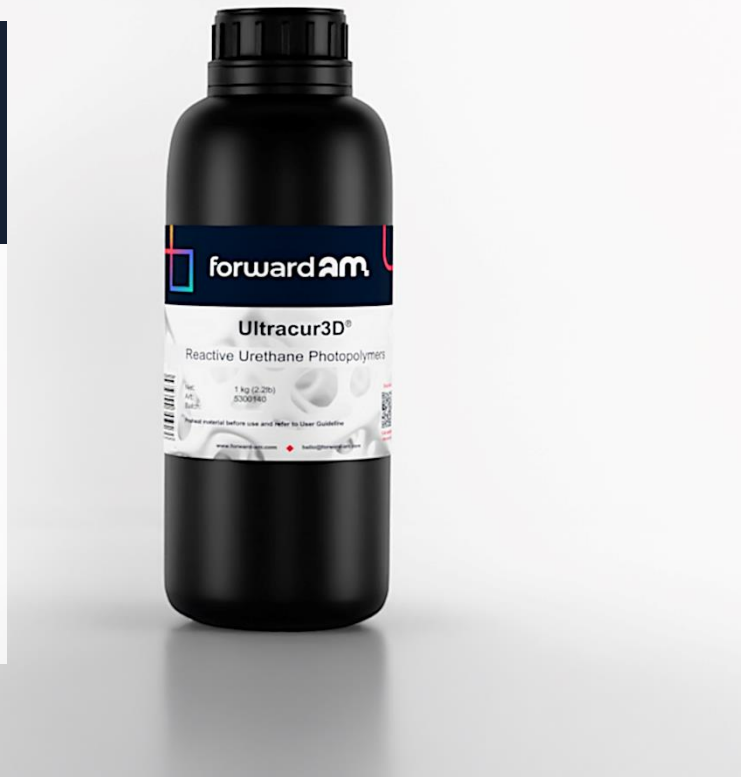
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# Ultracur3D® EL 4000 B

**User Guideline**




## Introduction

The following user guideline is for professionals who use: Ultracur3D® EL 4000 B.
The safety data given in this publication is for information purposes only and does not constitute a legally binding Material Safety Data Sheet (MSDS). The relevant MSDS can be obtained upon request from your supplier or you may contact MAM directly at sales@forward-am.com.
**For more information, please refer to the country specific MSDS for advice.**

Are you looking for an updated User Guideline version? Check out the latest online version here.

## Storage conditions and disposal considerations

Keep container tightly closed in a room temperature, well-ventilated place. Keep container dry. If material is not being used, fill it back through a filter in the corresponding material bottle. The filter prevents cured pieces or failed prints from going back into the bottle. Ultracur3D® EL 4000 B must be disposed of in accordance with local regulations.
**For more information, please refer to the country specific MSDS for advice.**



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## Intended use

Ultracur3D® EL 4000 B is a technical material based on (meth-)acrylate resin for suggested LCD and DLP systems. Working wavelength: 385 nm or 405 nm. Below, you can find some suggested 3D printers and printing parameters. For more information contact MAM directly at sales@forward-am.com.

## Examples of suitable 3D-Printers and settings

| | Wavelength | Power | Curing time | Voxel depth |
|---|---|---|---|---|
| **Creality Halot Sky CL 89** | 405 nm | 2 mW / cm² | 10 s | 100 µm |
| **MiiCraft Ultra 125 Y** | 385 nm | 4 mW / cm² | 2.5 s | 100 µm |
| **Phrozen Sonic Mini 8k** | 405 nm | 1.5 mW / cm² | 8 s | 100 µm |
| **Rapidshape i30+®** | 385 nm | 2 mW / cm² | 4 s | 100 µm |

If you cannot find your printer in the table or using the 3D Printing and Post Processing Settings Navigator you can use the values below as starting parameters. These are only approximations, different 3D printers may require different curing times and further optimization, but these values should be a good starting point.

The given values are all for printing at a layer thickness / voxel depth of 100 µm. If you need starting parameters for a different layer thickness, please contact us.

| | **405 nm Wavelength 3D Printer** | | | |
|---|---|---|---|---|
| **Power*** | 5 mW / cm² | 4 mW / cm² | 3 mW / cm² | 2 mW / cm² |
| **Suggested curing time** | 2.4 s | 3 s | 4 s | 6 s |

| | **385 nm Wavelength 3D Printer** | | | |
|---|---|---|---|---|
| **Power*** | 5 mW / cm² | 4 mW / cm² | 3 mW / cm² | 2 mW / cm² |
| **Suggested curing time** | 3.6 s | 4.5 s | 6 s | 9 s |

* Power measured directly on the glass

## Printing process

The material should be processed at room temperature. Before usage, the material should be shaken well. Pour it slowly into the vat and wait a couple of minutes, until a smooth, bubble-free surface is obtained before starting the print job.

The 3D printer examples and settings stated above are only for general guidance. The fully optimized settings should always be determined by the users themselves, according to their specific needs. Please always refer to the user manual of the employed 3D printer for instructions on printer settings and handling.

