LayrrSteel 4340

Type analysis

Single figures are nominal except where noted.

Iron	Balance
Carbon	0.38-0.43 %
Manganese	0.65-0.85 %
Silicon	0.15-0.35 %

Phosphorus	0.025 %
Sulfur	0.025 %
Chromium	0.70-0.90 %

Nickel	1.65-2.00 %
Molybdenum	0.20-0.30 %
Copper	0.35 %

Description

LayrrSteel 4340 is a premium, vacuum-melted, gas-atomised powder engineered for the additive manufacturing of high-stress structural components. Renowned for its exceptional "structural integrity", 4340 offers a rare combination of high strength and superior toughness. Its deep hardenability ensures that parts with large cross-sections achieve uniform mechanical properties from core to surface after heat treatment.

Material Behavior & Microstructure

- Deep Hardenability: The synergistic effect of Chromium and Molybdenum allows for a consistent martensitic transformation throughout the part volume, regardless of thickness.
- Toughness & Ductility: Nickel (1.65–2.00%) prevents the material from becoming brittle during the quenching process, ensuring the part can withstand massive cyclic stress.
- Carbon Martensite Transformation: Relying on a traditional carbon backbone (0.38–0.43% C), this alloy provides a higher strength-to-weight ratio for powertrain applications than many maraging steels.

Powder Properties

Part number	LayrrSteel 4340 0-150 µm	LayrrSteel 4340 20-63 µm
Application		L-BBF[1]
Maximum particle size	Max 10 wt% > 150 µm[3]	Max 10 wt% > 63 µm[3]
Minimum particle size	Max 10 vol% < 0 µm[3]	Max 10 wt% > 20 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