LayrrSteel 17-4 PH

Type analysis

Single figures are nominal except where noted.

Iron	Balance
Nickel	3.00-5.00 %
Niobium + Tantalum	0.15-0.45 %
Carbon	Max 0.07 %

Chromium	15.00-17.50 %
Manganese	Max 1.00 %
Nitrogen	Max 0.10 %
Phosphorus	Max 0.040 %

Copper	3.00-5.00 %
Silicon	Max 1.00 %
Oxygen	Max 0.10 %
Sulfur	Max 0.030 %

Description

LayrrSteel 17-4 PH is a versatile, chromium-copper stainless steel engineered for applications requiring a unique combination of high strength, hardness, and excellent corrosion resistance. Designed for Laser Powder Bed Fusion (LPBF), our gas-atomised feedstock features tightly controlled Niobium (Nb) and Copper (Cu) levels to ensure a predictable and uniform response to precipitation hardening (aging).

- **Martensitic Matrix:** The as-printed structure consists primarily of a low-carbon martensitic matrix, providing a high baseline of mechanical strength.
- **Precipitation Hardening:** The "PH" designation stands for precipitation hardening, and refers to the formation of nanometric Copper (Cu) precipitates during the aging process. These precipitates pin dislocations, significantly increasing hardness (up to 44 HRC).
- **Corrosion Resistance:** Maintains environmental resistance comparable to 304 Stainless Steel, making it superior to traditional high-strength tool steels in corrosive environments.

Powder Properties

Part number	LayrrSteel 17-4 PH 10-53 µm	LayrrSteel 17-4 PH 0-22 µm
Application	L-PBF[1]	L-PBF[1]
Maximum particle size	Max 1 wt% > 53 µm[3]	Max 1 wt% > 22 µm[3]
Minimum particle size	Max 10 vol% < 10 µm[3]	Max 10 vol% < 0 µm[3]
LSD percentile	D10, D50, D90[3], reported	D10, D50, D90[3], reported
Atomisation	Vacuum Induction Melted, Nitrogen Gas Atomised	Vacuum Induction Melted, Nitrogen Gas Atomised
Apparent density (g/cm³)	Measured according to ASTM B212[4] and reported	Measured according to ASTM B212[4] and reported
Carney flow	Measured according to ASTM B964[4] and reported	Measured according to ASTM B964[4] and reported

[1] ASTM/ISO 52900: Laser - Powder Bed Fusion (L-PBF), Electron-Beam Powder Bed Fusion (EB-PBF), Directed Energy Deposition (DED)
[2] ASTM B214 Standard Test Method for Sieve Analysis for Metal Powders
[3] ASTM B822 Standard Test Method for Particle Size Distribution of Metal Powders and Related Compounds by Light Scattering
[4] ASTM B212 Standard Test Method for Apparent Density of Free-Flowing Metal Powders Using the Hall Flowmeter Funnel Testing of powder will fulfill certification requirements to Nadcap Materials Testing and ISO/IEC 17025 Chemical, per relevant ASTM procedures