

## [Phrozen Resin User Guide]

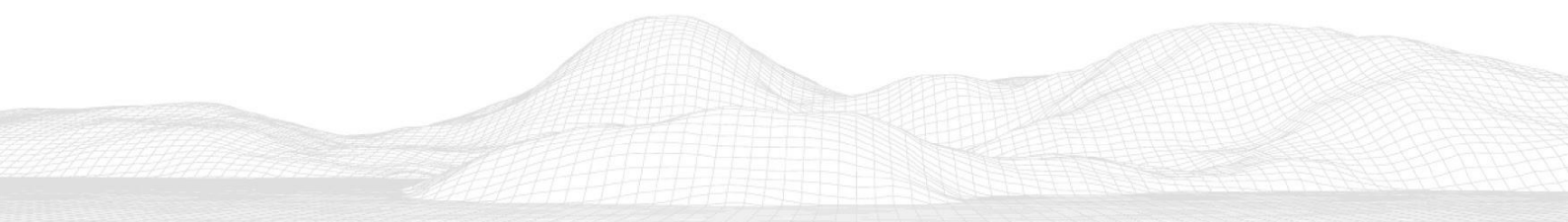
# Phrozen Ceramic White Resin

## 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.

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## Section 1

### TDS

General Properties	Norm	Typical values	
Appearance	-	White	
Viscosity, 30	Cone/Plate Rheometer <sup>1</sup>	120 mPas	
Viscosity, 50 °C	Cone/Plate Rheometer <sup>1</sup>	45 mPas	
Density (liquid resin)	ASTM D4052-18a	1.45 g/cm <sup>3</sup>	
Tensile Properties	Norm	Typical values (UV post-cured)	
E Modulus	ASTM D638	5800 MPa	
Ultimate Tensile Strength	ASTM D638	62 MPa	
Elongation at Break	ASTM D638	2 %	
Flexural Properties	Norm	Typical values (UV post-cured)	
Flexural Modulus	ASTM D790	5400 MPa	
Flexural Strength	ASTM D790	90 MPa	
Impact Properties	Norm	Typical values (UV post-cured)	
Notched Izod (Machined), 23 °C	ASTM D256	26 J/m	
Unnotched Izod, 23 °C	ASTM D256	90 J/m	
Charpy notched, 23 °C	ISO 179-1	5.36 kJ/m <sup>2</sup>	
Thermal Properties	Norm	Typical values (UV post-cured)	Typical values (UV + thermal*)
HDT at 0.45 MPa	ASTM D648	67 °C	90 °C
HDT at 1.82 MPa	ASTM D648	58 °C	60 °C
Hardness	Norm	Typical values (UV post-cured)	
Shore D	ASTM D2240	>90	
Other	Norm		
Water Absorption, Short Term (24 hours)	ASTM D570	0.22 %	

*\* All testing specimens are printed using Phrozen Sonic Mighty 8K or Sonic Mini 8K, and post-cured using Phrozen Cure & Wash.*

*\* Regular UV post-curing and additional thermal post-cure are for 24 hours at 80°C.*

## Section 2

# Printing

## Printing Parameters

<b>Printer</b>	Sonic Mini/Sonic Mini 4K
<b>Layer Height</b>	50 μm
<b>Exposure Time</b>	3–4 s
<b>Bottom Exposure time</b>	25–35 s
<b>Light-off Delay</b>	12 s
<b>Lift Distance</b>	6 mm
<b>Lifting Speed</b>	60 mm/min

<b>Printer</b>	Sonic Mini 8K
<b>Layer Height</b>	50 μm
<b>Exposure Time</b>	2.5–3 s
<b>Bottom Exposure time</b>	25–35 s
<b>Rest Time After Retract</b>	3 s
<b>Lift Distance</b>	6 mm
<b>Lifting Speed</b>	60 mm/min

<b>Printer</b>	Sonic Mighty 4K
<b>Layer Height</b>	50 μm
<b>Exposure Time</b>	3–4 s
<b>Bottom Exposure time</b>	25–35 s
<b>Light-off Delay</b>	11 s
<b>Lift Distance</b>	8 mm
<b>Lifting Speed</b>	60 mm/min

