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# Datasheet
# Aluminum Alloy AlSi10Mg

## Description

The AlSi10Mg alloy has excellent casting properties and is typically used for thin-walled and complex castings. It is characterized by good strength and hardness as well as high dynamic load-bearing capacity and is therefore also used for highly stressed components. Components made of AlSi10Mg aluminum are ideal for applications that require a combination of good thermal properties and low weight. They can be machined, wire and die-sunk eroded, welded, microblasted, polished, and coated.
Conventionally cast components made of this aluminum alloy are often heat treated to improve their mechanical properties. For example, with the T6 cycle, consisting of solution annealing, quenching, and warm aging. A special feature of the Laserinter process is the extremely fast melting and recrystallization. This results in a structure with mechanical properties similar to the T6 condition of cast components directly from the construction process.

## Properties & Application

- Good gas technology properties, good strength and hardness, high dynamic load capacity
- For functional prototypes, series parts, motorsports, aerospace interiors, mechanical engineering, series vehicles

| Chemical Composition (in wt.-%) | | | |
|---|---|---|---|
| **Al** | Remaining | **Si** | 9,0 -11,0 |
| **Fe** | ≤ 0,55 | **Cu** | ≤ 0,05 |
| **Mn** | ≤ 0,45 | **Mg** | 0,2 - 0,45 |
| **Ni** | ≤ 0,55 | **Zn** | ≤ 0,10 |
| **Pb, Sn** | each ≤ 0,05 | **Ti** | ≤ 0,15 |

| Physical Properties | |
|---|---|
| **relative density** | approx. 99,85% |
| **density** | approx. 2,67 g/cm³ |

3D Laser BW GmbH & Co. KG, Wielandstr. 19, 73230 Kirchheim unter Teck
phone: +49 7021 73467-25 | email: info@3-d-laser.de | website: www.3-d-laser.de

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## Mechanical properties of components

| **tensile strength**[1] | **as built** | **after heat treatment** |
|---|---|---|
| horizontal direction (XY) | 460 ± 20 MPa | 345 ± 10 MPa |
| vertical direction (Z) | 460 ± 20 MPa | 350 ± 10 MPa |
| **yield strength [RP 0.2%]**[1] | | |
| horizontal direction (XY) | 270 ± 10 MPa | 230 ± 15 MPa |
| vertical direction (Z) | 240 ± 10 MPa | 230 ± 15 MPa |
| **elongation at break** | | |
| horizontal direction (XY) | (9 ± 2) % | (12 ± 2) % |
| vertical direction (Z) | (6 ± 2) % | (11 ± 2) % |
| **modulus of elasticity** | | |
| horizontal direction (XY) | 75 ± 10 GPa | 70 ± 10 GPa |
| vertical direction (Z) | 70 ± 10 GPa | 60 ± 10 GPa |
| **Hardness [HRC]**[2] | approx. 119 ± 5 HBW | |

[1] Mechanical strength tested in accordance with ISO 6892-1:2009 (B) Annex D, proportional bars, sample diameter 5 mm, initial measuring length 25 mm.

[2] Hardness test according to Brinell (HBW 1/10) in accordance with DIN EN ISO 6506-1. The measured values were determined on cross-sectioned samples. The measured hardness can vary greatly depending on the type of sample preparation.

[3] Stress relief annealing

## Thermal properties of the components

| **thermal conductivity at 20°C** | **as built** | **after heat treatment** |
|---|---|---|
| horizontal direction (XY) | approx. 103 ± 5 W/m °C | approx. 173 ± 10 W/m °C |
| vertical direction (Z) | approx. 119 ± 5 W/m °C | approx. 173 ± 10 W/m °C |
| **specific heat capacity** | | |
| horizontal direction (XY) | approx. 920 ± 50 J/kg °C | approx. 890 ± 50 J/kg °C |
| vertical direction (Z) | approx. 910 ± 50 J/kg °C | approx. 890 ± 50 J/kg °C |

**Note:**
The specified material properties depend on the machine, powder material, parameter settings, and other factors such as the anisotropy of the components. They therefore do not provide a sufficient basis for component design. These specifications are for reference purposes only.

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