Remove the parts carefully from the build platform with a suitable tool, for more information, refer to the user manual of the used 3D printer.

## Cleaning and post curing process

Most flexible photopolymer materials are very sensitive to chemical changes in the green state. To obtain the highest consistency in final part performance, especially for lattices, we recommend to keep the post-processing procedure as constant as possible. This includes the washing and drying methods and time, but also the time kept between printing, washing, drying and UV post-curing steps. In addition, to achieve the mechanical properties listed in our TDS, it is best to stay as close as possible to the exact post-processing methods listed in this User Guideline.

For Ultracur3D® EL 4000 B we recommend to use a combination of a Glycol Ether based solvent like Ultracur3D® Cleaner and 2-propanol. We do not recommend to use only 2-propanol as this usually leads to insufficient cleaning. Please refer to the following cleaning procedure.

**Cleaning with Ultracur3D® Cleaner and 2-propanol (IPA)**

- Step 1: Place the parts in a container filled with Ultracur3D® Cleaner and place this container in an Ultrasonic bath filled with water for 5 minutes. The cleaning time can vary depending on the complexity of the printed geometry.
- Step 2: Rinse the parts with 2-propanol for a few seconds. Fine structures or holes may be better cleaned by using 2-propanol and a syringe or by separate brushing. Next, place the parts in a container filled with 2-propanol and place this container in an Ultrasonic bath filled with water for 5 minutes.
- Step 3: Blow dry the parts with pressurized air or nitrogen, until the parts are clean.
- Remark: whichever cleaning method is applied, keep the exposure to the cleaning solvent as short as possible, maximum 10 minutes in total (= 2x5 min). Longer cleaning can lead to instable material properties.
- Option 1: Place the parts into a warming cabinet at 40°C (104°F) for 30 minutes. Important: do not dry for longer than 30 minutes at 40°C, as longer drying may affect the final material properties.
- Option 2: Dry the parts at room temperature for 1h. At room temperature, the material is less sensitive. Drying up to 24h is possible without affecting the final material properties.



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## Example of post curing procedures

Ultracur3D® EL 4000 B parts require adequate post-curing to achieve the optimal mechanical properties. After each post-curing cycle, the parts need to be flipped to achieve an even curing. After post-curing, remove any support structures and smoothen the surface if required.

| | UV lamp | Power in mW / cm² | Duration of post-curing | Notes |
|---|---|---|---|---|
| **Dymax ECE 2000 flood** | Hg Metal Halide Bulb (broad spectrum) | Ca. 140 mW / cm² at 405 nm | 2 x 900 seconds | Shelf height K |
| **OtoFlash G 171** | Flash-bulbs (broad spectrum) | Ca. 3.5 mW / cm² at 405 nm | 2 x 9000 flashes | With Nitrogen |
| **Phrozen Cure** | 405 nm LED | Ca. 12 mW / cm² at 405 nm | 2 x 10 minutes | |
| **Zortrax Curing Station** | 405 nm LED | Ca. 35 mW / cm² at 405 nm | 2 x 31 minutes | |

These proceedings are only general guidelines. In the end, the user has to determine the optimum post-curing procedure based on their specific requirements and the equipment used.



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## Frequently asked questions and other tips and tricks

1. **Ultracur3D® EL 4000 B is not completely black.**

- Make sure to mix the material thoroughly before pouring it into the VAT and make sure to remix the VAT in the morning. Also, be aware that Ultracur3D® EL 4000 B can sometimes appear more like translucent black, depending on the part wall thickness.

2. **Ultracur3D® EL 4000 B is difficult to clean, what should I do?**

- Make sure to follow the User Guideline for properly cleaning Ultracur3D® EL 4000 B. Using only 2-propanol (IPA) might not be enough to get your parts clean. Do not exceed the cleaning time of 10 minutes total.
- A small brush or syringe can help cleaning fine structures

3. **Ultracur3D® EL 4000 B is still sticky after post-curing.**

- Do not extremely overcure your parts during the printing process.
- Make sure to follow the User Guideline for properly cleaning and post-curing.
- Pre-dry your parts as much as possible with an air/nitrogen gun and dry them in an oven.
- A post-curing unit with Nitrogen can help reducing the stickiness.

*The data contained in this publication are based on our current knowledge and experience. They do not constitute an agreed contractual quality of the product and, in view of the many factors that may affect processing and application of our products, do not relieve processors from carrying out their own investigations and tests. The agreed contractual quality of the product at the time of transfer of risk is based solely on the data in the specification data sheet. Any descriptions, drawings, photographs, data, proportions, weights, etc. given in this publication may change without prior information. The customer and/or user is responsible to consider and respect all hazard and safety issues according to the MSDS of Ultracur3D® EL 4000 B and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, Mass Additive Manufacturing GmbH shall not be liable for any personal injury, property damages and/or environmental emissions arising out of or related to the testing, handling or usage, storage and possession of Ultracur3D® EL 4000 B. It is the sole responsibility of the recipient of our product to ensure that any proprietary rights and existing laws and legislation are observed (02/2020)*