Chemical resistance test on

Ultracur3D® EPD 4006

This document is intended to provide guidance for manufacturers regarding the compatibility of the 3D printed materials with hydrocarbons and cleaning chemicals. BASF 3D Printing Solutions GmbH has performed specific chemical test for the material Ultracur3D® EPD 4006. Indications on material changes that can occur during the chemical test were studied. It remains the responsibility of the device manufacturers and/or end-users to determine the suitability of all printed parts for their respective application.

Used hydrocarbons and cleaning chemicals

Fluid
Cooling fluid
Multipurpose fat
Engine oil
Hydraulic oil
Brake fluid
Transmission oil
Acetone

Test method and specimens

75 tensile bars were printed with the material and were soaked in each fluid, one set for 30 minutes and one set for 7 days. After the soaking time the parts were removed from the test fluid and were dried to measure the weight and the mechanical properties like E modulus, Tensile strength and Elongation at break.

Figure 1 Tensile bar ASTM D638 IV

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Mechanical testing

The mechanical properties of Ultracur3D® EPD 4006 immersed in Cooling fluid for 30 min are the most stable ones even though the E modulus deviates from the control by 10 %. The mechanical properties when Ultracur3D® EPD 4006 is immersed in Acetone for 30 min shows a big decrease in all mechanical properties. The rest of the test fluids lead to an increase in E modulus and tensile strength and a decrease in Elongation at break.
The impression of the results intensifies after seven days of immersion, except for the cooling fluid, where the mechanical properties show a decrease.

