

## 【Phrozen樹脂 使用者指南】

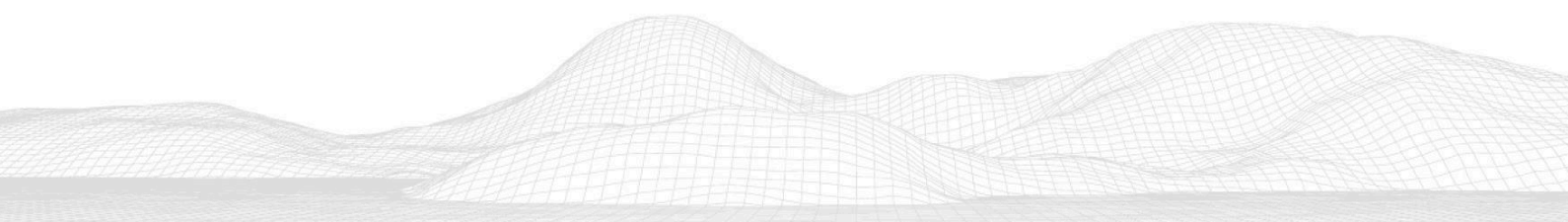
# 湖水8K樹脂- 湖水灰,雪灰,紅陶,香草色

### 大綱

在列印一個理想的物件前, 我們可以先了解材料在各條件下能完整列印出物件的極限在哪; 因此Phrozen提供以下設計建議, 幫助您列印物件時大幅提升成功率, 並印製出更符合您心目中的物件。

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## Section 1

# TDS

| General Properties             | Norm                              | Typical values                         |
|--------------------------------|-----------------------------------|--|
| Appearance                     | -                                 | Gray / Snow Gray / Red Clay / Vanilla  |
| Viscosity, 30                  | Cone/Plate Rheometer <sup>1</sup> | 280 - 350 cps<br>Snow Gray 200-250 cps |
| Density (liquid resin)         | ASTM D4052-18a                    | 1.1 g/cm <sup>3</sup>                  |
| Tensile Properties             | Norm                              | Typical values (UV post-cured)         |
| Tensile Strength at Break      | ASTM D638                         | 35 - 46 MPa                            |
| Tensile Modulus                | ASTM D638                         | 2433 - 2848 MPa                        |
| Elongation at Break            | ASTM D638                         | 4.8 - 7.6 %                            |
| Impact Properties              | Norm                              | Typical values (UV post-cured)         |
| Notched Izod (Machined), 23 °C | ASTM D256                         | 28 - 48 J/m                            |
| Thermal Properties             | Norm                              | Typical values (UV post-cured)         |
| HDT at 0.45 MPa                | ASTM D648                         | 60.3 - 62.7 °C                         |
| Hardness                       | Norm                              | Typical values (UV post-cured)         |
| Shore D                        | ASTM D2240                        | 80 - 86D                               |

\* 所有的性能測試都是以Phrozen Sonic Mighty 8K 或 Sonic Mini 8K列印,並使用 Phrozen 清洗固化組做清洗及二固。

Specimens are printed unless stated otherwise. The information in this TDS, including product recommendations, is based on our current knowledge and experience. Descriptions, drawings, photographs, data, proportions, weights, etc. provided may change without notice and do not establish the product's contractual quality. Request the relevant MSDS from your supplier or contact Phrozen Tech Co., Ltd at [sales@phrozen3d.com](mailto:sales@phrozen3d.com)

## Section 2

# 列印

## 列印參數

|                      |                            |
|----------------------|----------------------------|
| 測試機台                 | Sonic mini / Sonic mini 4K |
| Layer Height         | 50 $\mu$ m                 |
| Exposure Time        | 2 - 2.5 s                  |
| Bottom Exposure Time | 25 - 35 s                  |
| Light-off Delay      | 10 - 13 s                  |
| Lift Distance        | 6 mm                       |
| Lifting Speed        | 60 mm/min                  |

|                         |               |
|-------------------------|---------------|
| 測試機台                    | Sonic Mini 8K |
| Layer Height            | 50 $\mu$ m    |
| Exposure Time           | 1.8 - 2.5 s   |
| Bottom Exposure Time    | 30 - 35 s     |
| Rest Time After Retract | 2 - 4 s       |
| Lift Distance           | 6 mm          |
| Lifting Speed           | 60 mm/min     |

