

Instruction for Use

Ultracur3D® RG 3280

The following Instruction for Use is for professionals who use: **Ultracur3D® RG 3280**.

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

BASF 3D Printing Solutions GmbH

69115 Heidelberg

GERMANY

E-mail address: sales@basf-3dps.com

<http://www.forward-am.com/>

Storage Conditions and Disposal Considerations

Keep container tightly closed in a room temperature, well-ventilated place. Keep container dry. This material is more sensitive to storage temperature than most of our other materials. Try to keep the storage temperature always below 25°C. 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® RG 3280 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® RG 3280 is available in the following packaging sizes: 1.65 kg (= 1 liter) and 8.25kg (= 5 liter) and possible larger volume packaging are also available upon request.

Intended Use

Ultracur3D® RG 3280 is a technical material based on (meth-)acrylate resin for suggested LCD and DLP systems. Working wavelength: 365nm, 385 nm or 405 nm. Attached a list of suggest 3D printers and Printing parameters. For more information contact BASF directly at sales@basf-3dps.com.

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Example of Suitable 3D-Printers and Settings

The build parameters are dependent on site conditions and the printer being used. The below mentioned parameters should be the base parameters to start with. The user needs to adjust the printing parameters according to their use conditions, printers, and the type of print jobs.

PRINTER	MIICRAFT ULTRA 125	PHROZEN SONIC MINI 4K
Wavelength	405 nm	405 nm
Power	2 mW/cm ²	Ca. 1.2 mW/cm ²
Curing time	1.75 s	2.1 s
Voxel depth	100 µm	50 µm

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Printing Process

Preparation of Resin

The material should be processed at room temperature. It's highly recommended to shake the bottle well for about 1-2min before pouring into the VAT. Please make sure to pour the resin slowly into the VAT and wait a couple of minutes, until the bubbles are gone before starting the print job. Ultracur3D® RG 3280 should be well mixed before each print job, inhomogeneities or failed prints might occur when not mixed thoroughly. Shake the bottle for 1-2 minutes before refilling. Also make sure to filter resin inside the VAT after a failed 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 suitable tool, for more information see the Instruction for Use of the used 3D-Printer. Always wear safety glasses since the ceramic parts can chip while trying to remove them from the platform. For easy removal, we recommend to remove parts shortly after the print is finished. Parts become more difficult to remove when they are left on the platform for a longer time.

Replacing material

When replacing/swapping the material always clean the surfaces which come in contact with the resin. Such as machine build platform, VAT, glass, etc. If needed dispose the used material and the cleaning products (solvents, paper towels etc.) adequately.

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Cleaning and Post curing process

Cleaning Process

Ultracur3D® RG 3280 can be cleaned with 2-propanol or ethanol, please refer to either of the three following cleaning procedure. We do not recommend using any glycol-based cleaners like Ultracur3D Cleaner, as this can lead to cracking in the final parts.

Option 1: Cleaning with 2-propanol and 2-propanol wipes

Step 1: Remove excess resin from the specimens using wipes/paper towel.

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 with a fine brush. Afterwards wipe again. Repeat the procedure until all the resin is removed.

Step 3: Blow-dry the parts with pressure air/nitrogen, until the parts are clean.

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Cleaning Process

Option 2: Cleaning with 2-propanol or ethanol and a washer with magnetic stirrer

Step 1: Place the parts in a washer with magnetic stirrer with 2-propanol or ethanol for 1-2 minutes. The recommended cleaning time depends on the exact washer type and printed geometry, but should be kept as short as possible in order to have the best final part performance.

Step 2: Rinse the parts with 2-propanol or ethanol for a few seconds. Fine structures or holes may be better cleaned by using 2-propanol and a syringe or by separate brushing.

Step 3: Blow dry the parts with pressure air/nitrogen, until the parts are clean.

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Cleaning Process

Option 3: Cleaning with 2-propanol or ethanol and Ultrasonic bath

Step 1: Place the parts in a container filled with 2-propanol or ethanol and *place this container* in an Ultrasonic bath filled with water for 2-3 minutes.

Step 2: Rinse the parts with 2-propanol or ethanol for a few seconds. Fine structures or holes may be better cleaned by using 2-propanol and a syringe or by separate brushing.

Step 3: Blow dry the parts with pressure air/nitrogen, until the parts are clean.

REMARK: using an ultrasonic bath can in some cases lead to lower tensile properties, lower temperature stability and surface defects in parts. If you observe these issues, please use the alternative cleaning option 1 or 2. Alternatively, it can also help to somehow keep the parts moving while in the ultrasonic bath.

REMARK: whichever cleaning method is applied, the exposure to the cleaning solvent should be kept as short as possible, maximum 2-3 minutes in total or preferably even shorter. Longer cleaning may lead to cracking in the final parts and also to a decrease in mechanical performance.

For this resin, we recommend to just blow-dry the parts or leave them for a short time at room temperature to dry. We do not recommend drying at elevated temperatures as this can lead to lower tensile properties and lower temperature stability. Also, try to keep the time between printing, washing and UV post-curing short, as the material is quite sensitive in the green state.

