

【Phrozen Filament User Guide】

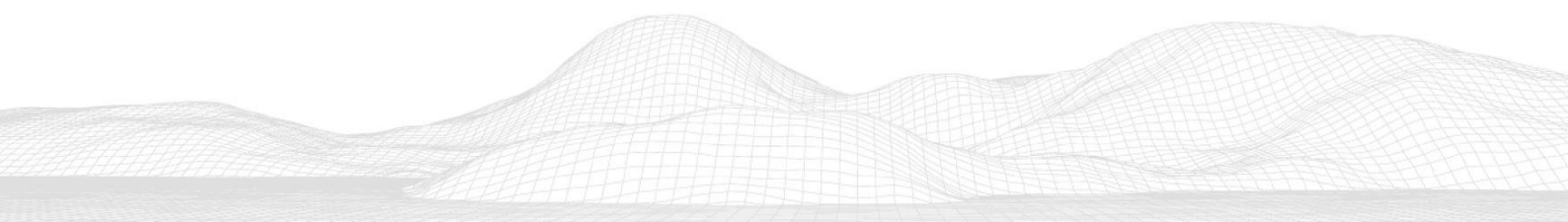
PLA Silk - Titan Flame, Blue Spirit

Outline

Before printing the perfect object, it is important to first understand the material limitations we are handling and how it can be successfully printed under various conditions. With this in mind, Phrozen provides the following design suggestions to help you better understand the properties of each material and how you can best utilize them to bring your wildest creation to life.

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Section 1

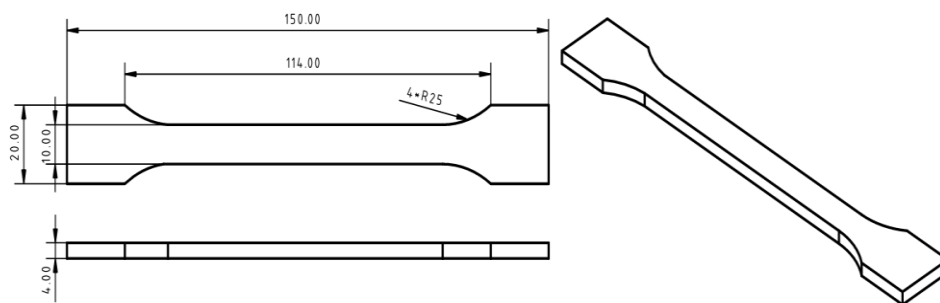
TDS

Tensile Properties	Norm	Values	
		Printing Direction (X-Y)	Printing Direction (Z)
Tensile Strength at Break	ISO 527	38.3 – 39.6 MPa	14.1 – 16.7 MPa
Tensile Modulus	ISO 527	2979 - 3772 MPa	2269 - 2578 MPa
Elongation at Break	ISO 527	4.5 – 12.8 %	0.6 - 0.8 %
Impact Properties	Norm	Values	
		Printing Direction (X-Y)	Printing Direction (Z)
Notched Izod Impact Strength	ISO 180	23.7 – 35.9 J/m	13.5 – 16.5 J/m
Thermal Properties	Norm	Values	
HDT at 0.45 MPa	ASTM D648	58.4 °C	
Hardness	Norm	Typical values	
Shore D	ISO 7619-1	78-82D	

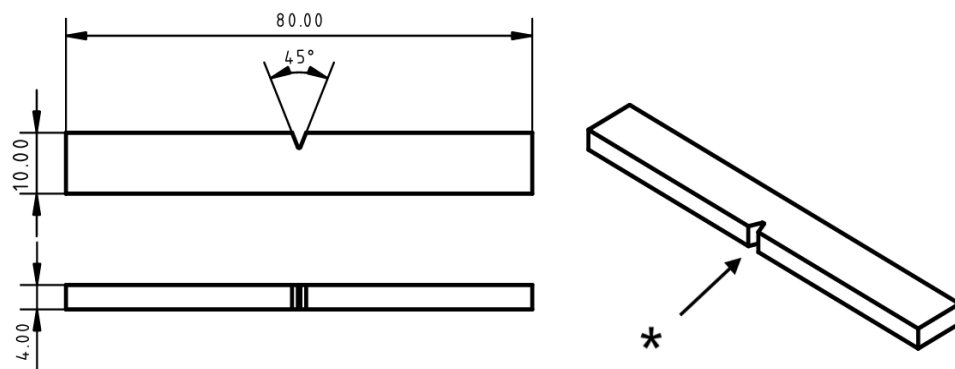
**All test pieces were printed in an environment of $25 \pm 2^{\circ}\text{C}$ and $\text{RH}55 \pm 10\%$ right after removing the vacuum bag and were set aside to cool down completely before testing.*

Performance values obtained in standard sample tests conducted by Phrozen are for design reference and comparison only. The actual performance of each 3D printed model might be impacted by other variables, including the printer, printing model, printing environment, printing parameters, etc.

Users are responsible for their legality, safety, and performance indicators when printing with Phrozen's material. Phrozen is not responsible for the materials and usage scenarios, nor is it responsible for any damage that occurs during the use of our materials.

