Protopasta

Filament by **Protoplant**

CDP1xxxx
Technical Data Sheet
Date of issue: 01-November-24

Protopasta Conductive PLA is a Natureworks INGEO based PLA and carbon black composite designed for printing projects requiring electrical conductivity. Wearable electronics, capacitive touch sensors, and lighting LEDs are some examples of prints using Conductive PLA. With easy printing and reliable conductivity, this material is perfectly suited for these applications.

Formulated and compounded in-house, Protopasta Conductive PLA has been designed for maximum conductivity while maintaining good mechanical properties and trouble free printing. For quality control during production, we measure the resistance of a 10cm section of 1.75mm filament right off of the production line. We use a custom tool that applies a constant force to the filament where it contacts the terminals, which are polished 3mm pins. For reference, below are our QC ranges for this test method for our conductive and dissipative materials. The Ωcm results for the conductive PLA are from using the equation ρ=RA/L, where ρ is the volume resistivity (Ωcm), R is measured resistance, A is cross sectional area of the filament, and L is length.

Material Under Test	**Result Range**	**Meter Used**
Protopasta Conductive PLA	2.0kΩ-3.5kΩ (4.8Ωcm -8.4Ωcm)	Standard DMM
Protopasta Dissipative Materials	100kΩ-100,000kΩ or (10^5Ω-10^8Ω)	DESCO 19786

To verify printed part volume resistivity and to determine variation from orientation and temperature we printed 4mm X 4mm X 120mm samples. A Bambu P1S with AMS and .4mm Nozzle was used to print these parts at a maximum of 8mm^3/s with 100% infill. The resistance was measured using a DMM and the test fixture described above. The calculated value for volume resistivity is again found using ρ=RA/L. ***Please note that this is an example only and results will vary depending on where in our QC range the batch tests, what your print and geometry parameters are, and your environmental conditions.***

Volume Resistivity of Printed Part (For Reference Only, Batch and Print Parameter Dependent)

Print Orientation	**Print Temperature, C**	**Measured Resistance, Ω**	**Calculated Volume Resistivity, Ωcm**
Flat (X-Y)	210C	1200	19.2
Flat (X-Y)	230C	900	14.4
Vertical (Z)	210C	2100	33.6
Vertical (Z)	230C	1700	27.2

Recommended Printing Parameters

Print Temperature	210C-230C
Build Plate temperature	60C
Print Speed (Volume Flow)	Up To 8mm^3/second
Build Plate Preparation	None (textured PEI), Magigoo or glue stick release
Nozzle	.4mm or larger
Abrasive	Non Abrasive
Drying	Generally not required. 55C for 6hrs
AMS Compatibility	Compatible

Processing Notes

Carbon black based conductive products are extremely dark and generally require more purge to change material than other colors.

Electrically conductive polymer composites are sensitive to print orientation, temperature, infill, part geometry, and print speed. User must test suitability for their specific application.