|                         |                |
|-------------------------|----------------|
| 測試機台                    | Sonic Mini 8KS |
| Layer Height            | 50 $\mu$ m     |
| Exposure Time           | 1.5 - 3 s      |
| Bottom Exposure Time    | 7 - 15 s       |
| Rest Time After Retract | 2 - 4 s        |
| Lift Distance           | 6 mm           |
| Lifting Speed           | 60 mm/min      |

|                      |                 |
|----------------------|-----------------|
| 測試機台                 | Sonic Mighty 4K |
| Layer Height         | 50 μm           |
| Exposure Time        | 2 - 2.5 s       |
| Bottom Exposure Time | 30 - 35 s       |
| Light-off Delay      | 12 - 14s        |
| Lift Distance        | 8 mm            |
| Lifting Speed        | 60 mm/min       |

|                         |                 |
|-------------------------|-----------------|
| 測試機台                    | Sonic Mighty 8K |
| Layer Height            | 50 μm           |
| Exposure Time           | 1.8 - 2.5 s     |
| Bottom Exposure Time    | 30 - 35 s       |
| Rest Time After Retract | 2 - 4 s         |
| Lift Distance           | 8 mm            |
| Lifting Speed           | 60 mm/min       |

|                         |                         |
|-------------------------|-------------------------|
| 測試機台                    | Sonic Mighty 12K (升級套件) |
| Layer Height            | 50 μm                   |
| Exposure Time           | 2 - 3 s                 |
| Bottom Exposure Time    | 30 - 40 s               |
| Rest Time After Retract | 2 - 4 s                 |
| Lift Distance           | 8 mm                    |
| Lifting Speed           | 60 mm/min               |

|                         |               |
|-------------------------|---------------|
| 測試機台                    | Sonic Mega 8K |
| Layer Height            | 50 μm         |
| Exposure Time           | 2 - 3 s       |
| Bottom Exposure Time    | 35 - 40 s     |
| Rest Time After Retract | 2 - 4 s       |
| Lift Distance           | 8 mm          |
| Lifting Speed           | 45 mm/min     |

|                         |                 |
|-------------------------|-----------------|
| 測試機台                    | Sonic Mega 8K S |
| Layer Height            | 50 μm           |
| Exposure Time           | 1.5 - 2.5 s     |
| Bottom Exposure Time    | 30 s            |
| Rest Time After Retract | 2 - 4 s         |
| Lift Distance           | 8 mm            |
| Lifting Speed           | 60 mm/min       |

\* Mega 8K 因拉拔力較大，須提高固化秒數以增加列印成功率

\* 列印時務必蓋上遮光罩，以維持樹脂最佳列印狀態

\* 增加靜止時間可以減緩樹脂積料，已達到更好的解析度。

### 清洗、靜置

1. 建議使用Phrozen 後處理設備：「Phrozen清洗固化組」
2. 使用 Phrozen Wash 水流機，添加95%酒精，清洗45-60秒。請勿在酒精或其他溶劑 (例IPA) 浸泡超過60秒，有可能傷害物件表面
3. 空心薄件請務必洗淨內部
4. 清洗後靜置30分鐘即可二固

\*薄件貼底印製時請小心鏟下，有可能讓模型變形

### 二固

1. 建議使用Phrozen 二固化設備：「Phrozen 清洗固化組」、「Phrozen Mega Cure S UV後固化燈」或其他有相同波長的二固化設備等
2. 二固化時間 30分鐘。

