DIRECT METAL LASER SINTERING

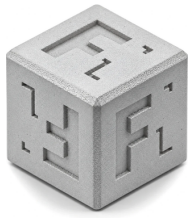
# Aluminum AlSi10Mg

Lightweight High-Performance Metal Alloy

Aluminum AlSi10Mg is a versatile casting alloy optimized for DMLS additive manufacturing. Combining exceptional strength-to-weight ratio with excellent thermal conductivity and corrosion resistance, it delivers consistent mechanical properties ideal for aerospace, automotive, and industrial applications requiring lightweight, high-strength components.



## SURFACE FINISHES



**Standard Finish** Natural

Supports are carefully removed and parts are shot peened to a uniform matte surface, which also helps relieve residual stresses. Critical features may receive light machining for tighter tolerances.



**Machining & Polishing** Enhanced

Precision machining and polishing enhance surface quality for critical applications, achieving tighter tolerances and a smooth, high-gloss metallic finish.



**Anodizing** Protective

For aluminium parts, anodizing forms a protective oxide layer that significantly improves corrosion resistance and hardness while enhancing appearance.



**Performance Paint** Premium

An automotive-grade coating that enhances aesthetics and durability. Each part is hand-finished with professional-grade equipment for exceptional adhesion, in matte to semi-gloss with custom colour matching.

| BUILD VOLUME | LEAD TIME | LAYER HEIGHT | TOLERANCE |
|---|---|---|---|
| 250 × 250 × 325 mm | From 4 business days | 0.03-0.06 mm | ±0.3% (min ±0.3 mm) |

## MECHANICAL PROPERTIES

Aluminum AlSi10Mg delivers dependable strength in the as-built condition. Its balanced mechanical profile handles demanding load conditions without turning brittle, which suits aircraft brackets, automotive engine parts and heat exchangers.

The table lists three conditions. As built gives the highest tensile strength, with some difference between the XY and Z directions, so align load paths with the build orientation. EOS T6 trades strength for higher elongation, lower variation and nearly equal properties in both directions. Stress relief stabilizes the part before it is removed from the build plate, and gives the lowest yield strength of the three. Fatigue strength depends on geometry and surface finish, and aluminum alloys have no true fatigue limit.

| PROPERTY | VALUE | TEST STANDARD |
|---|---|---|
| Tensile Strength, As Built (XY / Z) | **461 / 466 MPa** | EN ISO 6892-1 |
| Yield Strength (Rp0.2), As Built (XY / Z) | **270 / 233 MPa** | EN ISO 6892-1 |
| Elongation at Break, As Built (XY / Z) | **10.2 / 6.3 %** | EN ISO 6892-1 |
| Tensile Strength, EOS T6 (XY / Z) | **320 / 310 MPa** | EN ISO 6892-1 |
| Yield Strength (Rp0.2), EOS T6 (XY / Z) | **260 / 250 MPa** | EN ISO 6892-1 |
| Elongation at Break, EOS T6 (XY / Z) | **11 / 11 %** | EN ISO 6892-1 |
| Tensile Strength, Stress Relieved (90 min at 270 °C) | **310 MPa** | EOS typical value |
| Yield Strength, Stress Relieved (90 min at 270 °C) | **200 MPa** | EOS typical value |
| Elongation at Break, Stress Relieved (90 min at 270 °C) | **9 %** | EOS typical value |
| Modulus of Elasticity, As Built (XY / Z) | **75 / 70 GPa** | EOS MDS 05.2014 |
| Hardness, As Built / EOS T6 | **114 / 105 HBW** | EN ISO 6506, HBW 2.5/62.5 |
| Fatigue Strength, As Built ($2\times10^7$ cycles, fully reversed) | **110 MPa** | ASTM E466-15 |

## THERMAL PROPERTIES

Aluminum AlSi10Mg maintains dimensional stability through temperature swings and repeated thermal cycling, from under-hood automotive components to industrial equipment exposed to heat sources. Specify EOS T6 or stress relief, the higher-conductivity conditions in the table, for heat sinks, heat exchangers and cooled housings.

