

# Ultracur3D<sup>®</sup> CK Line

## User Guideline



## INTRODUCTION

The following user guideline is for professionals who use: Ultracur3D<sup>®</sup> CK 01 White, Ultracur3D<sup>®</sup> CK 02 Yellow, Ultracur3D<sup>®</sup> CK 03 Cyan, Ultracur3D<sup>®</sup> CK 04 Magenta and Ultracur3D<sup>®</sup> CK 06 Black.

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](mailto:sales@basf-3dps.com).

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

## 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<sup>®</sup> CK 01 White, Ultracur3D<sup>®</sup> CK 02 Yellow, Ultracur3D<sup>®</sup> CK 03 Cyan, Ultracur3D<sup>®</sup> CK 04 Magenta and Ultracur3D<sup>®</sup> CK 06 Black must be disposed of in accordance with local regulations.

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

## INTENDED USE

Ultracur3D® CK Line can be used to print parts in a wide range of colors, without the need for post-processing. To use the color kits, you just mix a small amount of the color kit into your clear base resin before printing. For more information contact BASF directly at [sales@basf-3dps.com](mailto:sales@basf-3dps.com).

## AVAILABLE COLORS

- Ultracur3D® CK 01 (White)
- Ultracur3D® CK 02 (Yellow)
- Ultracur3D® CK 03 (Cyan)
- Ultracur3D® CK 04 (Magenta)
- Ultracur3D® CK 06 (Black)

## MIXING METHOD

- 1) Shake the color kits well before use. Pigment dispersions will often show some settling over time.
- 2) Determine the amount of color kit you want to add. You can use the table below as a guideline.
- 3) Mix the clear resin with the color kit:
  - Option 1: using an external mixer, just mix until the mixture looks homogenous. We have good results with a Silverson L5M-A mixer, at 1500 rpm for 15-30 minutes. Since materials will be exposed to light, it is recommended to do this in a UV-free (orange light) room.
  - Option 2: Add the required amount of Color kit to your base resin in its original container (bottle) and shake until homogenous.
- 4) Determine appropriate printing parameters (see indications below) and start printing!

Remarks:

- In the examples below, Ultracur3D® ST 80 is used as the clear base resin. Results with other materials will usually be similar, but take into account that if your base resin has a strong background color (e.g. yellow or brown), this may affect the final color.
- The table uses weight-based ratio's. However, the same ratio's can be used on a volume-base (e.g. using a syringe to add color kit). Liquid densities of both the color kits as well as most available resins are all very similar (around 1.0-1.1 g/ml), so any effects on the final color will be negligible.

**There are various options that lead to equally good results.**

Figure	Color		ST 80	CK 01	CK 02	CK 03	CK 04	CK 06
			Clear	White	Yellow	Cyan	Magenta	Black
1	White	<b>Opaque</b>	1000 g	45 g				
2	Black	<b>Opaque</b>	1000 g					10 g
3	Grey	<b>Opaque</b>	1000 g	23 g				1.5 g
4	Blue, light	<b>Translucent</b>	1000 g			5 g		
5	Blue, dark	<b>Translucent</b>	1000 g			40 g		
6	Blue	<b>Opaque</b>	1000 g	20 g		5 g		
7	Magenta, light	<b>Translucent</b>	1000 g				5 g	
8	Magenta, dark	<b>Translucent</b>	1000 g				40 g	
9	Magenta	<b>Opaque</b>	1000 g	20 g			5 g	
10	Yellow, light	<b>Translucent</b>	1000 g		5 g			
11	Yellow, dark	<b>Translucent</b>	1000 g		40 g			
12	Yellow	<b>Opaque</b>	1000 g	20 g	5 g			
13	Green, dark	<b>Translucent</b>	1000 g		20 g	20 g		
14	Purple	<b>Translucent</b>	1000 g			5 g	35 g	
15	Royal Blue	<b>Translucent</b>	1000 g			20 g	20 g	
16	Orange	<b>Translucent</b>	1000 g		35 g		5 g	
17	Red	<b>Translucent</b>	1000 g		20 g		20 g	



Figure 1: White



Figure 2: Black



Figure 3: Grey



Figure 4: Blue, light



Figure 5: Blue, dark



Figure 6: Blue



Figure 7: Magenta, light



Figure 8: Magenta, dark



Figure 9: Magenta



Figure 10: Yellow, light



Figure 11: Yellow, dark



Figure 12: Yellow



Figure 13: Green, dark



Figure 14: Purple



Figure 15: Royal Blue



Figure 16: Orange



Figure 17: Red

## COMPATIBILITY WITH OTHER ULTRACUR3D® 3D-PRINTING RESIN

The Ultracur3D® CK Line has shown good compatibility with both rigid Ultracur3D® materials (ST-line, RG-line) as well as flexible Ultracur3D® materials (FL / EL – line). Please contact us if you have questions about a specific material – color combination.

