⁽¹⁾

Density [g/cc]	7.72
Thermal Conductivity [W/m*K]	17.9
Melting Range [°C]	1404-1440
Coefficient of Thermal Expansion (0 to 100 °C) [K ⁻¹]	1.08x10 ⁻⁵

⁽¹⁾ From AZO Materials

Chemical Composition ⁽²⁾

Element	Mass %
Fe	Balance
Cr	15.5 - 16.7
Ni	3.6 - 4.6
Cu	3.0 - 3.5
Si	0.50 - 1.00
Nb	0.15 - 0.40
Nb + Ta	0.15 - 0.45
Al	0.05 Max
C	0.06 Max
Co	0.40 Max
Mn	0.70 Max
Mo	0.50 Max
N	0.030 Max
O	0.040 Max
P	0.025 Max
S	0.025 Max

⁽²⁾ From Praxair Surface Technologies

Heat Treatment

Testing samples were precipitation hardened at 1040 °C for 30 minutes and air cooled, then aged at 460 °C for 1 hour and air cooled.

Mechanical Properties

	Mean Value	Standard Deviation
Component Density [g/cc]	7.70	--
Percentage of Theoretical density	99.70%	--
Ultimate Tensile Strength (UTS) - ASTM E8		
Horizontal (XY) [ksi (MPa)]	197 (1357)	2.2 (15.3)
Vertical (Z) [ksi (MPa)]	189 (1301)	14.6 (101)
Yield Strength - ASTM E8		
Horizontal (XY) [ksi (MPa)]	182 (1254)	1.7 (11.9)
Vertical (Z) [ksi (MPa)]	174 (1200)	11.1 (76.8)
Elongation at Break - ASTM E8		
Horizontal (XY)	9.7%	3.9%
Vertical (Z)	5.0%	1.7%
Hardness (Rockwell) - ASTM E18	42.0	1.00



Powder Particle Size Distribution ⁽³⁾

Per ASTM B822 (Using Microtrac)	Min	Max
-16	0	2
d10 (microns)	10	25
d50 (microns)	20	35
d90 (microns)	40	55

⁽³⁾ From Praxair Surface Technologies

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