Technical Data Sheet (TDS)

Version 1.0

1. Product Introduction

Filoostry® PLA-CF is a carbon fiber-reinforced Polylactic Acid (PLA) 3D printing filament. By incorporating chopped carbon fibers into the PLA matrix, the material achieves significantly improved stiffness and strength while providing printed parts with a fine matte surface finish.

This product is suitable for printing functional and aesthetic components that require both good mechanical properties and an attractive appearance, such as equipment housings, artistic objects, and design prototypes.

Notes:

- It is recommended to use nozzles made of sufficiently hard materials, such as hardened steel or tungsten carbide.
- Avoid exposing printed parts to temperatures above 55°C.

2. Product Specifications

Item	Specifications
Filament Diameter	1.75 ± 0.03 mm
Net Filament Weight	1000 g
Filament Length	333 ± 5 m
Spool Material	Cardboard (Heat resistance: 120°C)
Spool Weight	146 ± 1 g
Spool Dimensions	Outer diameter: 200 mm; Inner diameter: 88.5 mm; Total width: 65.5 mm; Winding width: 58 mm

3. Recommended Printing Settings

Item	Recommended Settings
Pre-print Drying	55° C for 6 – 12 hours
Compatible Printer	Open-frame and enclosed 3D printers
Compatible Nozzle Materials	Hardened steel, tungsten carbide
Compatible Nozzle Diameters	0.4, 0.6, 0.8 mm
Nozzle Temperature	200-230° C
Chamber Temperature	Below 45° C
Heated Bed Temperature (Textured PEI Build Plate)	55-65° C
Printing Speed	30 – 300 mm/s (Equivalent volumetric flow rate: 3 – 32 mm^3 /s)
Cooling Fan Speed	50-100%

Optional Annealing	55 – 60° C in an oven for 6 – 12 hours

4. Physical Properties

Property	Test Method	Value
Density	ISO 1183	1.289 g/cm3
Saturated Water Absorption	25° C, 55% RH	Pending testing
Melt Flow Rate (MFR)	210° C, 2.16 kg	Pending testing
Glass Transition Temperature (Tg)	DSC, 10° C/min	60.5° C
Crystallization Temperature	DSC, 10° C/min	N/A
Melting Temperature	DSC, 10° C/min	159.4° C
Vicat Softening Temperature	ISO 306, GB/T 1633	63.2° C
Heat Deflection Temperature (HDT) 1	ISO 75, 1.80 MPa	55.3° C
Heat Deflection Temperature (HDT) 2	ISO 75, 0.45 MPa	57.4° C

5. Mechanical Properties

Property	Test Method	Value
Tensile Strength (XY)	ISO 527, GB/T 1040	50 ± 1 MPa
Tensile Strength (Z)	ISO 527, GB/T 1040	17 ± 1 MPa
Young's Modulus (XY)	ISO 527, GB/T 1040	5,774 ± 289 MPa
Young's Modulus (Z)	ISO 527, GB/T 1040	2,363 ± 267 MPa
Elongation at Break(XY)	ISO 527, GB/T 1040	1.3 ± 0.1%
Elongation at Break(Z)	ISO 527, GB/T 1040	0.9 ± 0.1%
Flexural Strength (XY)	ISO 178, GB/T 9341	79 ± 2 MPa
Flexural Strength (Z)	ISO 178, GB/T 9341	28 ± 1 MPa
Flexural Modulus (XY)	ISO 178, GB/T 9341	6716± 163 MPa
Flexural Modulus (Z)	ISO 178, GB/T 9341	2260± 22 MPa
Impact Strength (XY)	ISO 179, GB/T 1043	12.5 ± 0.7 kJ/m² (Unnotched) 3.1 ± 0.1 kJ/m² (Notched)
Impact Strength (Z)	ISO 179, GB/T 1043	4.9 ± 0.4 kJ/m²

6. Test Specimen Information

Item	Parameter
Specimen Dimensions	As shown below
Nozzle Temperature	230° C
Heated Bed Temperature	55° C
Printing Speed	XY: 150 mm/s; Z: 60 mm/s
Infill Density	100%
Infill Pattern	Concentric
Annealing Treatment	None

Testing and Sample Preparation Notes

The filament was dried in a forced-air oven at 55°C for 6 hours before printing.

