Technology Data Sheet (TDS)

TINMORRY PETG-CF

Version 1.0

• Basic Introduction

TINMORRY PETG-CF is a carbon fiber reinforced PETG composite. Its formula has been specially designed, tested and optimized to provide excellent processing stability, print stability and comprehensive mechanical properties. It retains the excellent toughness, water resistance, surface gloss and other properties of generic PETG, and also has higher strength, stiffness and dimensional stability owing to the addition of carbon fiber. And the CF also brings a special texture to the prints and cover the layer lines, making their surface more delicate and smooth. Besides, being compatible with most FDM printers on the market (hardened steel nozzles are recommended), available for various colors and cost-efficient, TTINMORRY PETG-CF is really an ideal and worthwhile 3D printing filament.

• Specifications

Subjects	Data
Diameter	1.75 ± 0.03 mm
Net filament weight	1000 g
Length	315 ± 5 m
Spool material	ABS ((Temperature resistance: 80 °C)
Spool size	External Diameter：198 mm；Inner Diameter：56 mm； Width：65 mm；

• Recommended Printing Settings

Subjects	Data
Drying settings before printing	65 ± 5 °C，≥ 8 h (Blast drying oven, or filament drying box)
Printing temperature and humidity	≤ 65 °C, ≤ 25% RH （Put in a working filament drying box, or put in an air-tight container and sealed with desiccant）
Storage temperature and humidity	≤ 30 °C, ≤ 20% RH（Sealed with desiccant）
Compatible support material	Itself or support filament for PETG
Compatible printer type	Open-frame, enclosed-frame
Compatible nozzle material	Hardened Steel
Compatible nozzle size	0.4 (recommended), 0.6, 0.8 mm
Compatible plate type	Textured PEI Plate or other plate
Plate surface preparation	Glue
Nozzle temperature	240 - 270 °C
Bed temperature	70 ± 5 °C (depending on the printer and plate types)
Printing speed	< 250 mm/s
Chamber temperature	< 60 °C

• Properties

The commonly used physical properties, mechanical properties, chemical properties, printing properties and other properties of TINMORRY PETG-CF have been tested and are shown in the tables below.

• Physical Properties

Subjects	Testing Methods	Data
Density	ISO 1183	1.32 g/cm³
Saturated water absorption rate	25 °C , 55% RH	0.38%
Melt index	210 °C, 2.16 kg	14.1 ± 1.6 g/ 10 min
Glass transition temperature	DSC, 10 °C/min	70 °C
Crystallization temperature	DSC, 10 °C/min	N / A
Melting temperature	DSC, 10 °C/min	221 °C
Vicar softening temperature	ISO 306, GB/T 1633	74 °C
Heat deflection temperature 1	ISO 75, 1.82 MPa	67 °C
Heat deflection temperature 2	ISO 75, 0.45 MPa	72 °C

• Mechanical Properties

Properties	Testing Methods	Data
Tensile strength (XY)	ISO 527, GB/T 1040	52 ± 4 MPa
Tensile strength (Z)	ISO 527, GB/T 1040	37 ± 3 MPa

Young's modulus (XY)	ISO 527, GB/T 1040	2430 ± 140 MPa
Young's modulus (Z)	ISO 527, GB/T 1040	1620 ± 110 MPa
Breaking elongation rate (XY)	ISO 527, GB/T 1040	9.3% ± 1.6%
Breaking elongation rate (Z)	ISO 527, GB/T 1040	6.8% ± 1.7%
Bending strength (XY)	ISO 178, GB/T 9341	86 ± 4 MPa
Bending strength (Z)	ISO 178, GB/T 9341	61 ± 4 MPa
Bending modulus (XY)	ISO 178, GB/T 9341	3070 ± 180 MPa
Bending modulus (Z)	ISO 178, GB/T 9341	2240 ± 150 MPa
Impact strength (XY)	ISO 179, GB/T 1043	59.3 ± 4.5 kJ/m²
Impact strength (Z)	ISO 179, GB/T 1043	8.2 ± 1.7 kJ/m²

• Chemical and Other Properties

Subjects	Data
Component	PETG, carbon fiber
Skin irritation	May cause allergy in some people, and wearing gloves is suggested
Resistance to water	Yes
Resistance to oil and grease	Resistant to most kinds of daily oil and grease
Resistance to organic solvent	Not resistant to some organic solvents
Resistance to weak acid	Yes
Resistance to strong acid	Not resistant
Resistance to weak alkali	Yes
Resistance to strong alkali	Not resistant
Flammability	Yes
Odor during printing	Odorless
Odor during combustion	Pungent

• Specimen Info

Subjects	Data
Size	Shown at the following pictures
Nozzle temperature	255 °C
Bed temperature	70 °C
Printing speed	150 mm/s
Infill density	100%
Infill pattern	Concentric