## Section 3

# 設計規格

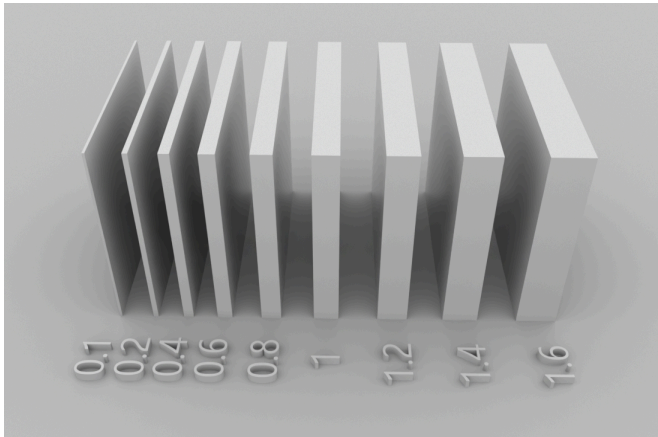
※註：所有指標均為樹脂之極限值，會依照使用機台不同有所差距※

### Minimum Unsupported Wall Thickness

## 最小無支撐壁厚

此項指標為在無支撐前提下能獨立印出且無彎曲、斷裂現象之最薄厚度。

建議厚度： $\geq 0.2$  mm

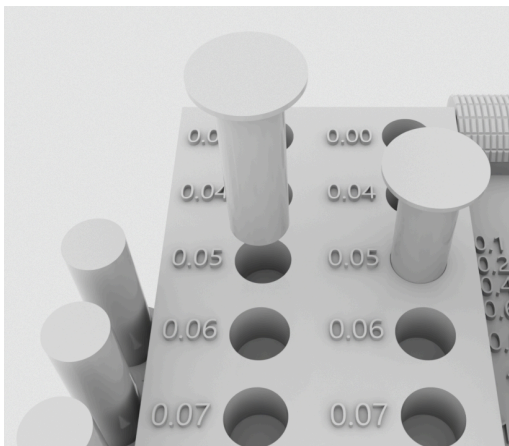


### Size Tolerance, X-Y plane

## 最小尺寸公差

此項指標為平行於XY平面上的孔洞與立柱接合之最小尺寸公差。

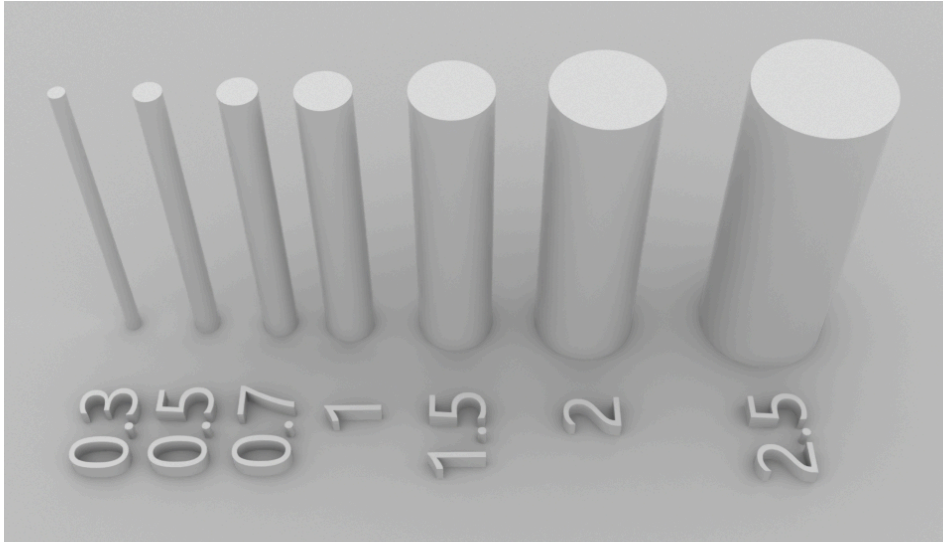
建議公差： $\geq 0.04$  mm



Minimum Pin Diameter

最小立柱直徑

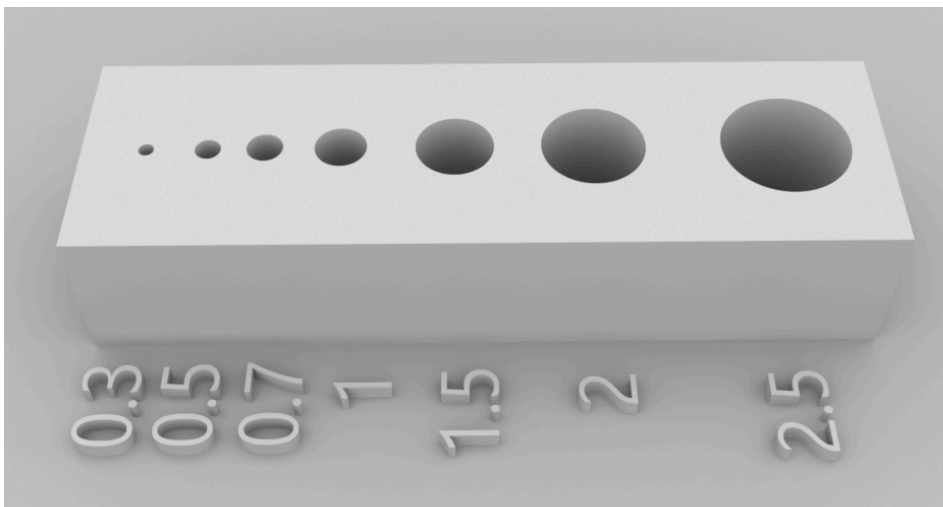
此項指標為細根及支撐能獨立印出且無彎曲、斷裂現象之最小立柱直徑。  
建議直徑： $\geq 0.3$  mm