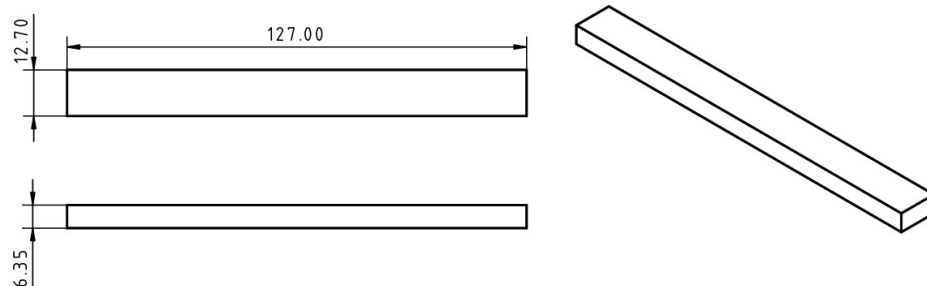


ISO 527 Tensile Test Bar (unit: mm)

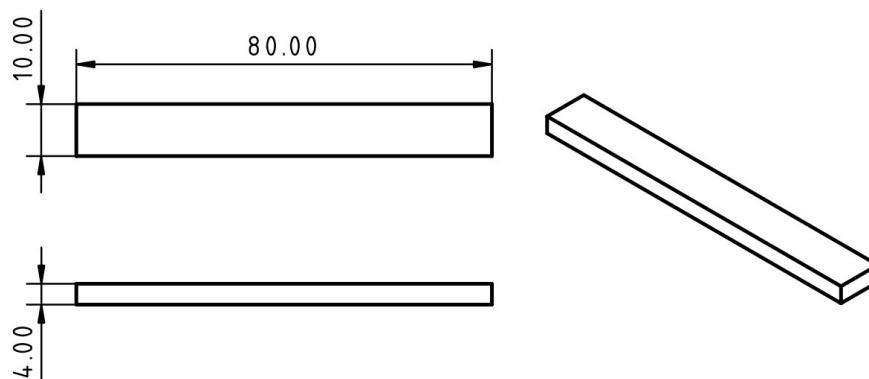


ISO 180 Impact Test Bar (unit: mm)

*Impact test direction



ASTM D648 HDT Test Bar (unit: mm)



ISO 178 Flexural Test Bar (unit: mm)

Section 2

Printing

Printing Parameters

Filament Specifications

Appearance	Titan Flame, Blue Spirit
Diameter	1.75 ± 0.2 mm
Density	1.198 cm ³
HDT 0.45 Mpa	58.4 °C
Melt Flow Index	7.02 g / 10min
Weight	1 kg

Test Print Parameters

Nozzle Diameter	0.4 mm
Nozzle Temperature	220 ± 20 °C
Heat Bed Temperature	60 °C
Printing Speed	100 mm/s
Fan Speed	100 %
Infill Percentage	100 %

Recommended Printing Parameters

Nozzle Temperature	210 ± 10 °C (50 - 100 mm/s) 230 ± 10 °C (100 - 150 mm/s)
Heat Bed Temperature	60 °C
Printing Speed	< 150 mm/s
Fan Speed	100 %

*For a better metallic sheen, it is recommended to print the outer layer at a speed of 40-60 mm/s.

Drying Conditions

Drying Temperature	50°C
Drying Time	4 hours

※Be sure to bake the filament before each print to remove moisture.

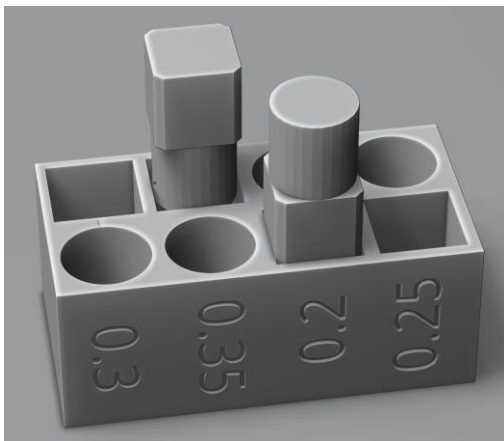
Section 3

Design Specifications

※Note: All indicators are the limit values of PLA and will vary depending on the machine, parameters, operating environment, and printing model used※

Size Tolerance, X-Y plane

This indicator is the minimum tolerance allowed when printing the pin and hole connection.

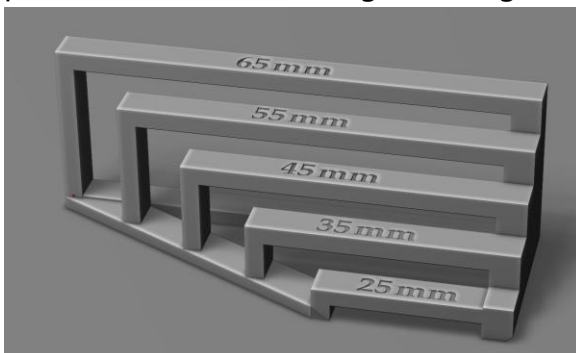


Recommended square aperture: $\geq 0.1 \text{ mm}$

Recommended circular aperture: $\geq 0.1 \text{ mm}$

Maximum Horizontal Bridge Span

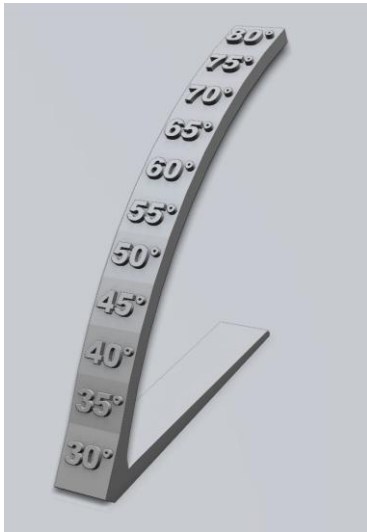
This indicator shows the maximum width between the supporting walls that can be printed without deforming the bridge.



Recommended distance: $\leq 15 \text{ mm}$

Maximum Hanging Angle

This indicator is the maximum angle that can be printed completely without support.



Recommended angle: $< 45^\circ$