

## POLYLACTIC ACID (PLA) PLASTIC MATERIAL PROPERTIES

PHYSICAL	NOMINAL VALUE UNIT	TEST METHOD
Density	1.24 g/cm <sup>3</sup>	ASTM D1505

FILM	NOMINAL VALUE UNIT	TEST METHOD
Film Thickness - Tested	25 µm	
Secant Modulus		ASTM D882
MD: 25 µm	3450 MPa	
TD: 25 µm	3790 MPa	
Tensile Strength		ASTM D882
MD: Yield, 25 µm	103 MPa	
TD: Yield, 25 µm	145 MPa	
Tensile Elongation		ASTM D882
MD: Break, 25 µm	180 %	
TD: Break, 25 µm	100 %	
Elmendorf Tear Strength		ASTM D1922
MD: 25 µm	17 g	
TD: 25 µm	14 g	
Carbon Dioxide Transmission Rate	2850 cm <sup>3</sup> /m <sup>2</sup> /24 hr	Internal Method
Oxygen Permeability	675 cm <sup>3</sup> /m <sup>2</sup> /24 hr	ASTM D1434
Water Vapor Transmission Rate	380 g mm/m <sup>2</sup> /atm/24 hr	ASTM F1249
Spencer Impact	2.50 J	

THERMAL	NOMINAL VALUE UNIT	TEST METHOD
Peak Crystallization Temperature (DSC)	155°C to 170°C	ASTM D3418

OPTICAL	NOMINAL VALUE UNIT	TEST METHOD
Gloss (20° , 25.4 µm)	90	ASTM D2457
Haze (25.4 µm)	2.1 %	ASTM D1003

FILAMENT	NOMINAL VALUE UNIT	TEST METHOD
Diameter	1.75mm / 3.0mm	--
Diameter Tolerance	±0.05 mm	--
Ovality Tolerance	±0.01 mm	--
Melting	200°C	--
Extrusion Temperature	170°C to 218°C	--

**GENERAL TIPS FOR PRINTING WITH PLA:**

- The printing temperature guideline for printing with PLA filament is approximately 170°C to 200°C. As each desktop 3D printer has its own unique characteristics, you might need to tweak around with your temperature settings a bit to get the best results. To obtain optimal results for your prints you need to take into account variables like your 3D printer's nozzle diameter, your printing speed settings, and layer height.
- PLA has much less tendency to warp compared to ABS, although it can still warp a little in a cold environment or on large objects. Although PLA can be printed both with and without a heated print bed, if your desktop 3D printer does have a heated print bed it is recommended to set your print bed temperature to approximately 40° to 50°C which will relax the lower layers of your print without overheating them. One easy way to deal with this, is to have an active cooling fan cooling down the PLA immediately after it exists the nozzle.
- A good first layer adhesion is of the utmost importance in obtaining the best results for your prints. There are several tricks to get the first layer of your PLA print to stick better to the print bed of your 3D printer:
  - Blue Masking Tape. PLA prints usually stick really well to blue masking tape. The PLA will adhere well whether or not you're printing on a heated plate, and your printed objects will be pretty easy to remove. When preparing the print bed it is better to have tiny gaps between your strokes of masking tape, rather than having overlaps. Overlaps of smaller pieces of tape may cause difficulties later on during the print process.
  - Coat your print bed with hairspray. Like ABS, PLA has a tendency to stick really well to extra strong hairsprays.
  - Blue masking tape is unlikely to leave a residue on your print bed. A hairspray coating however will leave a residue on your print bed.