

## [Phrozen Resin User Guide]

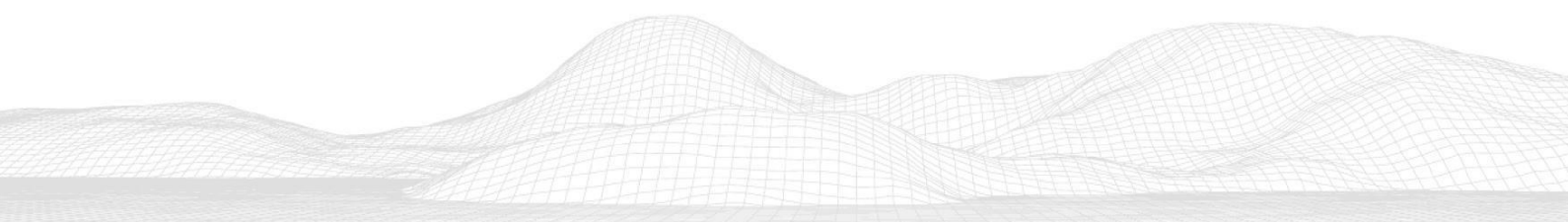
# Phrozen Water - Washable Dental Model Resin

## 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

<b>Mechanical Properties*</b>	<b>Unit</b>	<b>Results</b>	<b>Method</b>
<b>Flexural strength</b>	<b>MPa</b>	<b>65.7</b>	<b>ASTM D790</b>
<b>Flexural modulus</b>	<b>MPa</b>	<b>1542</b>	<b>ASTM D790</b>
<b>Shore D Hardness</b>	<b>-</b>	<b>76</b>	<b>ASTM 2240</b>
<b>Thermal dimensional stability at 60°C</b>	<b>µm</b>	<b>&lt;100</b>	<b>ASTM D1204</b>
<b>Liquid Properties</b>			
<b>Viscosity at 25°C (77°F)</b>	<b>cP</b>	<b>60 – 100</b>	<b>ASTM D1475</b>
<b>Liquid Density</b>	<b>g/cm<sup>3</sup></b>	<b>1.1</b>	<b>ASTM D7867</b>

*\* All testing specimens are printed using Phrozen Sonic 4K 2022 or Sonic XL 4K 2022 , and post-cured using Phrozen Cure V2 or Cure Mega.*

## Section 2

# Printing

### Printing Parameters

<b>Printer</b>	Sonic 4K 2022
<b>Layer Height</b>	50μm
<b>Exposure Time</b>	4~6 s
<b>Bottom Exposure time</b>	25~35 s
<b>Rest Time</b>	1~3s
<b>Lift Distance</b>	7 mm
<b>Lifting Speed</b>	50 mm/min

<b>Printer</b>	Sonic 4K XL 2022
<b>Layer Height</b>	50μm
<b>Exposure Time</b>	2~4 s
<b>Bottom Exposure time</b>	25~35 s
<b>Rest Time</b>	1~3 s
<b>Lift Distance</b>	7 mm
<b>Lifting Speed</b>	50 mm/min

## Printing Suggestions

### Printing

Shake well the resin before pouring it to the vat.

### Printing Full-Plate

When printing full-plate prints, it's recommended to add 1-2 seconds of rest time.

## Cleaning

After removing the printed object from the building stage, use an ultrasonic cleaner and clean water for 5 minutes to remove uncured resin from the surface. Make sure that the object has been thoroughly cleaned, then leave it in a dark place for up to 30 minutes or use an air gun to immediately dry the printed object.

Avoid rubbing the printed object as it may cause over-cleaning and affect precision tolerances.

## Post-Curing

Use Phrozen post-curing lamps (Cure V2, Cure Luna, Cure Mega) or other post-curing lamps with the same wavelength to cure printed objects. Cure for 30 minutes to achieve good mechanical properties and precision.

## Section 3

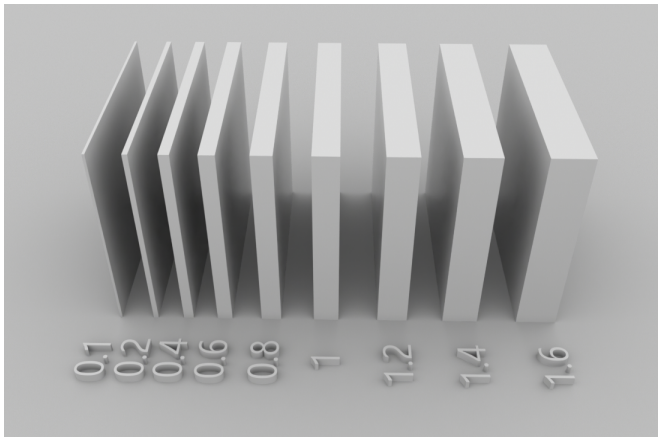
# Design Specifications

※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.