<b>Printer</b>	Sonic Mighty 8K
<b>Layer Height</b>	50 $\mu\text{m}$
<b>Exposure Time</b>	2.5–3 s
<b>Bottom Exposure time</b>	30–35 s
<b>Rest Time After Retract</b>	3 s
<b>Lift Distance</b>	8 mm
<b>Lifting Speed</b>	60 mm/min

<b>Printer</b>	Sonic Mega 8K*
<b>Layer Height</b>	50 $\mu\text{m}$
<b>Exposure Time</b>	2.5–5 s
<b>Bottom Exposure time</b>	30–35 s
<b>Rest Time After Lift</b>	5 s
<b>Lift Distance</b>	8 mm
<b>Lifting Speed</b>	45 mm/min

\* Mega 8K has a higher peeling force. Therefore, a longer exposure time is necessary to increase the success rate.

## Cleaning

After removing the printed object from the building stage, use Phrozen Wash and Cure Kit for post-processing. Soak the object in the Washing Station filled with 95% alcohol for 35–40 seconds to remove uncured resin from the surface.

Do not soak in alcohol or other solvent (such as IPA) for more than 45 seconds, as it may damage the surface of the objects. In addition, make sure to clean the inner parts of hollow objects completely.

Make sure that the object has been thoroughly cleaned, then 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.

**\*When printing flat on the building plate, remove the printed objects carefully to avoid deformation on the objects.**

## Post-Curing

Use Phrozen post-curing lamps (Phrozen Curing Station, Cure Luna, Cure Mega) or other post-curing lamps with the same wavelength to cure printed objects. Cure the printed objects for 120 minutes for the best results.

## Section 3

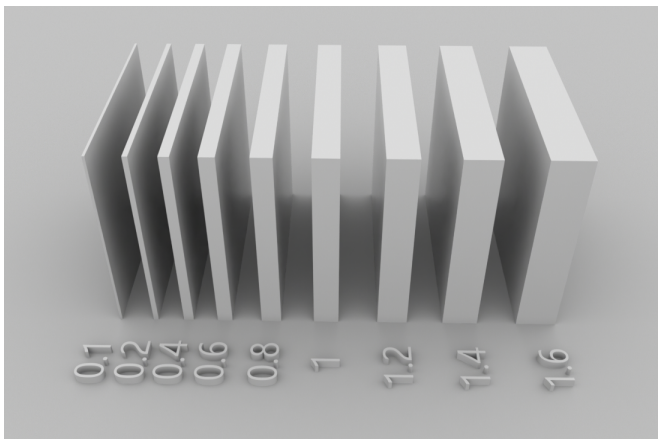
# Design Specifications

※Note: All indicators are limited to each resin; the value will vary with different machines and environmental conditions.※

### Minimum Unsupported Wall Thickness

This indicator shows the minimum wall thickness that can be printed independently with no support without causing any bending or breaking.

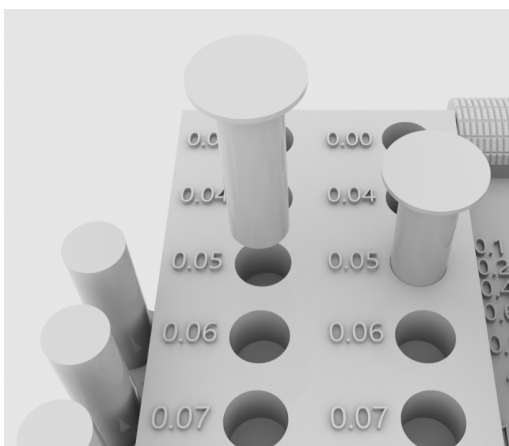
*Recommended thickness:*  $\geq 0.4$  mm



### Size Tolerance, X-Y plane

This indicator shows the minimum dimensional tolerance between the hole and the column parallel to the XY plane.

