Proto-pasta

Opaque HTPLA (v3)

Not your everyday PLA, HTPLA v3 offers the ease of PLA printing with exceptional quality, compatibility, reliability, durability, performance, and finish. Proto-pasta's Premium HTPLA v3 is our own unique formulation based on extensive in-house testing and our industry-leading experience working with heat treatable PLA. PLA and HTPLA as printed, though both adequate performers in an office environment, have poor temperature stability, loosing significant stiffness at temperatures not much above 50C. Different than standard PLA, HTPLA is designed to survive heat treating for higher temperature stability in a no/minimal load condition to near melting.

Material Properties

Properties	Value/Description
Base material	Heat treatable PLA w/ high temp resistance
Characteristics	low odor, non-toxic, renewably sourced
Molecular structure	Amorphous or partially crystalline *(Amorphous as printed, part crystalline when heat-treated) (Melting resets crystalline structure to amorphous state)*
Additives	Minimal color added
Max particle size	N/A
Density	approx. 1.2 g/cc
Length	Approx. 346 m/kg (1.75 mm) & 130 m/kg (2.85 mm)
Min bend diameter	15 mm (1.75 mm) & 25 mm (2.85 mm)
Glass transition (Tg) onset	approx. 60 deg C (140 deg F)
Melt point (Tm) onset	approx. 155 deg C (310 deg F)
Max use	Tg for amorphous, Tm for crystalline

Use limit is geometry, load & condition dependent

Print Settings
(Based on Ultimaker s5 .15mm Profile)

Setting	Value
Nozzle Temperature [°C]	210
Heated Bed Temperature [°C]	60
Print Speed [mm/s]	25-45
Flow Rate/Extrusion Multiplier [%]	90
Extrusion Width [mm]	.45 (.05mm larger than nozzle size)
Volume Flow Rate [mm³/s]	2-3

Heat Treating (for heat-treating only)

HTPLA is a semi-crystalline grade of PLA optimized for heat-treating for higher temperature use. Prior to printing, HTPLA parts should be scaled in the slicer to compensate for shrinkage when heat treating.
(Please note that all values for heat-treating are process dependent and may vary between users)

Part Axis	Percentage
Scale Values (x/y-axis)	101.8%
Scale Values (z-axis)	99%

(a large range of temperatures & times can yield acceptable results)

Typical Heat Treat Temperature	Typical Heat Treat Time
95-110 °C	10+ minutes

Results may vary based on print settings as well as print quality

For a more in-depth look at heat treating please view proto-pasta.com/opaque