## EXAMPLES OF SUITABLE 3D-PRINTERS AND SETTINGS (ALL WITH ULTRACUR3D® ST 80 AS CLEAR BASE RESIN)

Examples below show suggested settings with the 3D printer **MiiCraft Ultra 125 Y**.

	Wavelength	Power	Curing time	Voxel depth
<b>Ultracur3D® ST 80 (reference)</b>	385 nm	4 mW / cm <sup>2</sup>	2.5 s	75 µm
<b>White</b>	385 nm	4 mW / cm <sup>2</sup>	2.75 s	75 µm
<b>Black</b>	385 nm	4 mW / cm <sup>2</sup>	5 s	75 µm
<b>Grey</b>	385 nm	4 mW / cm <sup>2</sup>	3 s	75 µm
<b>Blue, light, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	4 s	75 µm
<b>Blue, dark, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	4.5 s	75 µm
<b>Blue, Opaque</b>	385 nm	4 mW / cm <sup>2</sup>	3 s	75 µm
<b>Magenta, light, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	3.5 s	75 µm
<b>Magenta, dark, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	3.5 s	75 µm
<b>Magenta, Opaque</b>	385 nm	4 mW / cm <sup>2</sup>	3 s	75 µm
<b>Yellow, light, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	3.5 s	75 µm
<b>Yellow, dark, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	4.5 s	75 µm
<b>Yellow, Opaque</b>	385 nm	4 mW / cm <sup>2</sup>	3 s	75 µm
<b>Green, dark, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	4 s	75 µm
<b>Purple, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	3.5 s	75 µm
<b>Royal Blue, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	3.75 s	75 µm
<b>Orange, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	4.5 s	75 µm
<b>Red, Translucent</b>	385 nm	4 mW / cm <sup>2</sup>	4 s	75 µm

## 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

Ultracur3D® CK line can be cleaned with a Glycol Ether based solvent like Ultracur3D® Cleaner and 2-propanol, please refer to the following cleaning procedure.

### Cleaning with Ultracur3D® Cleaner and 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 2 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 2 minutes.
- Step 3: Blow dry the parts with pressurized air or nitrogen, until the parts are clean.
- Step 4: Place the parts into a warming cabinet at 40°C for 30 minutes to dry off any remaining cleaning solvent.

## EXAMPLES OF POST CURING PROCEDURES

Ultracur3D® CK 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. The following settings can be used for all listed colors.

	UV lamp	Power in mW / cm <sup>2</sup>	Duration of post-curing	Notes
Dymax ECE 2000 flood	Hg Metal Halide Bulb (broad spectrum)	Ca. 140 mW / cm <sup>2</sup> at 405 nm	2 x 600 seconds	Shelf height K
OtoFlash G 171	Flash-bulbs (broad spectrum)	Ca. 3.5 mW / cm <sup>2</sup> at 405 nm	2 x 6000 flashes	With Nitrogen
Zortrax Curing Station	405 nm LED	Ca. 35 mW / cm <sup>2</sup> at 405 nm	2 x 21 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.

## MECHANICAL PROPERTIES

Please note that due to adding the colors, certain characteristics like the mechanical- properties might be slightly affected. This is very dependent on the base material (clear) that is in use. In our tests below with Ultracur3D® ST 80, we saw slight decreases in E modulus, and slight increases in Elongation at break, but usually not more than 10% . For other materials this might be different though.

