

User Guideline

Ultracur3D® CK Line

The following User Guideline is for professionals who use: **Ultracur3D® CK 01 White, Ultracur3D® CK 02 Yellow, Ultracur3D® CK 03 Cyan, Ultracur3D® CK 04 Magenta and Ultracur3D® 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.

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. 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06 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® CK Line, are available in the following packaging sizes:

- Ultracur3D® CK 01 White in 500g and 10 kg,
- Ultracur3D® CK 02 Yellow in 500g,
- Ultracur3D® CK 03 Cyan in 500g,
- Ultracur3D® CK 04 Magenta in 500g,
- Ultracur3D® CK 06 Black in in 500g and 10 kg

and possible larger volume packaging are also available upon request.

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

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.

Available Color

- 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.
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.
- 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!

There are various options that lead to equally good results.

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

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

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

Example of Suitable 3D-Printers and Settings (all with Ultracur3D® ST 80 as clear base resin)

MATERIAL	WHITE	BLACK	GREY	BLUE, LIGHT TRANSLUCENT	BLUE, DARK TRANSLUCENT	BLUE OPAQUE
Printer	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125
Wavelength	385 nm	385 nm	385 nm	385 nm	385 nm	385 nm
Power	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²
Curing time	2.75 s	5 s	3 s	4 s	4.5 s	3 s
Voxel depth	75 µm	75 µm	75 µm	75 µm	75 µm	75 µm

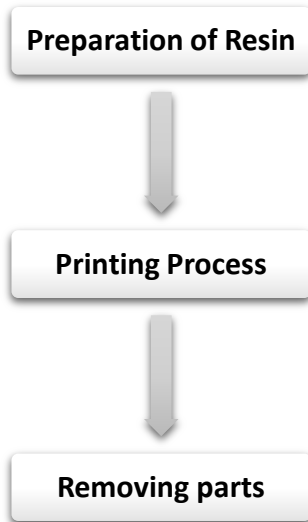
MATERIAL	MAGENTA, LIGHT TRANSLUCENT	MAGENTA, DARK TRANSLUCENT	MAGENTA OPAQUE	YELLOW, LIGHT TRANSLUCENT	YELLOW, DARK TRANSLUCENT	YELLOW OPAQUE
Printer	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125
Wavelength	385 nm	385 nm	385 nm	385 nm	385 nm	385 nm
Power	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²
Curing time	3.5 s	3.5 s	3 s	3.5 s	4.5 s	3 s
Voxel depth	75 µm	75 µm	75 µm	75 µm	75 µm	75 µm

MATERIAL	GREEN TRANSLUCENT	PURPLE TRANSLUCENT	ROYAL BLUE TRANSLUCENT	ORANGE TRANSLUCENT	RED TRANSLUCENT	ULTRACUR3D® ST 80 (REFERENCE)
Printer	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125	MiiCraft Ultra 125
Wavelength	385 nm	385 nm	385 nm	385 nm	385 nm	385 nm
Power	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²	4 mW/cm ²
Curing time	4 s	3.5 s	3.75 s	4.5 s	4 s	2.5 s
Voxel depth	75 µm	75 µm	75 µm	75 µm	75 µm	75 µm

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

Printing Process



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.

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.

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.

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

Cleaning and Post curing process

Cleaning Process

The different color mixtures, listed in this document, with the Ultracur3D® CK Line can be cleaned with a Glycol Ether based solvent like Ultracur3D® Cleaner & 2-propanol, 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 2 minutes.

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 pressure air/nitrogen, until the parts are clean.

Drying

Place the parts into a warming cabinet @40°C for 30 minutes.

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

Post curing

The following settings can be used for all listed colors. After each post-curing cycle, the part needs to be flipped to achieve an even curing.

Examples of post curing procedures

MiiCraft Ultra 125

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



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.

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

Mechanical properties

Please note that due to adding a foreign material, 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% change (preliminary data!). For other materials this might be different.