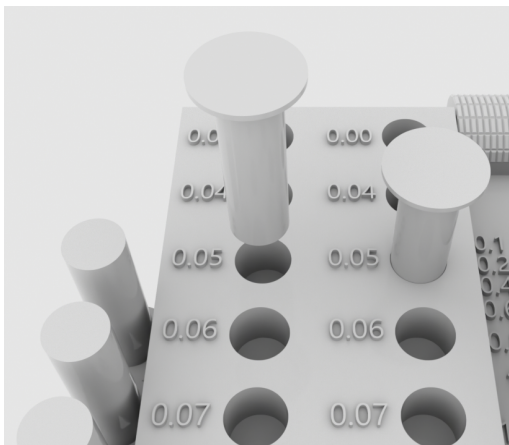
*Recommended thickness:*  $\geq 0.4$  mm



### Size Tolerance, X-Y plane

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

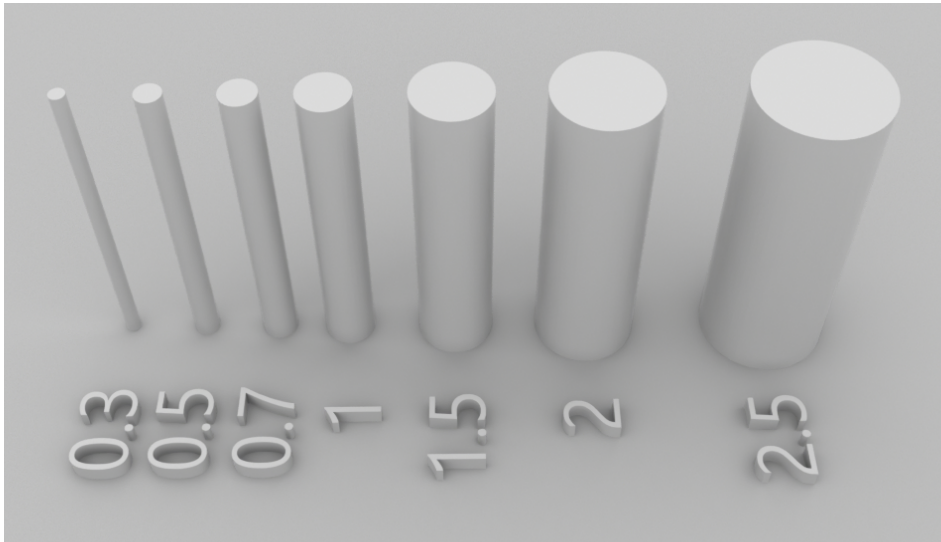
*Recommended tolerance:*  $\geq 0.04$  mm



