

Carbodeon uDiamond[®] PLA – Diamond Reinforced PLA 3D Filament



Diamond performance
for 3D printing

Carbodeon uDiamond[®] PLA (polylactide) is a high-performance diamond enforced 3D printing filament. This PLA filament is strengthened with functionalized nano diamond particles (under 1 wt.%, particle size 4-6nm). Nano diamonds are round and thus non-abrasive both in filament extrusion and printing. Nanodiamond enhanced thermal conductivity enables printing speeds up to 1000mm/s. The functionalized diamond particles are also electrostatically interacting with parent PLA polymer and thus, improving the stiffness, strength and adhesion between printed layers. The filament is suitable for consumer-grade and professional FDM/FFF 3D printers.

Unique characteristics

Printing speed up to
1000mm/sec

This PLA can outperform 3D printers normal printing speeds, still maintaining high quality. This allows shorter production times/higher productivity without any sacrifices in printed product quality.

High strength and
stiffness

Diamonds dispersion-strengthen the structure enabling the 3D printed samples match or even outperform equal injection -molded samples from same base polymer. Diamonds also greatly improve the wear resistance of printed material.

Thermal resistance

This PLA is withstanding more heat than normal PLA, HDT: 95C. Printed items maintain high dimensional accuracy even after annealing (0.25%).

Nozzle friendly

Many fillers might cause nozzle wear. Nano diamonds are round and 4-6nm particles, which will act as a lubricant, therefore saving your nozzle from wear.

General PLA features

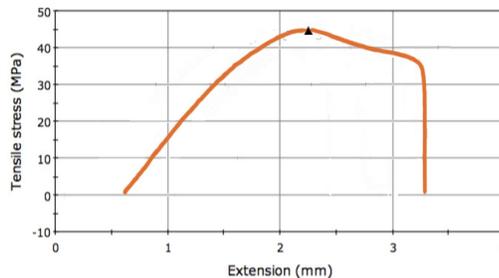
While this PLA has high performance in all the aspects, it also maintains the normal good features of PLA: ease of use, low toxicity and biodegradability.

Tensile strength test results

Tensile bar samples were printed according ISO 527-1A with Mass Portal delta 3D printer. The samples were tested by VTT with ISO 527 5mm/min tensile strength machine.

The parameters for the printing were:

- Mass Portal XD30 FDM printer
- Filament: 1,75mm
- Nozzle: 0,8mm steel
- Layer height: 0,37mm
- Bed temperature: 60 C
- Extrusion temperature: 252 C
- Printing speed: 55mm/s



| Property | Standard | Value |
|------------------|----------|----------|
| Density | ISO 1183 | 1,27g/cc |
| Tensile strength | ISO 527 | 45 Mpa |
| Tensile modulus | ISO 527 | 6500 Mpa |

| Recommended printing settings | |
|-------------------------------|-----------------|
| Extruder Temperature | 220C - 240C |
| Bed temperature | 0 C – 50C * |
| Printing speed | 50 – 500 mm/sec |

*When printing with high speed, bed temperature can be reduced if warping occurs.