

# PLA

PLA is a tough, easy to use high grade PLA type of filament, ideal for 3D printing. Slightly modified, the filament retains the typical features of PLA, but makes it tougher and less brittle. Due to a low shrinkage factor PLA will not deform after cooling. Poly Lactic Acid is a biodegradable plastic made from renewable natural resources and one of the most popular materials for 3D printing.

## Material features:

- Tougher and less brittle compared to regular PLA
- Easy to print at low temperature
- Low warping
- Biodegradable
- Limited smell

## Filament specs.

Size	Ø tolerance	Roundness
1,75mm	± 0,05mm	≥ 95%
2,85mm	± 0,10mm	≥ 95%

## Material properties

Description	Testmethod	Typical value
Specific gravity	ISO 1183	1,24 g/cc
MFR 210°C/2,16 kg	ISO 1133	9,56 gr/10 min
Tensile strength at yield	ISO 527	66 MPa
Elongation-strain at break	ISO 527	2,3%
Elongation-strain at yield	ISO 527	2,3%
Tensile (E) modulus	ISO 527	3027 MPa
Impact strength - Charpy method 23°C	ISO 179	3,4 kJ/m <sup>2</sup>
Moisture absorption	ISO 62	1968 ppm
Printing temp.	Internal method	205±10°C
Melting temp.	ISO 11357	115±35°C
Vicat softening temp.	ISO 306	60°C
Glass transition temp.	ISO 11357	57°C

## Additional info:

Due to its low tendency to warp PLA can also be printed without a heated bed. If you have a heated bed the recommended temperature is ≤60°C. PLA can be used on all common desktop FDM or FFF technology 3D printers.

Storage: Cool and dry (15-25°C) and away from UV light. This enhances the shelf life significantly.


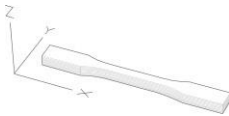

"The values presented in this publication are based on the producer's knowledge and experience and are intended for reference purposes only. While the producer has made every reasonable effort to ensure the accuracy of the information in this publication, the producer does not guarantee that it is error-free, nor does the producer make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. The producer reserves the right to make any adjustments to the information contained herein at any time without notice. The producer expressly disclaims warranties of any kind regarding the information contained herein, including, but not limited to, any warranties of merchantability or fitness of a particular purpose, use or application. The producer shall not be liable for any damage, injury or loss induced from the use of the producer's products in any application. Each user should thoroughly review this publication before selecting a product and, in view of the many factors that may affect processing and application of the product, each user should carry out their own investigations and tests and determining the safety, lawfulness, technical suitability, proprietary rights, and disposal/ recycling practices of the materials for the intended application."

# Mechanical Specifications

During additional research a print profile has been made which was optimized for achieving a highest possible tensile performance. Table 1 shows the typical values of an injection moulded specimen compared to a 3D-printed specimen in both the X-Y axis (3D-printed horizontally) and the Z-axis (3D-printed vertically). After that, some important parameters are given, and the corresponding trend is briefly described.

**Table 1: Tensile data of both injection moulded and 3D-printed specimens.\***

	Injection Moulded	3D-Printed X-Y	3D-Printed Z
Young's Modulus [MPa]	3384	3138	3112
Stress at Yield [MPa]	73	69	39
Stress at Break [MPa]	68	65	39
Strain at Yield [%]	3	3	2
Strain at Break [%]	4	4	3

## Most important parameters:

*When increasing the Nozzle Temperature, the Stress at Yield will increase*

*When decreasing the Fan Speed, the Stress at Yield will increase*

*When increasing the Material Flow the Stress at Yield will increase*

### Print Conditions

All specimens have been printed using a 0.4mm nozzle and the layer height was set to 0.2mm. The room in which the 3D-printer was located had an environmental temperature of  $\pm 25^{\circ}\text{C}$ .

### \*Test Conditions

The tensile tests have been carried out according to ISO-527 using modified 1BA specimens (3D-printing) and 1A specimens (injection moulding). The room in which the Universal Testing Machine was located had an environmental temperature of  $\pm 20^{\circ}\text{C}$ .

\*The values presented in this publication are based on the producers knowledge and experience and are intended for reference purposes only. While the producer has made every reasonable effort to ensure the accuracy of the information in this publication, the producer does not guarantee that it is error-free, nor does the producer make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. The producer reserves the right to make any adjustments to the information contained herein at any time without notice. The producer expressly disclaims warranties of any kind regarding the information contained herein, including, but not limited to, any warranties of merchantability or fitness of a particular purpose, use or application. The producer shall not be liable for any damage, injury or loss induced from the use of the producer's products in any application. Each user should thoroughly review this publication before selecting a product and, in view of the many factors that may affect processing and application of the product, each user should carry out their own investigations and tests and determining the safety, lawfulness, technical suitability, proprietary rights, and disposal/ recycling practices of the materials for the intended application."