*Recommended tolerance:*  $\geq 0.04$  mm

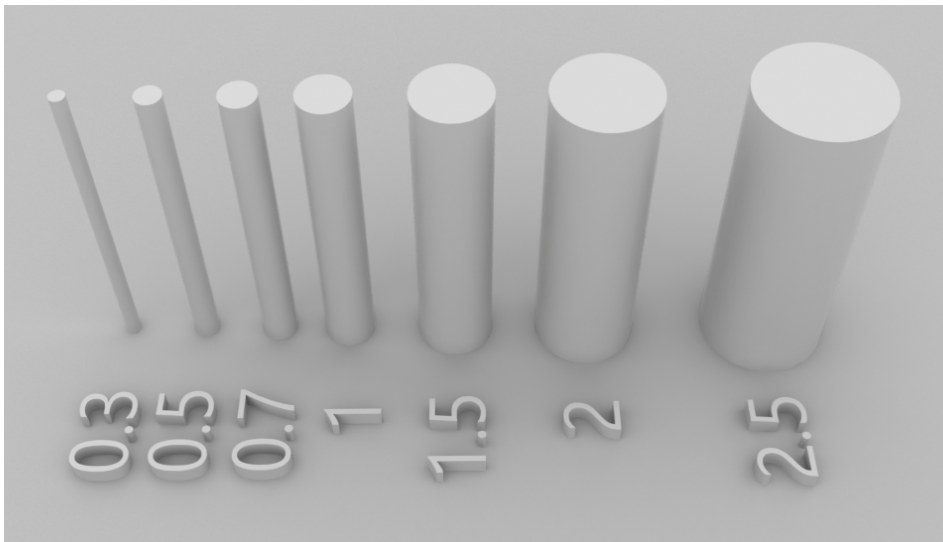




## Minimum Pin Diameter

This indicator shows the minimum column diameter of pillars and supports that can be printed independently without bending or breaking.

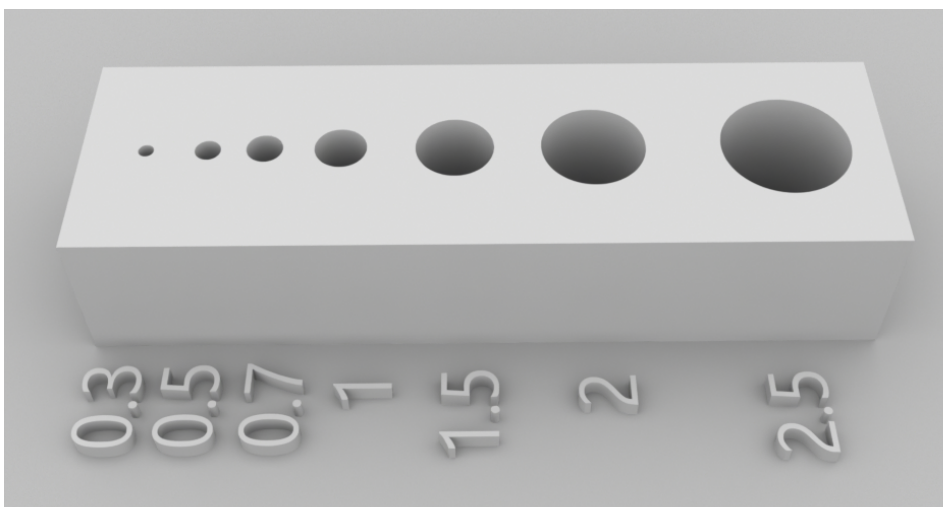
*Recommended diameter:  $\geq 0.5$  mm*



## Minimum Hole Diameter, X-Y plane

This indicator shows the minimum hole diameter that can be successfully printed parallel to the XY plane.