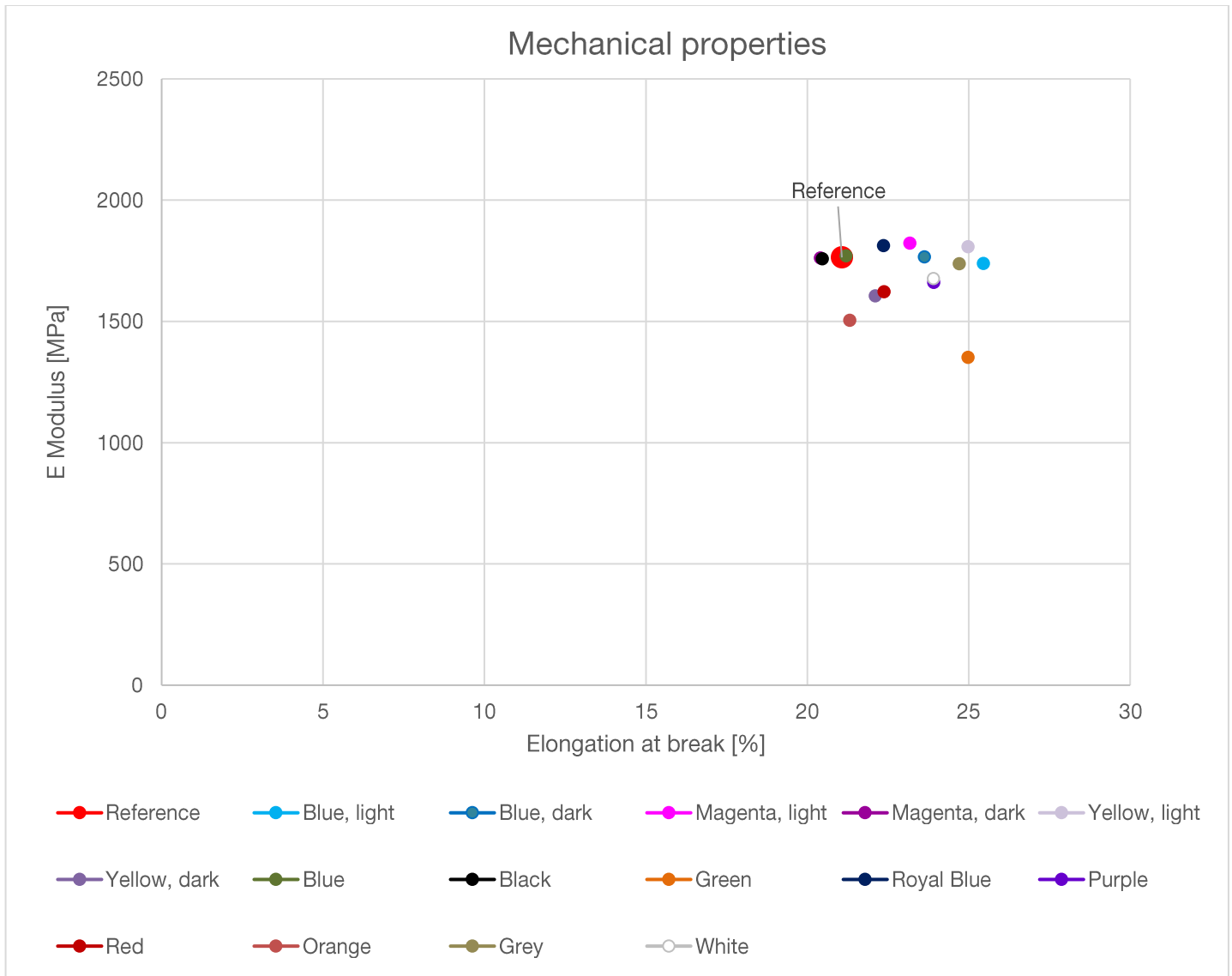


Figure 18 Change in mechanical properties

## BIOCOMPATIBILITY

In order to test the Biocompatibility of Ultracur3D® CK Line, BASF3D Printing Solutions GmbH performed external test and fulfilled the requirements after ISO 10993-5 (2009) Cytotoxicity Testing- Neutral red for 3D printed test items in the following mixtures:

Color		ST 80 Clear	CK 01 White	CK 02 Yellow	CK 03 Cyan	CK 04 Magenta	CK 06 Black
White	Opaque	1000 g	45 g				
Black	Opaque	1000 g					10 g
Blue, dark	Translucent	1000 g			40 g		
Magenta, dark	Translucent	1000 g				40 g	
Yellow, dark	Translucent	1000 g		40 g			

For more information, please refer to the corresponding Product information.

However, the biocompatibility tests were recorded on test specimen of the above referenced mixtures to show compatibility of the material in general. The biocompatibility tests listed are not part of any continuous production protocol. The test assessments reflect only the test specimen and have to be retested on the final product. It remains the responsibility of the device manufacturers and/or end-users to determine the suitability of all printed parts for their respective application.

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