Drying

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Ultracur3D® RG 3280 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. Ultracur3D® RG 3280 can be post-cured using regular UV post-curing. Optionally, after UV post-curing, and additional thermal treatment can be done to improve the HDT and make the parts more white. Refer to the procedures below for optimal post-curing.

Post-curing

Examples of UV post-curing procedures

MiiCraft Ultra 125

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

Phrozen Sonic Mini 4k

Post-curing unit	Dymax ECE 2000 flood	Otoflash G 171
Amount of cycles	2	2
Duration of one curing cycle	900 seconds	6000 flashes

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Thermal treatment

Examples of additional thermal treatment after UV post-curing (optional!)

Thermal Oven	Nabertherm T 60 - Oven	
Ramp up phase	2 hours	30 °C to 150 °C (ca. 86 °F to 302 °F)
Holding phase	3 hours	150 °C (ca. 302 °F)
Ramp down phase	2 hours	150 °C to 30 °C (ca. 302 °F to 86 °F)

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/thermal treatment might differ by using different 3D-Printers and different post-curing units may require different settings.

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Frequently asked questions and other Tips & tricks:

1. Why do I see cracks appearing in my parts after UV post-curing, or after exposure to high temperatures?

- This material is very sensitive to the specific washing and drying methods applied. Cracking can usually be avoided by keeping the cleaning time short (2-3 minutes max) and by using IPA or ethanol rather than other resin cleaners. Please refer to the washing instructions given above.

2. Why do my parts have surface defects (e.g. small holes)?

- Surface defects can usually be avoided by not using an ultrasonic bath, but rather wipes or a part washer. Please refer to the washing instructions given above.

3. Why do my parts have lower mechanical properties than given in the TDS, or become more brittle after exposure to higher temperatures?

- This material is very sensitive to the specific washing and drying methods applied. To get the best mechanical performance and temperature stability, do not use an ultrasonic bath and do not dry green parts at elevated temperatures. Please refer to the washing and drying instructions given above.

4. My part are yellow, how can I make them more white?

- Depending on the device used, parts will usually be a bit yellow after post-curing. The best method to make parts more white, is to perform a thermal treatment like the one recommended above. Alternatively, washing longer or using an ultrasonic bath can also make parts whiter, but this is not necessarily recommended, see the previous questions.

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5. Why are my parts difficult to remove from the platform?

- To make it easier to remove parts from the platform, we recommend adjusting the base curing time where possible, and to not leave the parts on the platform too long after the print has finished. Leaving the parts for a longer time on the platform will result in increasing difficulty to remove them from the platform.
- The material will be very brittle in its green state and will easily break. Be extra careful when removing the parts. A good method is to use a sharp chisel and a rubber hammer and carefully apply a small force from all the directions of the part.

6. The resin seems to be curing spontaneously in the printer vat. What is happening?

- This resin is slightly more sensitive to daylight / office light than most of our other products. Make sure to keep exposure to light as limited as possible, or use yellow light / light filters.

7. Why do I see small flakes being formed on part surfaces or in the printer vat?

- This is due to the high reactivity of the resin. Try to print at a lower power, or reduce the amount of parts per build. What can also help is to keep the resin a bit colder, e.g. by keeping it in the fridge before printing, or by giving it enough time to cool down during / after printing.

8. Why does the VAT film/membrane become foggy after a few print jobs?

- This is due to the abrasive nature of the ceramic particles. However, in our experience, this abrasion effect is limited and also does not show in every printer, and the VAT film is mostly still perfectly usable despite the foggy appearance.

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9. Why does the base of my part have black or grey spots?

- This happens when using an aluminum platform. Usually, the effect is limited and does not cause any other issues with the resin or part performance. To overcome the issue, thoroughly clean the platform after each use (repeat cleaning until the paper towels do not become black anymore), or replace the aluminum platform with an anodized aluminum or with steel.

10. How can I clean material leftovers from the vat, platform and tools used?

- Cleaning of tools can be quite challenging with this material. Some techniques that can help:
 - First try to clean the tool with IPA/Acetone, then dry it with air & wipes. Once it is completely dry, use a dry tissue to brush any leftovers off gently. Then repeat the process until its clean.
 - Reduce the amount of leftover resin as much as possible before cleaning with IPA. This can be done by fixing components under an angle to let resin flow off by itself, or by using tissues to clean most of the resin, before using IPA.
 - Avoid contamination e.g. by not touching tools with dirty gloves or by wrapping tools with paper towels before using them

11. How often do I have to mix this resin to keep the ceramic particles well-dispersed?

- The resin has been specifically designed to have a very stable dispersion of the particles. In our experience, the resin can last several days without showing any visible settling. However, for the best results, we would still recommend to briefly mix/stir the resin in the vat once a day, or before any longer print job.
- Also mix/stir the resin before emptying the vat e.g. in another bottle. Otherwise a residue of sedimented ceramic particles may be left on the bottom of the vat.

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