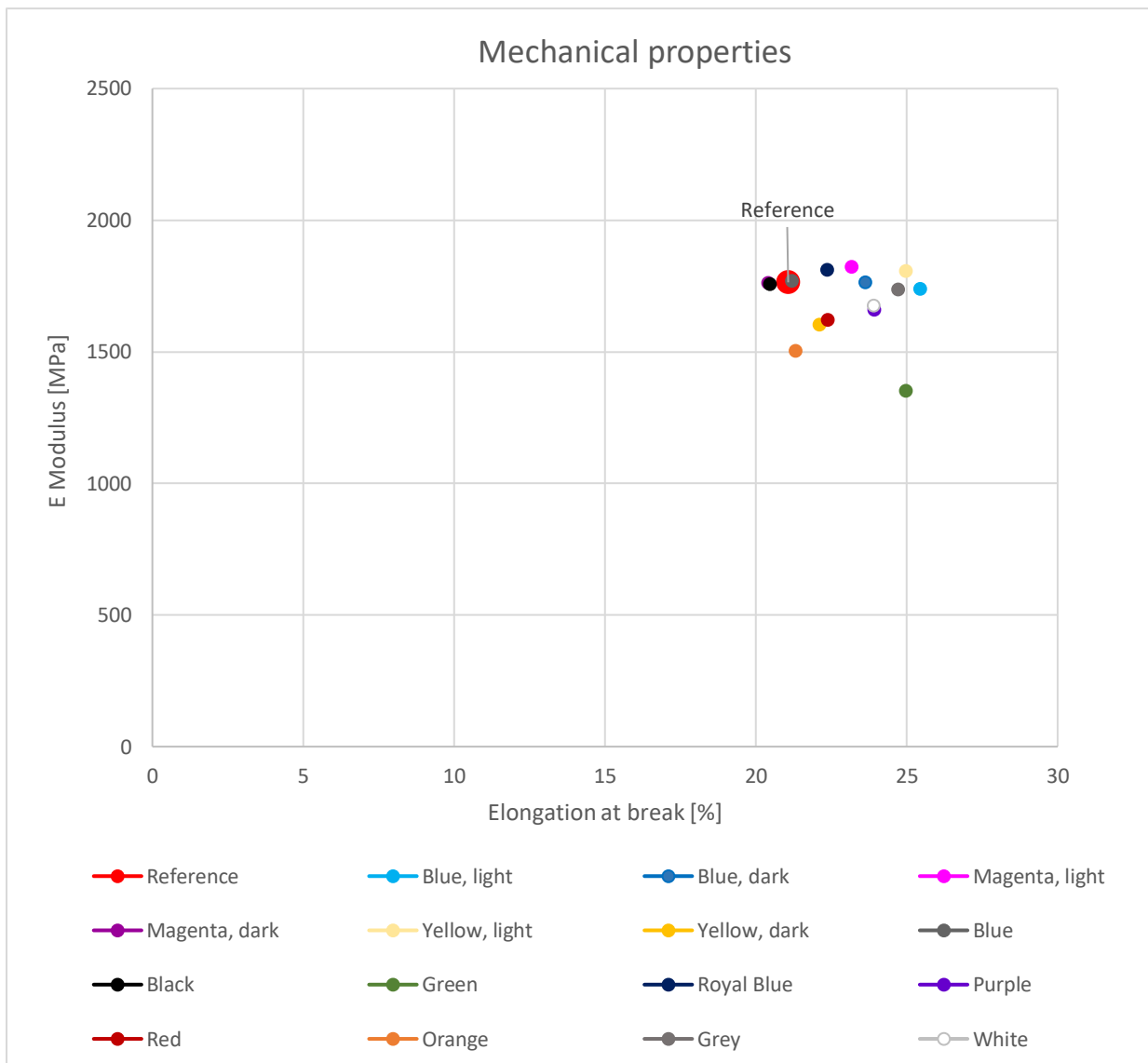


Figure 18 Change in mechanical properties

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0

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.

For notice:

We give no warranties, expressed or implied, concerning the suitability of above-mentioned product for use in any medical device and pharmaceutical applications. All information contained in this document is given in good faith and is based on sources believed to be reliable and accurate at the date of publication of this document. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed. The certificate is exclusively for our customers and respective competent authorities. It is not intended for publication either in printed or electronic form (e.g. via Internet) by others. Thus, neither partial nor full publication is allowed without written permission

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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, BASF3D Printing Solutions 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® CK 01, Ultracur3D® CK 02, Ultracur3D® CK 03, Ultracur3D® CK 04 and Ultracur3D® CK 06. 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)

Version 3.0