

## MATERIAL DATA SHEET



AlSi10Mg\_200C is formed when the powder Aluminum AlSi10Mg is processed at a building platform temperature of 200 °C. AlSi10Mg is a typical casting alloy with good casting properties and is typically used for cast parts with thin walls and complex geometry. It offers good strength, hardness and dynamic properties and is therefore also used for parts subject to high loads. Parts in Aluminum AlSi10Mg are ideal for applications which require a combination of good thermal properties and low weight. They can be machined, spark-eroded, welded, micro shot-peened, polished and coated if required.

### GENERAL PROCESS & GEOMETRIC DATA

| Exposure type  | Default_DirectPart   | Default_DirectPart_Surface  |
|--|--|---|
| Smallest wall thickness <sup>[1]</sup>                   | typ.0.4 mm<br>typ. 0.016 inch  | typ. 1 mm<br>typ. 0.039 inch  |
| Surface roughness,<br>- as built, cleaned <sup>[2]</sup> | .Ra typ. 8 µm, Rz typ. 40 µm<br>Ra typ. 0.32 x 10 <sup>-3</sup> inch<br>Rz typ. 1.57 x 10 <sup>-3</sup> inch | Ra typ. 4 µm, Rz typ. 20 µm<br>Ra typ. 0.16 x 10 <sup>-3</sup> inch<br>Rz typ. 0.79 x 10 <sup>-3</sup> inch               |
| - after micro shot-peening                               | Ra typ. 9 µm, Rz typ. 60 µm<br>Ra typ. 0.35 x 10 <sup>-3</sup> inch<br>Rz typ. 2.36 x 10 <sup>-3</sup> inch  | Ra typ. 5 µm, Rz typ. 28 µm<br>Ra typ. 0.19 x 10 <sup>-3</sup> inch<br>Rz typ. 1.1 x 10 <sup>-3</sup> inch <sup>[4]</sup> |
| Volume rate <sup>[3]</sup>                               | 7.4 mm <sup>3</sup> /s [26.6 cm <sup>3</sup> /h]<br>1.6 in <sup>3</sup> /h                                   |   |

### PHYSICAL & CHEMICAL PROPERTIES OF PARTS

|                      |                          |                      |                  |
|----------------------|--------------------------|----------------------|------------------|
| Material composition | Al (balance)             | Mn (≤ 0.45 wt-%)     | Pb (≤ 0.05 wt-%) |
|                      | Si (9.0 - 11.0 wt-%)     | Mg (0.2 - 0.45 wt-%) | Sn (≤ 0.05 wt-%) |
|                      | Fe (≤ 0.55 wt-%)         | Ni (≤ 0.05 wt-%)     | Ti (≤ 0.15 wt-%) |
|                      | Cu (≤ 0.05 wt-%)         | Zn (≤ 0.10 wt-%)     |                  |
| Relative density     | approx. 100 %            |                      |                  |
| Density              | 2.67 g/cm <sup>3</sup>   |                      |                  |
|                      | 0.096 lb/in <sup>3</sup> |                      |                  |



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## MECHANICAL PROPERTIES OF PARTS - AS BUILT

|  | <i>Horizontal Axis (XY)</i>   | <i>Vertical Axis (Z)</i>      |
|--|-------------------------------|-------------------------------|
| Tensile Strength <sup>[5]</sup>          | typ. 360 MPa<br>typ. 52.2 ksi | typ. 390 MPa<br>typ. 56.6 ksi |
| Yield strength [Rp 0.2 %] <sup>[5]</sup> | typ. 220 MPa<br>typ. 31.9 ksi | typ. 210 MPa<br>typ. 30.5 ksi |
| Modulus of elasticity                    | typ. 70 GPa<br>typ. 10.2 Msi  | typ. 70 GPa<br>typ. 10.2 Msi  |
| Elongation at break <sup>[5]</sup>       | typ. 8 %                      | typ. 6 %                      |

- [1] Mechanical stability dependent on the geometry (wall height etc.) and application.
- [2] Due to the layer-wise building, the surface structure depends strongly on the orientation of the surface, for example sloping and curved surfaces exhibit a stair-step effect. The values also depend on the measurement method used. The values quoted here given an indication of what can be expected of horizontal (up-facing) or vertical surfaces.
- [3] The volume rate is a measure of the building speed during laser exposure. The overall building speed is dependent on the average volume rate, the time required for coating (depends on the number of layers) and other factors, e.g. DMLS settings.
- [4] It is recommended to use IEPCONORM-A and IEPCONORM-C with max. pressure of 3 bar.
- [5] Tensile testing according to ISO 6892-1:2009 [B] Annex D, proportional test pieces, diameter of the neck area 5 mm [0.2 inch], original gauge length 25 mm [1 inch].

