



## Bambu Filament

Technical Data Sheet V3.0

# PLA Tough

### • Basic Info

**PLA** is the most common material in 3D printing as it's easy to print and inexpensive. Meanwhile, its stiffness and strength can meet most printing needs. It is worth mentioning that it can biodegrade in some artificial composting conditions. Bambu PLA Tough is a premium quality 3D printing filament that combines the benefits of regular PLA with added durability and strength. With 20% greater toughness and strength compared to regular PLA, Bambu PLA Tough is the ideal choice for applications that require enhanced mechanical properties. It also offers a more glossy and smooth finish compared to regular PLA, which means that it can be used for creating visually appealing objects and models.

### • Specifications

| Subjects            | Data                               |
|---------------------|------------------------------------|
| Diameter            | 1.75 mm                            |
| Net Filament Weight | 1 kg                               |
| Spool Material      | ABS (Temperature resistance 70 °C) |
| Spool Size          | Diameter: 200 mm; Height: 67 mm    |

### • Recommended Printing Settings

| Subjects                        | Data   |
|---------------------------------|--|
| Drying Settings before Printing | Blast Drying Oven: 55 °C, 8 h<br>X1 Series Printer Heatbed: 65 - 75 °C, 12 h |
| Printing and Storage Humidity   | < 20% RH (Sealed with desiccant)   |
| Nozzle Size                     | 0.2, 0.4, 0.6, 0.8 mm  |
| Nozzle Temperature              | 190 - 230 °C   |
| Build Plate Type                | Cool Plate, High Temperature Plate or<br>Textured PEI Plate                  |
| Bed Surface Preparation         | Glue   |
| Bed Temperature                 | 35 - 45 °C   |
| Cooling Fan                     | Turn on  |

|                     |                 |
|---------------------|-----------------|
| Printing Speed      | < 300 mm/s      |
| Retraction Length   | 0.6 - 1.0 mm    |
| Retraction Speed    | 20 - 40 mm/s    |
| Chamber Temperature | 25 - 45 °C      |
| Max Overhang Angle  | 55 °            |
| Max Bridging Length | 30 mm           |
| Support Material    | Support for PLA |

## • Properties

Bambu Lab has tested the differing aspects in the performance of PLA Tough material, including physical, mechanical, and chemical properties. Typical values are listed as followed:

| Physical Properties             |                    |                        |
|---------------------------------|--------------------|------------------------|
| Subjects                        | Testing Methods    | Data                   |
| Density                         | ISO 1183           | 1.26 g/cm <sup>3</sup> |
| Melt Index                      | 210 °C, 2.16 kg    | 44.2 ± 3.5 g/10 min    |
| Melting Temperature             | DSC, 10 °C/min     | 158 °C                 |
| Glass Transition Temperature    | DSC, 10 °C/min     | 57 °C                  |
| Crystallization Temperature     | DSC, 10 °C/min     | /                      |
| Vicar Softening Temperature     | ISO 306, GB/T 1633 | 58 °C                  |
| Heat Deflection Temperature     | ISO 75 1.8 MPa     | 53 °C                  |
| Heat Deflection Temperature     | ISO 75 0.45 MPa    | 55 °C                  |
| Saturated Water Absorption Rate | 25 °C, 55% RH      | 0.45%                  |

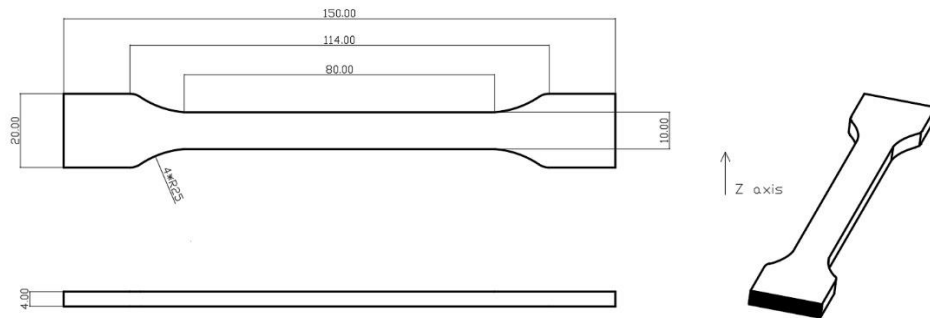
| Mechanical Properties          |                    |   |
|--------------------------------|--------------------|---|
| Subjects                       | Testing Methods    | Data  |
| Young's Modulus (X-Y)          | ISO 527, GB/T 1040 | 2590 ± 210 MPa  |
| Young's Modulus (Z)            | ISO 527, GB/T 1040 | 2210 ± 180 MPa  |
| Tensile Strength (X-Y)         | ISO 527, GB/T 1040 | 36 ± 3 MPa  |
| Tensile Strength (Z)           | ISO 527, GB/T 1040 | 31 ± 4 MPa  |
| Breaking Elongation Rate (X-Y) | ISO 527, GB/T 1040 | 8.2 ± 0.4 %   |
| Breaking Elongation Rate (Z)   | ISO 527, GB/T 1040 | 5.6 ± 0.6 %   |
| Bending Modulus (X-Y)          | ISO 178, GB/T 9341 | 2930 ± 150 MPa  |
| Bending Modulus (Z)            | ISO 178, GB/T 9341 | 2720 ± 180 MPa  |
| Bending Strength (X-Y)         | ISO 178, GB/T 9341 | 87 ± 4 MPa  |
| Bending Strength (Z)           | ISO 178, GB/T 9341 | 70 ± 4 MPa  |
| Impact Strength (X-Y)          | ISO 179, GB/T 1043 | 31.2 ± 2.6 kJ/m <sup>2</sup> ;<br>11.5 ± 3.4 kJ/m <sup>2</sup><br>(notched) |
| Impact Strength (Z)            | ISO 179, GB/T 1043 | 12.3 ± 0.6 kJ/m <sup>2</sup>  |