*Recommended diameter:  $\geq 0.7$  mm*

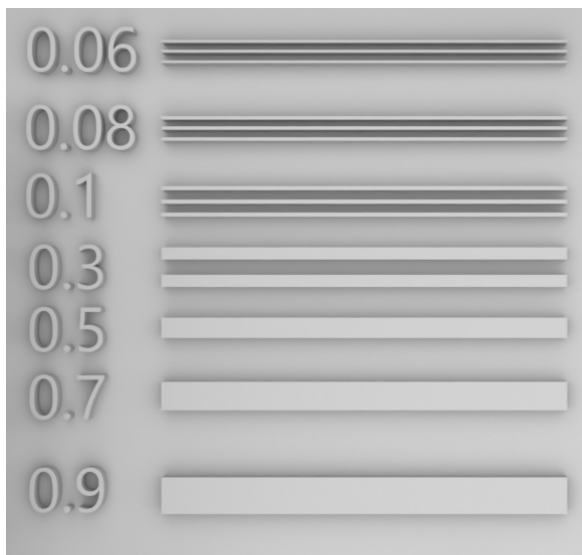




### Minimum Embossed Detail Width, X-Y plane

This indicator shows the minimum line width that can successfully be printed with embossed details.

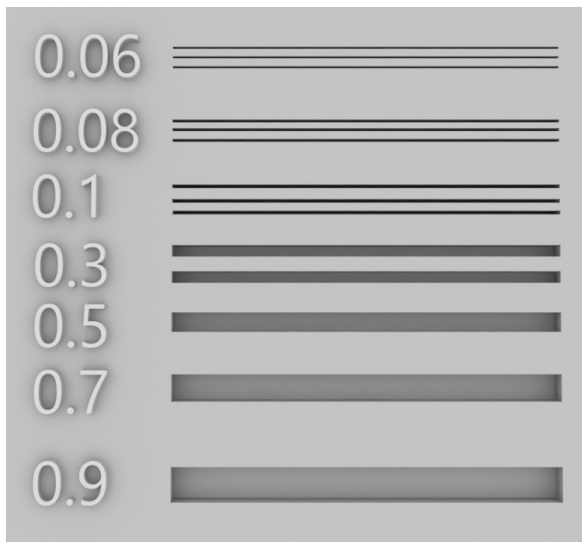
*Recommended width:  $\geq 0.1$  mm*



### Minimum Engraved Detail Width, X-Y plane

This indicator shows the minimum line width that can successfully be printed with engraved details.