Test specimens were printed using a Bambu Lab H2D 3D printer with a 0.4 mm nozzle and a layer height of 0.2 mm. The top and bottom layers were set to one layer each.

Filament Flow Ratio Calibration:

The flow ratio was initially set to 1.0 to print a flexural test specimen (80 mm × 60 mm × 4 mm), after which its thickness was measured. The flow ratio was then reduced to 0.99, and another specimen was printed and measured. This process was repeated until the measured thickness began to fall below 4.20 mm. The flow ratio corresponding to the threshold was selected as the preferred setting.

Tensile and Flexural Testing Conditions:

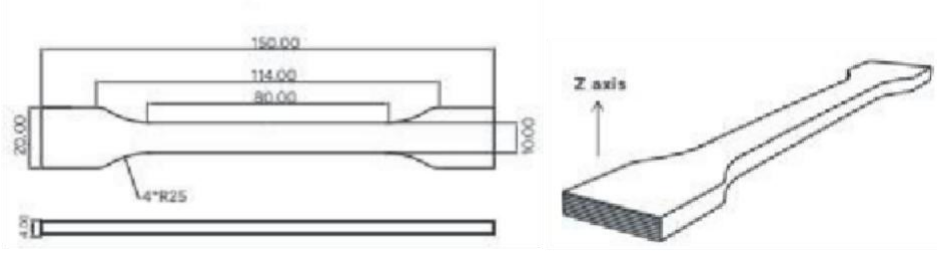
An extensometer was used to measure specimen deformation during tensile testing. When the deformation was below 0.125 mm (equivalent to 0.25% strain), the tensile test was conducted at a speed of 1 mm/s. Once the deformation exceeded this threshold, the speed was increased to 50 mm/s.

Therefore, Young's modulus was measured at a tensile speed of 1 mm/s, while tensile strength was determined at 50 mm/s.

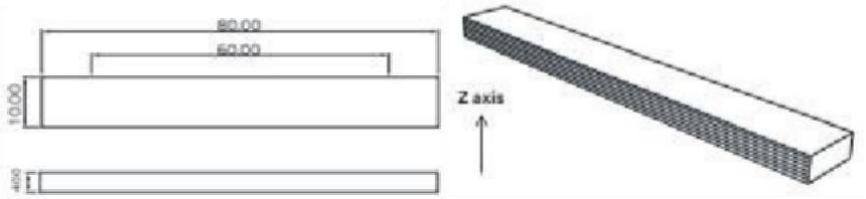
Flexural strength and flexural modulus were measured at a test speed of 2 mm/min.

Disclaimer

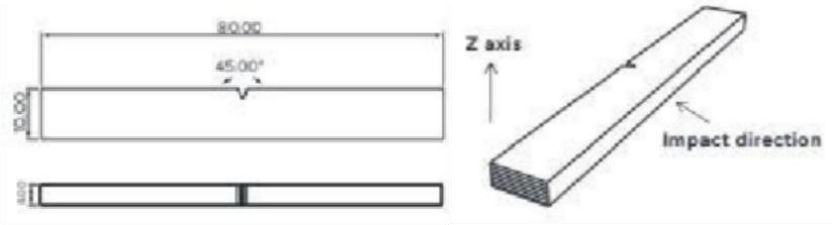
The above test results may vary depending on filament drying conditions, cooling fan settings, other printing parameters, and printer performance. The data provided are for reference purposes only and should not be considered as guaranteed specifications for all printing conditions.



Tensile Test Specimen (XY)



Flexural Test Specimen (XY)



Impact Test Specimen (XY)