# LayrrAlum 10 - AlSi10Mg

## Type analysis

*Single figures are nominal except where noted.*

| | |
|---|---|
| **Aluminium** | Balance |
| **Manganese** | 0.45 % |
| **Oxygen** | 0.10 % |
| **Lead** | 0.05 % |
| **Tin** | 0.05 % |

| | |
|---|---|
| **Silicon** | 9.00-11.00 % |
| **Magnesium** | 0.20-0.45 % |
| **Zinc** | 0.10 % |
| **Nickel** | 0.05 % |

| | |
|---|---|
| **Iron** | 0.55 % |
| **Titanium** | 0.15 % |
| **Copper** | 0.05 % |
| **Nitrogen** | 0.05 % |

## Description

Layrr AlSi10Mg is a gas-atomized, near-eutectic aluminium alloy optimized for Additive Manufacturing (Laser Powder Bed Fusion). It combines high thermal conductivity and is light weight with superior weldability. Our proprietary processing ensures spherical morphology and minimal moisture absorption to eliminate hydrogen porosity.
AlSi10Mg is a "near-eutectic" alloy, meaning it transitions from liquid to solid over a very narrow temperature range.

This solidification behavior is critical for additive manufacturing:

- Fine Microstructure: The rapid cooling rates of laser melting ($10^6$ K/s) create a unique, ultra-fine cellular microstructure that is significantly stronger than cast aluminium.
- Silicon Network: The 10% Silicon content forms a eutectic network that reinforces the aluminum matrix, increasing hardness and reducing shrinkage during solidification.
- Magnesium Hardening: The small addition of Magnesium (Mg) allows for precipitation hardening ($Mg_2Si$) through heat treatment, further boosting tensile strength.

## Powder Properties

| | |
|---|---|
| **Part number** | LayrrAlum 10 - AlSi10Mg |
| **Application** | L-PBF[1] |
| **Maximum particle size** | Max 10 wt% > 63 µm[3] |
| **Minimum particle size** | Max 10 vol% < 20 µm[3] |
| **LSD percentile** | D10, D50, D90[3], reported |
| **Atomisation** | Vacuum Induction Melted, Nitrogen Gas Atomised |
| **Apparent density (g/cm³)** | Measured according to ASTM B212[4] and reported |
| **Carney flow** | 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*