MATERIALS FOR 3D PRINTING
STAINLESS STEEL

DANISH
TECHNOLOGICAL
INSTITUTE

316L
Stainless steel alloy

Good hardness, high ductility, and corrosion resistance are the keywords for this stainless steel alloy. It can also be used at high temperatures and is good for tools and parts with a lot of wear.

We print stainless steel with Laser Powder Bed Fusion technology that prints in powder and uses a laser to weld the powder layers together. The technology requires support structure to attach the part to the build platform. The support is mechanically removed after printing.

The raw prints that come out of the printer have a surface finish similar to a cast metal part. The surface can subsequently be processed with various finishes.

The technology can print parts that meet ISO 2768-m 1 - however, the tolerances depend a lot on the geometry of the part.

MATERIAL PROPERTIES (STANDARD)	50 µm, 400 W – Raw print
TENSILE STRENGTH [Rm]	651 ±5 MPa
YOUNG'S MODULUS [E]	181 ±29 GPa
YIELD STRENGTH [Rp0,2]	546 ±8 MPa
ELONGATION AT BREAK [A]	41 ±1 %
REDUCTION OF CROSS SECTION [Z]	70 ±2 %
VICKERS HARDNESS [HV10]	211 ±4
POWDER DENSITY	7,9 g/cm3
PART DENSITY	>99,5 %

SURFACE TEXTURE	Raw	Media blasted	Processed
Average roughness [Ra]	9 ±3	6 ±2	0,8

Danish Technological Institute - Industrial 3D printing
Email: 3dprint@dti.dk
Phone: 7220 1701
www.dti.dk/3dprinting

Technology:
• Laser Powder Bed Fusion

Printers:
• SLM Solutions - SLM280

Build volume:
• 280 x 280 x 365 mm

Layer thickness
• 30 µm (fine)
• 50 µm (normal)

Possible post-processing:
• De-stressing
• Heat treatment
• Deburring
• Media blasting
• Conventional processing

Design features:
• Minimum feature size 0,6 mm
• Minimum channel size Ø2 mm
• Minimum wall thickness 1 mm
• Support for overhangs less than 45°
• Hole for emptying powder Ø5 mm

Design guides:
• Minimize the volume of the part as much as possible
• Avoid large changes in the cross-sectional area of the part
• Use camphors and roundings - they are "free"
• Consider the print orientation in your design

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