phrozen

Phrozen Resin User Guide

EL400 Resin

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.

Table of Contents

Section 1

TDS

General Properties	Norm	Typical values	
Appearance	-	Gray	
Viscosity, 25 °C	BROOKFIELD Viscometer	2300–3000mPas	
Density (liquid resin)	ASTM D4052-18a	1.04 g/cm³	
Tensile Properties	**Norm**	**Typical values**	
		UV post-cured	UV + Thermal (80°C)
Tensile Strength at Break	ASTM D412	6.3 MPa	10.5 MPa
Elongation at Break	ASTM D412	391 %	357 %
Tear Strength	ASTM D624	31 kN/m	39.1 kN/m
Hardness	**Norm**	**Typical values**	
		UV post-cured	UV + Thermal (80°C)
Shore A	ASTM D2240	70–75A	73–75A
Resilience testing	**Norm**	**Typical values**	
		UV post-cured	UV + Thermal (80°C)
Rebound Resilience	ASTM D7121	40 - 45 %	50 - 55%
Ross Flex	ASTM D1052	-	>60,000

* All testing specimens are printed using Phrozen Sonic Mighty 8K and post-cured using Phrozen Wash & Cure Kit.
* Regular UV post-curing for 60 minutes and additional thermal post-cure of 2h at 80°C.
* Heat curing can improve mechanical properties but also increase the risk of deformation.

Section 2

Printing

Printing Parameters

Printer	Sonic mini / Sonic mini 4K
Layer Height	100 μm
Exposure Time	11 ± 1
Bottom Exposure Time	22.5 ± 2.5
Light-off Delay	16.5 ± 3.5
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mini 8K
Layer Height	100 μm
Exposure Time	12.5 ± 2.5
Bottom Exposure Time	22.5 ± 2.5
Rest Time After Retract	9 ± 1
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mini 8K S
Layer Height	100 μm
Exposure Time	11 ± 2
Bottom Exposure Time	22.5 ± 2.5
Rest Time After Retract	9 ± 1
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mighty 4K
Layer Height	100 μm
Exposure Time	15 ± 2
Bottom Exposure Time	27.5 ± 2.5
Light-off Delay	21 ± 4
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mighty 8K
Layer Height	100 μm
Exposure Time	12.5 ± 2.5
Bottom Exposure Time	27.5 ± 2.5
Rest Time After Retract	11.5 ± 3.5
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mighty 12K (Upgrade Kit)
Layer Height	100 μm
Exposure Time	12.5 ± 2.5
Bottom Exposure Time	27.5 ± 2.5
Rest Time After Retract	11.5 ± 3.5
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mighty Revo
Layer Height	100 μm
Exposure Time	12.5 ± 2.5
Bottom Exposure Time	27.5 ± 2.5
Rest Time After Retract	12 ± 5
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mega 8K
Layer Height	100 μm
Exposure Time	15 ± 2
Bottom Exposure Time	32.5 ± 2.5
Rest Time After Retract	14 ± 6
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mega 8K S
Layer Height	100 μm
Exposure Time	11 ± 2
Bottom Exposure Time	22.5 ± 2.5
Rest Time After Retract	15 ± 5
Lift Distance	10 mm
Lifting Speed	45 mm/min

Printer	Sonic Mega 8K V2
Layer Height	100 μm
Exposure Time	12.5 ± 2.5
Bottom Exposure Time	32.5 ± 2.5
Rest Time After Retract	14 ± 6
Lift Distance	10 mm
Lifting Speed	45 mm/min

* Sonic Mega 8K and Sonic Mega 8K V2 have a higher peeling force. Therefore, a longer exposure time is necessary to increase the success rate.

* Be sure to cover the hood when printing to maintain the best printing condition of the resin.

Cleaning

1. After removing the printed object from the building stage, use the Phrozen Wash and Cure Kit for post-processing.
2. Soak the object in the Washing Station filled with 95% alcohol to remove uncured resin from the model.
3. Make sure to clean the inner parts of hollow objects completely.
4. After the object has been thoroughly cleaned, leave it in a cool, well-ventilated place for at least 30 minutes without exposure to light. Alternatively, you may gently apply compressed air to dry the printed object.

Post-Curing

1. Use Phrozen post-curing lamps (Phrozen Curing Station in Wash & Cure Kit / Phrozen Cure Mega S) or other post-curing lamps with the same wavelength to cure printed objects.
2. Soak the models in glycerin and post-cure for about 60 minutes. Once completed, remove from glycerin immediately and clean up the models with water. Leave models in a cool, well-ventilated place for at least 60 minutes without exposure to light to dry.
3. If required, an additional thermal post-cure at 80°C for 2 hours can be performed to enhance the mechanical properties of the models.

Section 3

Suggestions for Printing

Before Use

Due to the high viscosity of the resin, thoroughly shake the resin before pouring it into the container to ensure a uniform distribution of the colorant.

Print Settings

1. The recommended printing thickness is 100 um.
2. The model wall thickness needs to be 1.5 mm or more.
3. It is recommended to slow down the lifting and return speed, and increase the rest time. The return speed should be adjusted according to the type of model, with a recommended setting of 120–150 mm/min.
4. The recommended support thickness setting is 1.0 mm / 1.2 mm or more.
5. It’s recommended to print models directly on the build plate to minimize deformation.
6. Please note that if the space between supports or within the model's structure is too small, the resin may solidify within the gaps.

Post Processing:

1. Soaking in glycerin can help improve the structural integrity of soft materials and reduce the stickiness of post-cured object surfaces.
2. After curing, the object should be promptly cleaned thoroughly. Please avoid soaking the models in any liquid (including alcohol, glycerin, and water) for a prolonged period (>60 minutes) to avoid absorption of liquid that may cause expansion and deformation.
3. Please make sure that there is space between the models when soaked in glycerin to prevent models from sticking together.
4. Thermal post-curing can help improve the mechanical properties of the material, especially the tensile and tear strength, but may reduce ductility.

Please refer to the laboratory test data on the TDS at the beginning of this document. Choose the appropriate secondary post-curing method according to your application requirements and needs.

Section 4

Applications