| Other Physical and Chemical Properties |   |
|--|---|
| Subjects                               | Data  |
| Odor                                   | Odorless  |
| Composition                            | PLA   |
| Skin Hazards                           | No hazard   |
| Chemical Stability                     | Stable under normal storage and handling conditions |
| Solubility                             | Insoluble in water                                  |
| Resistance to Acid                     | Not resistant                                       |
| Resistance to Alkali                   | Not resistant                                       |
| Resistance to Organic Solvent          | Not resistant to some organic solvents              |
| Resistance to Oil and Grease           | Resistant to most kinds of oil and grease           |
| Flammability                           | Flammable   |
| Combustion Products                    | Water, carbon oxides                                |
| Odor of Combustion Products            | Odorless  |

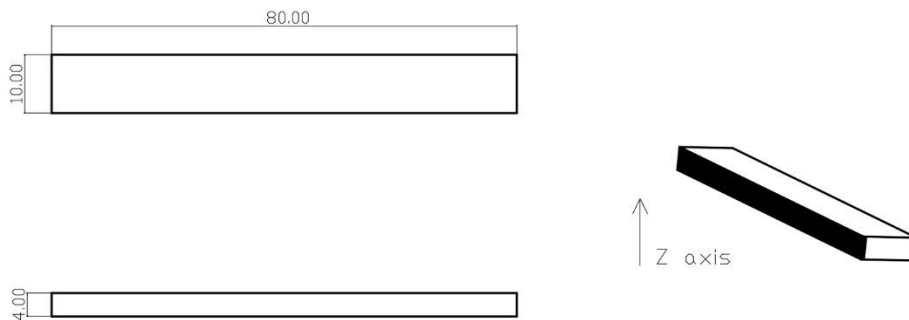
- **Specimen Test**

| Specimen Printing Conditions   |          |
|--|----------|
| Subjects   | Data     |
| Nozzle Temperature   | 220 °C   |
| Bed Temperature  | 35 °C    |
| Printing Speed   | 200 mm/s |
| Infill Density   | 100%     |
| <p><i>*All the specimens were annealed and dried at 55 °C for 8 h before testing. And the suggested annealing temperature of models printed with Bambu PLA Tough is 50 to 60 °C, and the time is 6 to 12 hours. The annealing effect depends on the annealing temperature, time and the model itself: size, structure, infill and other printing settings; some prints may deform and warp after annealing. When drying the filament and annealing the prints, it's required to use an oven that has big enough inside volume and can provides even temperature distribution, such as a blast drying oven (forced-air drying oven), and the filament and prints need to be away from the heater, and a micro-wave oven or kitchen oven is not compatible, otherwise the filament and prints can get damaged.</i></p> |          |

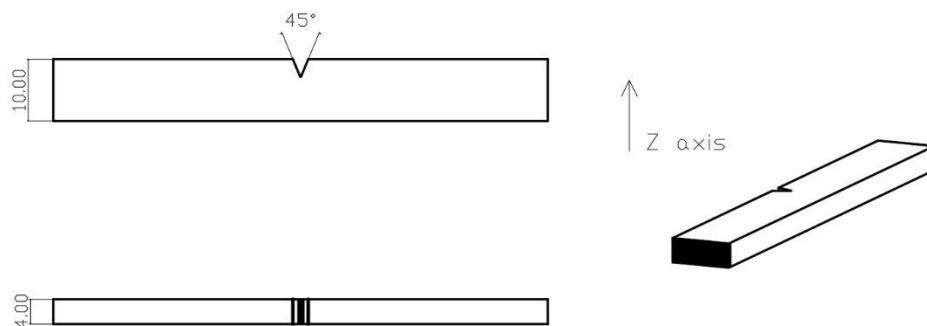
## 1. Tensile Testing



## 2. Bending Testing



## 3. Impact Testing



## • Disclaimer

The performance values are tested by standard samples at Bambu Lab, and the values are for design reference and comparison only. Actual 3D printing model performance is related to many other factors, including printers, printing conditions, printing models, printing parameters, etc.

In the process of using Bambu Lab 3D printing filaments, users are responsible for the legality, safety, and performance indicators of printing. Bambu Lab is not responsible for the use of materials and scenarios and is not responsible for any damage that occurs in the process of using our filaments.