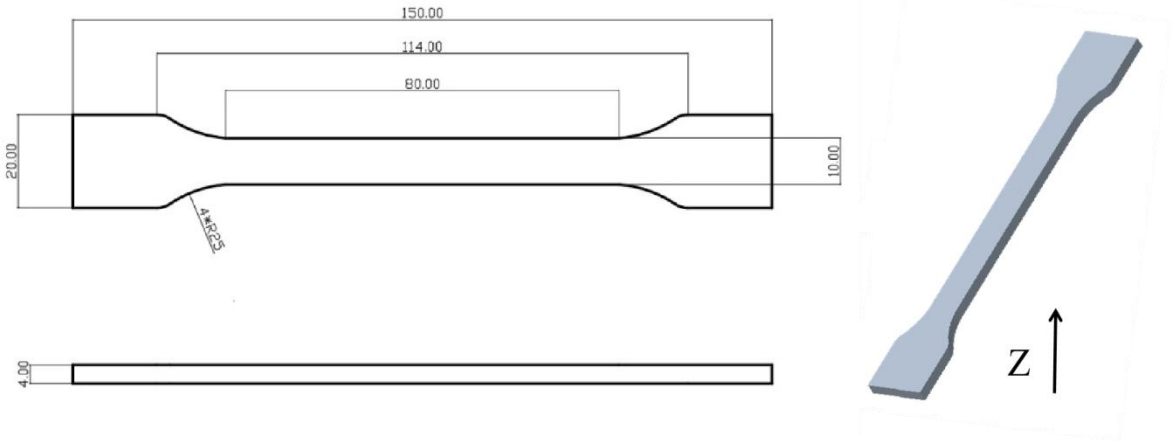
Statements：

1. The test specimens were printed under the key parameters mentioned above. Before testing, all specimens were annealed at 70 °C for 6 hours and then placed in an indoor environment at about 25 °C for 12 hours. Please note that different ambient temperatures, fan speeds and layer times can lead to varying cooling, which can affect the mechanical properties of the specimens, especially those in the Z-direction. Additionally, different printers can also result in variations in printing quality.
2. If high printing quality is required, it is recommended to dry every kind of TINMORRY

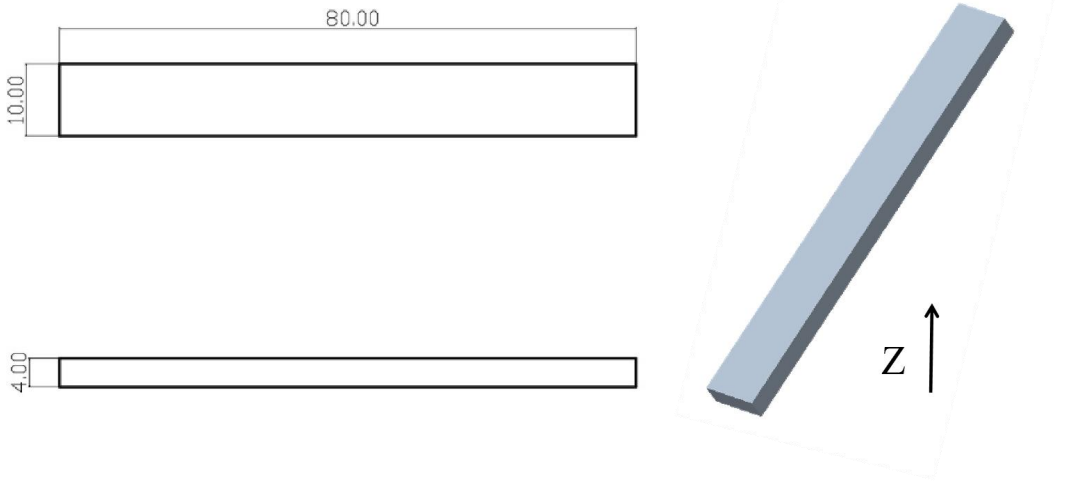
filaments before printing and use an air-tight container and desiccant to protect them from moisture during the printing process (with humidity inside the container less than 25%) to reduce the risk of issues related to moisture absorption in filaments. The recommended drying conditions are shown above. Note that when drying them, avoid placing the spools near the heater to prevent damage to the spools or the filaments due to excessive temperature. Do not use a kitchen oven or microwave oven.

3. After annealing, the strength, stiffness, toughness and heat resistance of TINMORRY PETG-CF prints can only be increased slightly, but some prints may undergo shrinkage or deformation after the annealing process. Note that the annealing effect is also affected by the size, structure, wall thickness, and infill density of the prints themselves. If you want to anneal them, it is recommended to use a blast drying oven which has uniform temperature, and it is recommended to first anneal at about 60 °C for about 2 hours, then slowly increase the temperature to about 70 °C and keep it for about 2 to 4 hours; if the prints are significantly deformed halfway, it should be stopped immediately and a lower temperature should be used instead.

1. Tensile Test



2. Bending Test and Impact Test



• Disclaimer

The above properties data is obtained by TINMORRY through testing with standard samples, standard methods, and specific equipment, and is for reference and comparison only; if some data are changed, TINMORRY will update this TDS, but may not be able to inform the users, and please forgive us. The actual performance of 3D prints depends not only on the performance of the filaments used, but also on many factors, such as the degree of moisture absorption of the filaments, the printer, environmental conditions, model characteristics, printing parameters, etc.. When using TINMORRY FDM 3D printing filaments, users are responsible for the legality, safety, and performance of the prints. TINMORRY is responsible for the quality of our filaments, but not for any damage or injury that occurs during using them,or the usage scenarios of them.