30 minutes

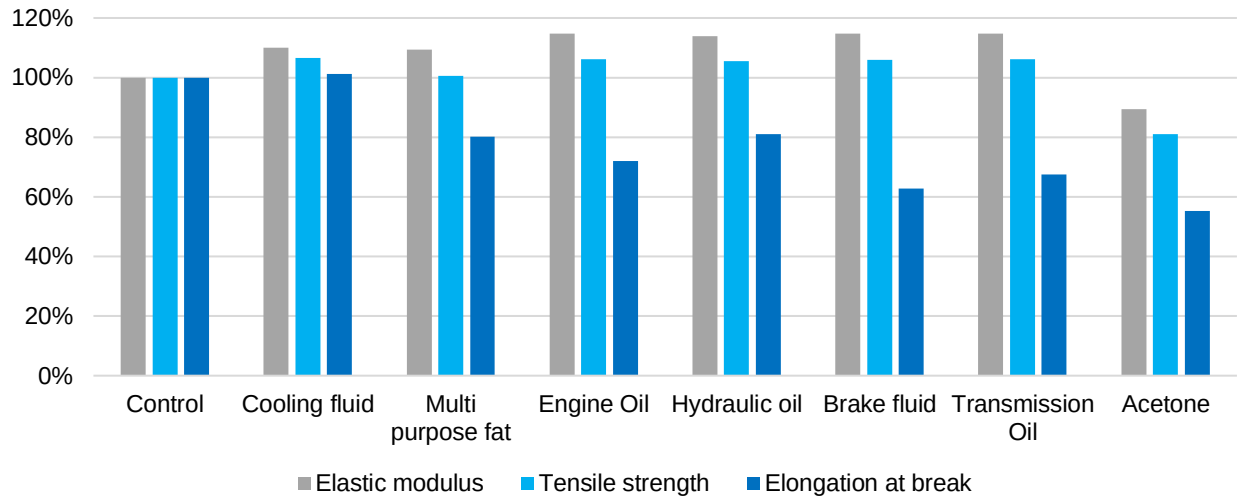

Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

7 days

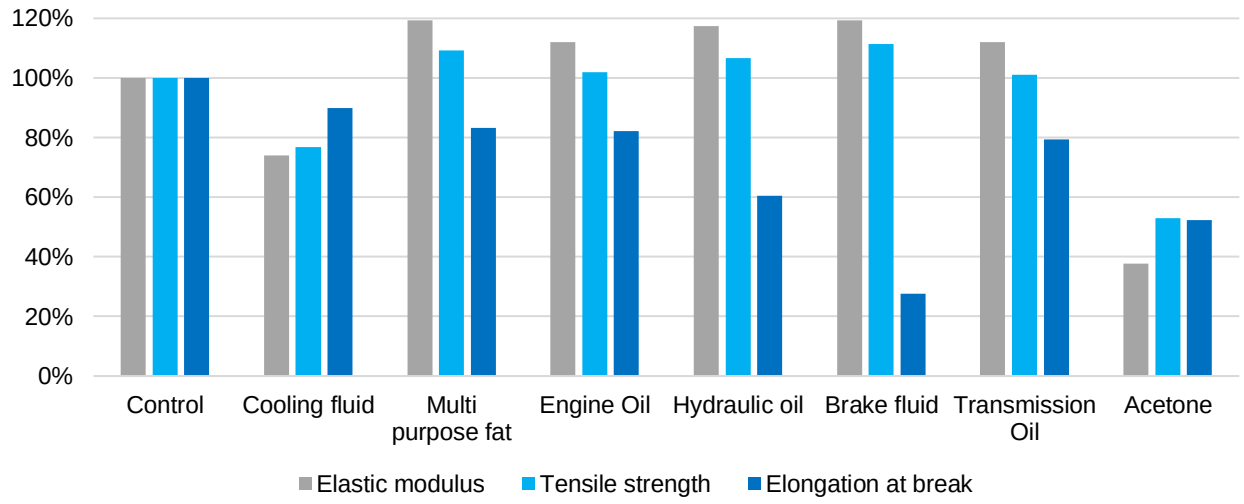

Figure 3 Change in mechanical properties in chemical fluid for 7 days

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Weight

Ultracur3D® EPD 4006 takes up acetone, but none of the other test fluids.

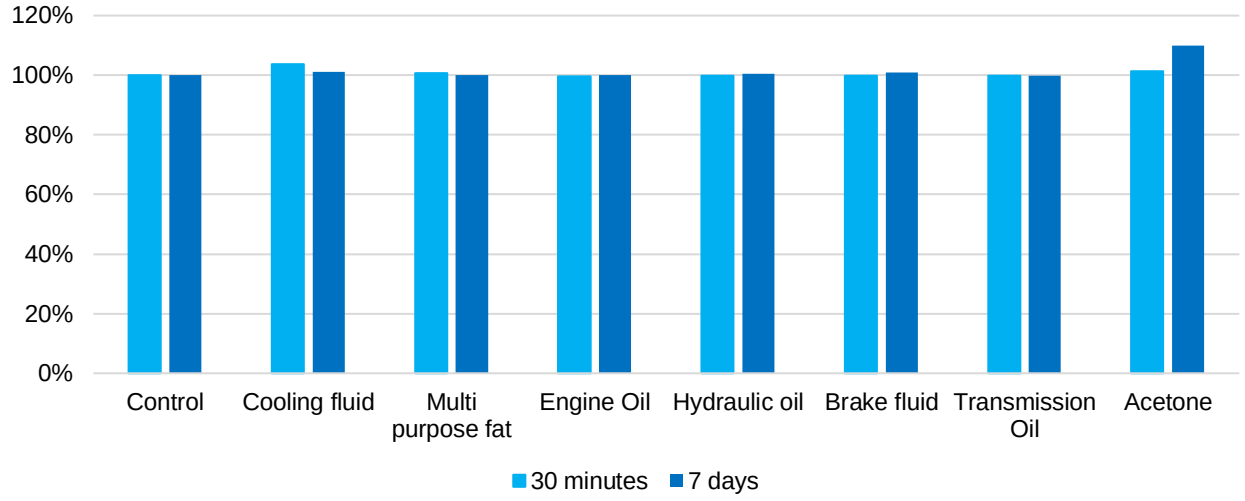

Figure 4 Change in weight in chemical fluid

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Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® EPD 4006** can be summarized in the table below.

Legend

= Change less than 10%; ↑↓ Change between 10%- 30%; ↑↓ Change higher than 30%

Ultracur3D® EPD 4006	30 minutes			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	↑	=	=	=
Multipurpose fat	=	=	↓	=
Engine oil	↑	=	↓	=
Hydraulic oil	↑	=	↓	=
Brake fluid	↑	=	↓	=
Transmission oil	↑	=	↓	=
Acetone	↓	↓	↓	=

Ultracur3D® EPD 4006	7 days			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	↓	↓	↓	=
Multipurpose fat	↑	=	↓	=
Engine oil	↑	=	↓	=
Hydraulic oil	↑	=	↓	=
Brake fluid	↑	↑	↓	=
Transmission oil	↑	=	↓	=
Acetone	↓	↓	↓	↑

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