User Guideline
Ultracur3D® EL 4000

The following User guideline is for professionals who use: **Ultracur3D® EL 4000**.

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 BASF directly at *sales@basf-3dps.com.*

For more information, please refer to the country specific MSDS for advice.

Manufacturer

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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 to fill cured pieces or failed prints back into the bottle. Ultracur3D® EL 4000 must be disposed of or incinerated in accordance with local regulations.

For more information, please refer to the country specific MSDS for advice.

Delivery units

Ultracur3D® EL 4000 is available in the following packaging sizes: 1 kg, 5 kg and possible larger volume packaging are also available upon request.

Intended Use

Ultracur3D® EL 4000 is a technical material based on (meth-)acrylate resin for suggested DLP systems. Working wavelength: 385 nm or 405 nm. Attached a list of suggest 3D printer and Printing parameters. For more information contact BASF directly at *sales@basf-3dps.com.*

Example of Suitable 3D-Printers and Settings

PRINTER	STRATASYS ORIGIN ONE	MIICRAFT ULTRA 125	HALOT-SKY CL-89 (CREALITY)
Wavelength	385 nm	385 nm	405 nm
Power	5 mW / cm²	4 mW / cm²	Ca. 2.5 mW / cm²
Curing time	1.1 s	2.5 s	7 s
Voxel depth	50 µm	100 µm	100 µm

If you cannot find your printer in the table, 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	2.5 s	3.1 s	4.2 s	6.25 s

385 nm WAVELENGTH 3D-PRINTER

Power *	5 mW/cm²	4 mW/cm²	3 mW/cm²	2 mW/cm²
Suggested curing time	3 s	3.75 s	5 s	7.5 s

*Power measured directly on the glass

Printing Process

Preparation of Resin

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

Printing Process

As the suitable 3D printer examples and setting parameters stated above are only for general guidance purpose, user should always define the optimal settings according to his needs by himself. Please refer to Instruction of Use or User Guide of the employed 3D-Printer for the printer settings and handling.

Removing parts

Remove the parts carefully from the build platform with a suite able tool, for more information see the Instruction for Use 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.

Cleaning Process

For Ultracur3D® EL 4000 we recommend to use a combination of a Glycol Ether based solvent like Ultracur3D® Cleaner & 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 & 2-propanol

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 pressure air/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.

Drying

Option 1: Place the parts into a warming cabinet @40°C 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.

Post-curing

Ultracur3D® EL 4000 parts require adequate post-curing to achieve the optimized final mechanical properties. After each post-curing cycle, the part needs to be flipped to achieve an even curing.

Examples of post curing procedures

Stratasys Origin One

Post-curing unit	**Dymax ECE 2000 flood**
Amount of cycles	2
Duration of one curing cycle	900 seconds

MiiCraft Ultra 125

Post-curing unit	**Dymax ECE 2000 flood**
Amount of cycles	2
Duration of one curing cycle	600 seconds

Halot-Sky CL-89 (Creality)

Post-curing unit	**Dymax ECE 2000 flood**	**Otoflash G171**
Amount of cycles	2	2
Duration of one curing cycle	1800 seconds	18000 flashes

Finishing Process

Remove, if necessary, support structures and smoothing the surface.

These proceedings are only general guidelines, the optimal printing settings as well as curing time must be defined by the user himself. The post-curing might differ by using different 3D-Printers and different post-curing units may require different settings.