### Minimum Pin Diameter

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

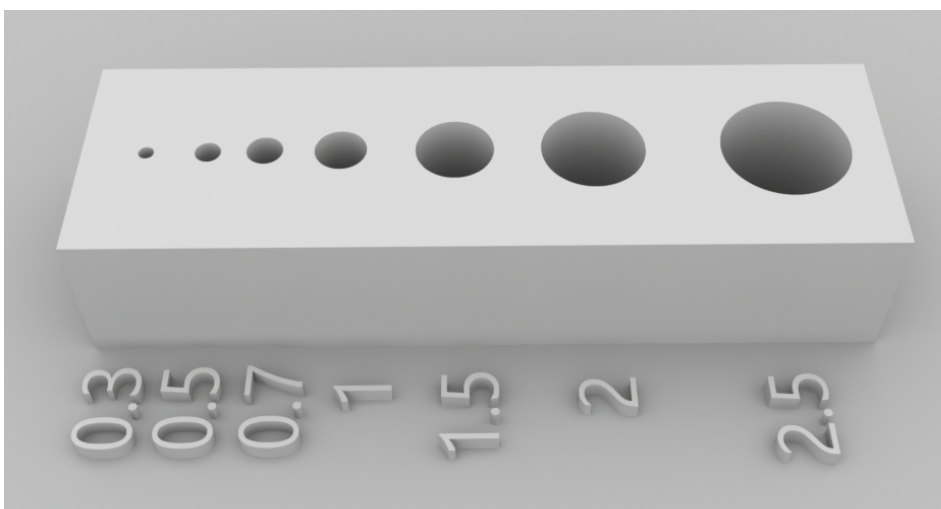
*Recommended diameter:  $\geq 0.5$  mm*



### 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:  $\geq 1$  mm*



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

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

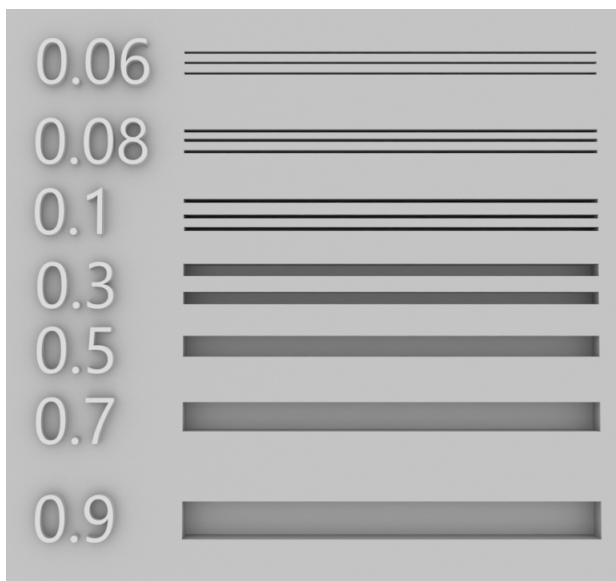
*Recommended width:  $\geq 0.3$  mm*



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

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

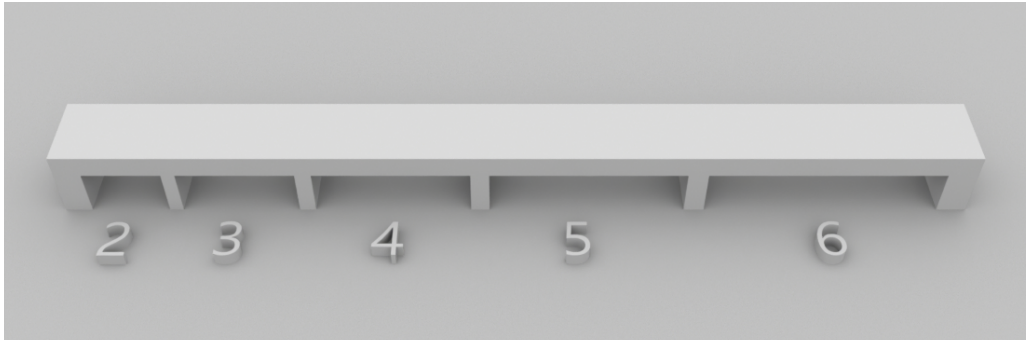
*Recommended width:  $\geq 0.06$  mm*



### Maximum Horizontal Bridge Span

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

*Recommended width:  $\geq 6$  mm*

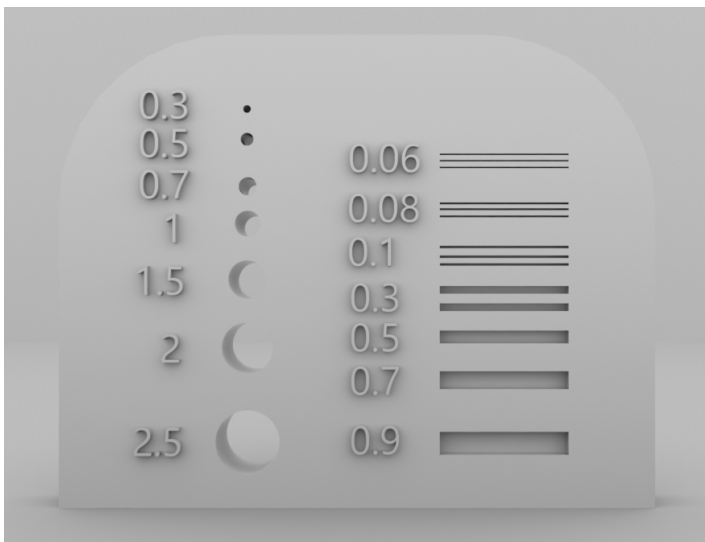


### Minimum Hole Diameter and Engraved Detail Width, Z-axis, at 0.05mm Layer Height

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:  $\geq 0.06$  mm*





## Section 4

# Applications

### Dental Work Model

