Technical Data Sheet

Advanced PLA

General Information

3D Fuel™ Advanced PLA Filament is being produced from high heat grade PLA, which was developed specifically for the manufacturing of 3D printer filament.

High heat grade resin exhibits improved heat-resistance and has faster crystallization rates.

When using 3D Fuel filament made from this resin, you can expect: low odor, higher print detail/resolution, excellent first layer adhesion, improved adhesion between layers, and reduced warping, curling and failed prints. (1)

Resin Typical Material Properties (1,2)		
Physical Properties	**PLA Resin**	**ASTM Method**
Specific Gravity, g/cc	1.24	D792
MFR, g/10 min (3)	7-9	D1238
Relative Viscosity (4)	4.0	D5225
Peak Melt Temperature, °C	165-180	D3418
Glass Transition Temperature, °C	55-60	D3418
Mechanical Properties (molded crystalline) (5)		
Tensile Yield Strength, psi (MPa)	9,500 (65.5)	D882
Tensile Elongation, %	4.3	D882
Notched Izod Impact, ft-lb/in (J/m)	0.75 (40)	D256
Flexural Strength, psi (MPa)	18,300 (126)	D790
Flexural Modulus, psi (MPa)	646,000 (4357)	D790
HDT - Heat Distortion Temp ,°C 66 psi (0.45 MPa)	144	E2092
Clarity	Opaque (when crystalline)	
3D Printing Temp	190-230°C	
Annealing Temp	80-130°C	
Print Bed Temp	None Needed (50-70°C if required)	

(1) As reported by the resin manufacturer.
(2) Typical properties for injection molded bars. Not to be construed as specifications.
(3) 210 °C / 2.16 KG
(4) RV measured at 1.0 g/dL in chloroform at 30
(5) Injection molded part, with 120 °C mold temperature.

Printing Information

To get the maximum strength out of your 3D printed part, we recommend a post-annealing procedure that could be done in your oven (at a range of 176-266°F (80-130°C) to promote increased crystallization and further improve the heat deflection temperature (1) (check our website for more annealing information). It is essential to ensure filaments are dry prior to printing. Our filament will run best at an extrusion temperature of 190-230 °C. It is recommended to use high water content hair spray (as opposed to high ethyl alcohol content) or painter's tape on the build plate to ensure the first layer of the print sticks to the plate. For more stability and a higher quality print: Reduce the speed of the extruder to 30-60mm/second; Increase infill to 30%; Reduce layer height to 0.10mm. For prints with curvatures, it is recommended to turn on rafts and supports in your settings. Print in an area with good airflow. Clean the base plate after each day of printing. Clean the nozzle after every use.

Comparative Data

The following table provides information comparing several common plastics used in the 3D printing industry to make filament.

Comparative Date Points for High Heat Grade PLA vs Standard PLA vs ABS (Data according to ASTM specifications.)			
Properties	**High Heat Grade PLA (1)**	**Standard PLA (6)**	**ABS (7)**
Heat Distortion Temp (HDT)	144°C (291°F)	55°C (131°F)	85°C (185°F)
Flexural Modulus, psi (MPa)	646,000 PSI	555,000 PSI	298,000 PSI
Flexural Strength, psi (MPa)	18,300 PSI	12,000 PSI	8,500 PSI
Tensile Yield Strength, psi (MPa)	9,500 PSI	8,700 PSI	5,900 PSI

(6) Ingeo 4043D Biopolymer PLA TDS.
(7) Samsung SD-0150 GP ABS TDS.

Heat Deflection Temperature: measure of a polymer's ability to bear a given load at elevated temperatures; the temperature at which it deforms.

Flexural Modulus: pressure required to start the bending; stiffness; the tendency of the material to bend.

Flexural Strength: pressure required before a certain degree of deformation; degree of deformation at which the test fails.

Tensile Yield Strength: maximum stress before breaking when being stretched from both ends.

3041 1/2 Main Avenue
Fargo, ND, 58103
www.3dfuel.com