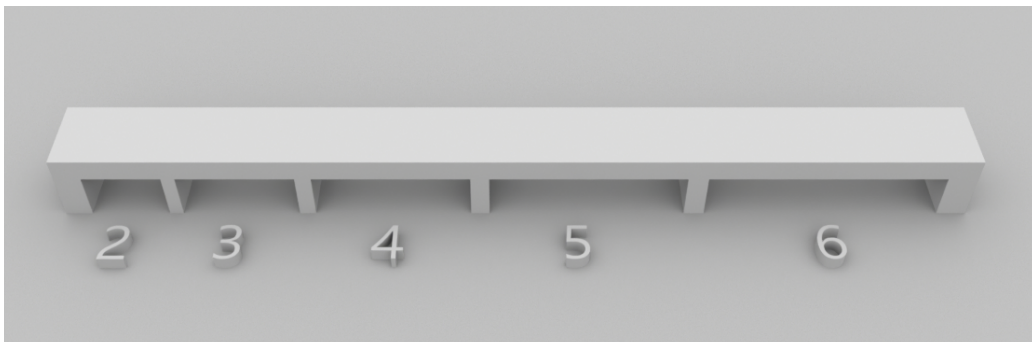
*Recommended width:  $\geq 0.3$  mm*



### Maximum Horizontal Bridge Span

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

*Recommended width:  $\leq 6$  mm*

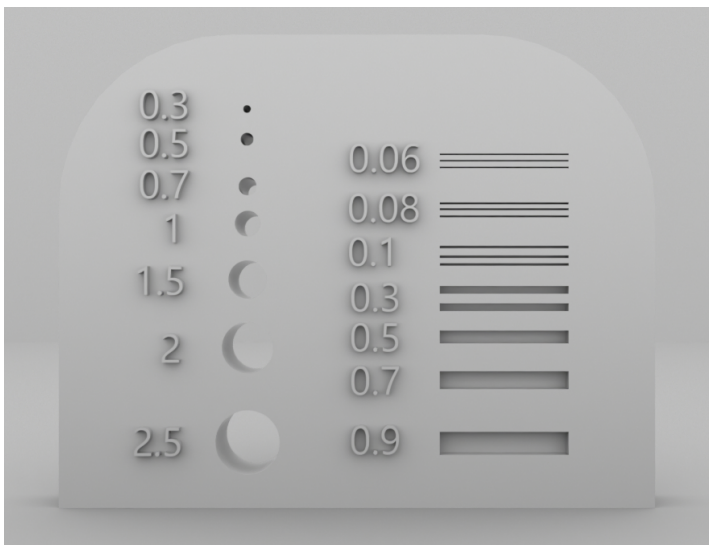


### Minimum Hole Diameter and Engraved Detail Width, Z-Axis, at 0.05mm Layer Height

This indicator shows the minimum hole diameter and engraving groove width that can be successfully printed on the Z-axis with a layer thickness of 0.05mm.

*Recommended diameter:  $\geq 0.5$  mm*

*Recommended width:  $\geq 0.08$  mm*



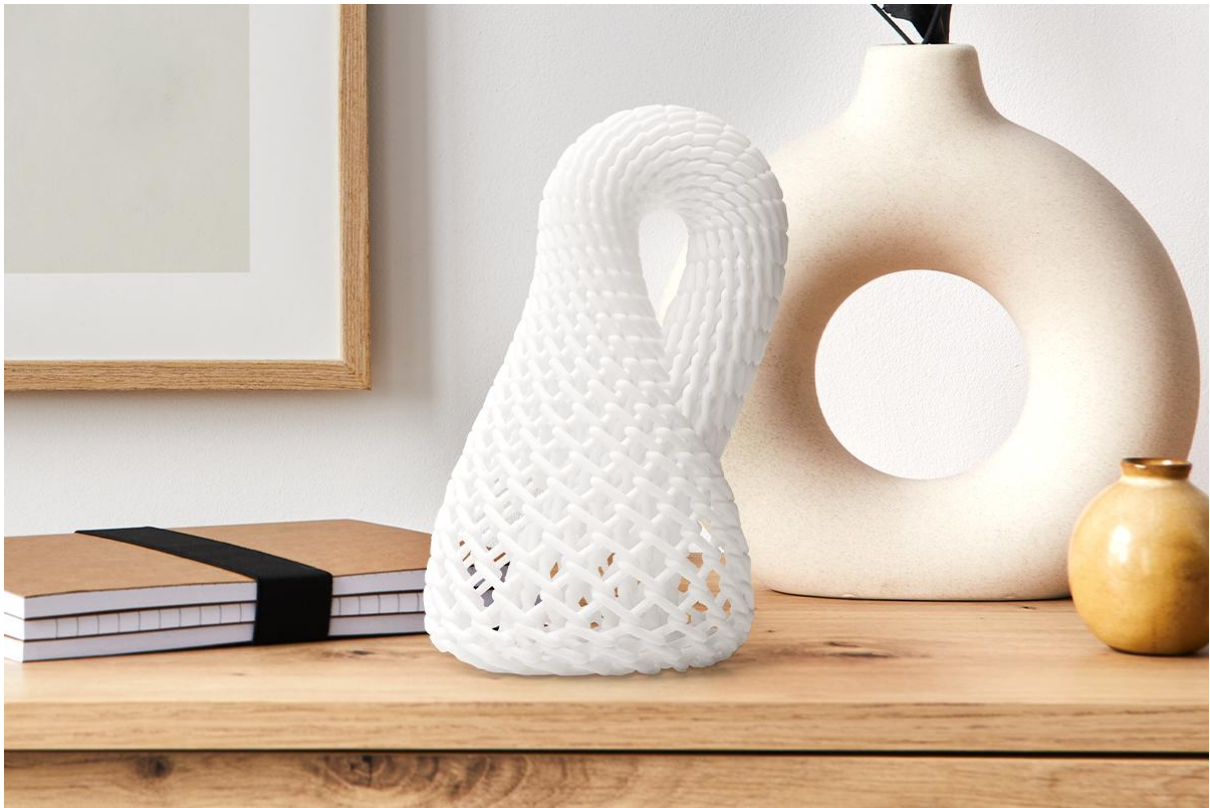
## Section 4

# Applications

### Mechanical simulation



### Fine crafts







## Skeleton models

