

## Metal powders for serial production of Additive Manufacturing components

### AM 316L Sieve Code 5

Höganäs stainless steel AM 316L Sieve Code 5 is a gas atomised, spherical powder for Additive Manufacturing applications. It is typically fit for the Directed Energy Deposition (DED <sup>(1)</sup>, laser cladding) process.

AM 316L is a general purpose stainless steel with good corrosion resistance to atmospheric corrosion and many organic and inorganic chemicals. AM 316L withstand the normal corrosive attack of the everyday environment that people experience.

For more information, please contact your local sales representative or send an e-mail to [additivemanufacturing@hoganäs.com](mailto:additivemanufacturing@hoganäs.com)

### Features:

- Powder with good flowability
- Very good building properties with density exceeding 99.6%
- Industrial scale production



The gas atomisation process employed for Additive Manufacturing powders, produces powders which must pass stringent controls at each manufacturing step. Certified production units ensure chemical and physical properties according to specifications.

Raw materials are carefully selected and sourced from certified suppliers. The individual raw materials are melted together in our induction furnaces. Prior to atomisation the chemical composition of the melt is analysed and a correction is made if necessary. Spherical powders without satellites is the characteristic morphology of Höganäs gas atomisation. This will ensure excellent flow and spreadability of the powder. After atomisation, the powders are sieved according to agreed requirements and the powder properties are carefully controlled on each lot.



Powders are packed in 5 kg air tight plastic bottles. The packing technique ensures a dry and contamination free powder as well as a uniform grain size distribution.

### Tensile test on non-heat treated specimen <sup>(7)</sup>

#### Typical results after DED process <sup>(7)</sup>

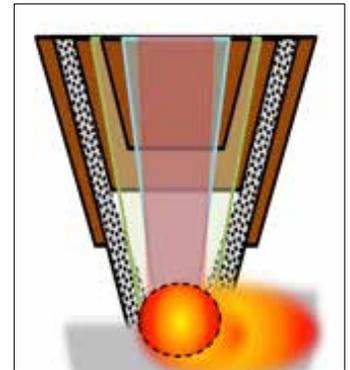
	x direction	z direction
E modulus	123 GPa	140 GPa
Yield strength	355 MPa	365 MPa
Tensile strength	508 MPa	485 MPa
Break elongation	20%	25%

As parts made by 3D printing show anisotropic properties, the results are referring to the properties relative to the directions of printing. The x direction is perpendicular to the direction of building, or the z direction.

Reference values can be optimised depending on process settings.



A DED built part from where test bars are cut.



The nozzle is designed to focus the cone of powder at a given distance below the nozzle tip.

#### Typical alloy composition AM 316L Sieve Code 5

Fe (balance) <sup>(2)</sup>
Cr 17%
Ni 12%
Mo 2.5%
Mn 1.5%
Si 0.8%
C 0.02%

#### Typical powder properties

53-150 µm balance <sup>(3)</sup>
> 150 µm max 3% <sup>(3)</sup>
< 45 µm max 0.2%
Hall flow rate 17 s/50g <sup>(4)</sup>
Apparent density 4.2 g/cm <sup>3</sup> <sup>(5)</sup>
Inner pores level < 0.7% <sup>(6)</sup>

- 1) ASTM F2792
- 2) DIN 51008-2; DIN 51009, ISO 9556, ISO 4935, EN 10276-2, ISO 15351
- 3) MPIF05, ASTM B 214, ISO 4497
- 4) MPIF03, ASTM B 213, ISO 4490
- 5) MPIF04, ASTM B 212, ISO 3923/1
- 6) Helium Pycnometry and Metallography, by SIRRIS (BE) report 5-2770
- 7) DED Powder validation by SIRRIS (BE) report 5-1511-01