Expansion is given over three temperature ranges for fit and clearance calculations where aluminum parts mate with steel or polymer parts. Strength values are measured at room temperature, so check parts that run hot against their operating temperature.

| PROPERTY | VALUE | TEST STANDARD |
|---|---|---|
| Thermal Conductivity, As Built (XY / Z) | **110 / 100 W/m·K** | EN ISO 22007-2 |
| Thermal Conductivity, EOS T6 (XY / Z) | **155 / 165 W/m·K** | EN ISO 22007-2 |
| Thermal Conductivity, Stress Relieved (XY / Z) | **165 / 160 W/m·K** | EN ISO 22007-2 |
| Specific Heat Capacity, As Built (XY / Z) | **920 / 910 J/kg·K** | EOS MDS 05.2014 |
| Coefficient of Thermal Expansion (25–100 / 25–200 / 25–300 °C) | **20 / 22 / 27 $\times10^{-6}$/K** | ASTM E228 |

## PHYSICAL PROPERTIES

Consistent density keeps parts lightweight yet solid and downstream finishing predictable. The very low defect level supports strength and gas-tight walls, and EOS confirms gas tightness with a helium leak test (EN 13185) on 2 mm walls.

The as-built surface carries the texture of the powder layers. Micro shot-peening evens it out, and machining or polishing finishes sealing, sliding and mating faces so assemblies fit without rework.

| PROPERTY | VALUE | TEST STANDARD |
|---|---|---|
| Part Density | **≥ 2.67 g/cm³** | EN ISO 3369 |
| Average Defect Percentage | **0.04 %** | EOS method |
| Surface Roughness, As Built (Ra) | **12–20 µm** | ISO 4287 (EOS M 290 MDS 12.2017) |
| Surface Roughness, Micro Shot-Peened (Ra) | **6–15 µm** | ISO 4287 (EOS M 290 MDS 12.2017) |

## ELECTRICAL PROPERTIES

Electrical conductivity follows thermal conductivity and rises by about three quarters after heat treatment, which suits grounded housings, shielding features and electrically integrated metal components. Values are given in % IACS, relative to annealed copper.

| PROPERTY | VALUE | TEST STANDARD |
|---|---|---|
| Electrical Conductivity, As Built (XY) | **25 % IACS** | ASTM E1004-17 |
| Electrical Conductivity, EOS T6 or Stress Relieved (XY) | **44 % IACS** | ASTM E1004-17 |

## CHEMICAL PROPERTIES

A protective oxide film gives Aluminum AlSi10Mg high corrosion resistance in the atmosphere and good resistance to seawater and weak acids, and it is compatible with motor oil, hydraulic fluids and fuels. Strong acids and alkaline solutions, including caustic cleaners, attack the oxide film.

EOS publishes no chemical resistance table for this alloy, so these ratings follow general aluminum corrosion behavior. Treat them as screening guidance and confirm them with application-specific testing before production release.

| CHEMICAL | RATING |
|---|---|
| Seawater | **Good** |
| Atmospheric Corrosion | **Excellent** |
| Alkaline Solutions | **Poor** |
| Weak Acids | **Good** |
| Motor Oil | **Excellent** |
| Hydraulic Fluids | **Excellent** |
| Strong Acids (HCl, $H_2SO_4$) | **Poor** |
| Strong Bases (NaOH) | **Poor** |
| Organic Solvents | **Good** |
| Fuel Systems | **Good to Excellent** |

## COMPLIANCE

EOS states that the chemical composition of its AlSi10Mg parts complies with the EN AC-43000 casting alloy in DIN EN 1706 and with ASTM F3318-18 for laser powder bed fusion AlSi10Mg, so drawings that call out either composition can be matched, and the EOS documentation goes straight into your quality packet.

| STANDARD | STATUS |
| --- | --- |
| **DIN EN 1706 (EN AC-43000)**<br>EOS states the part chemistry complies with the EN AC-43000 (AlSi10Mg(a)) casting alloy composition | EOS composition statement |
| **ASTM F3318-18**<br>EOS states the part chemistry complies with the ASTM specification for laser powder bed fusion AlSi10Mg | EOS composition statement |

## MANUFACTURING

| | |
| --- | --- |
| Heat treatment | **Stress relief and EOS T6, with HIP available** |