Minimum Hole Diameter, X-Y plane

最小孔洞直徑

此項指標為平行於XY平面列印前提下能完整印出之最小孔洞直徑。  
建議直徑： $\geq 0.5$  mm





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

#### 最小浮雕細節寬度

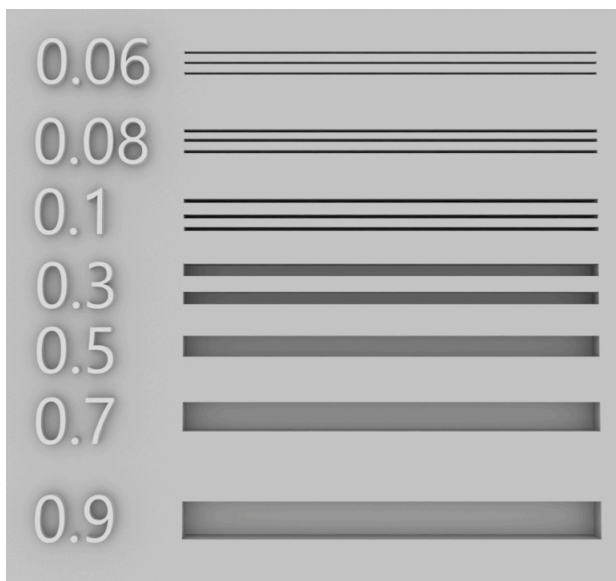
此項指標為可完整列印浮雕細節之最低線條寬度  
建議寬度：≥ 0.08 mm



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

#### 最小雕刻細節寬度

此項指標為可完整列印雕刻細節之最低線條寬度  
建議寬度：≥ 0.06 mm

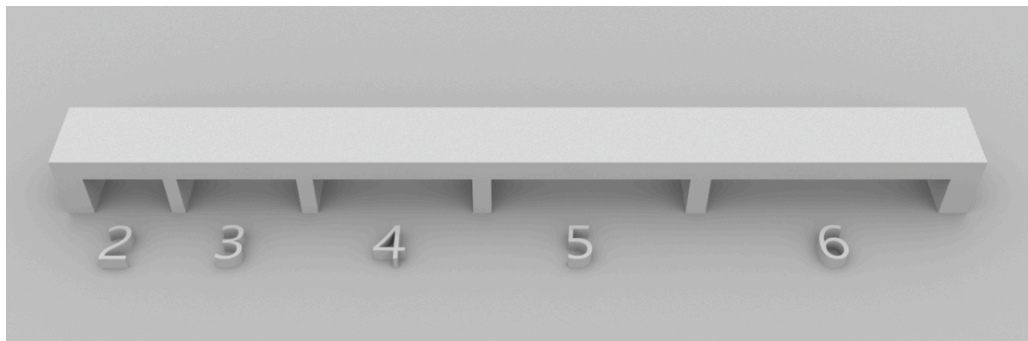




### Maximum Horizontal Bridge Span

## 最大水平跨橋寬度

此項指標為在兩側有支撐壁前提下能印出不變形懸空模型之支撐壁間最大寬度。  
建議寬度： $\leq 6\text{ mm}$



### Minimum Hole Diameter and Engraved Detail Width, Z-axis, at 0.05mm layer height

## Z軸最小孔洞直徑及最小雕刻凹槽寬度 (0.05mm層高)

此項指標為再層厚為0.05mm時Z軸上可完整印出之最小孔洞直徑及最小雕刻凹槽寬度

建議直徑： $\geq 0.5\text{ mm}$

建議寬度： $\geq 0.06\text{ mm}$

