

Chemical resistance test on Ultracur3D® EPD 3500

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 3500. 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

Mechanical testing

The performance of the material is stable in most tested chemicals. A noticeable drop in elongation at break can be observed on immersion in cooling fluid and multipurpose fat. A considerable drop in the elongation at break is seen when immersed in hydraulic oil and brake fluid. In case of Acetone, there was a slight increase in the elongation at break.

30 minutes

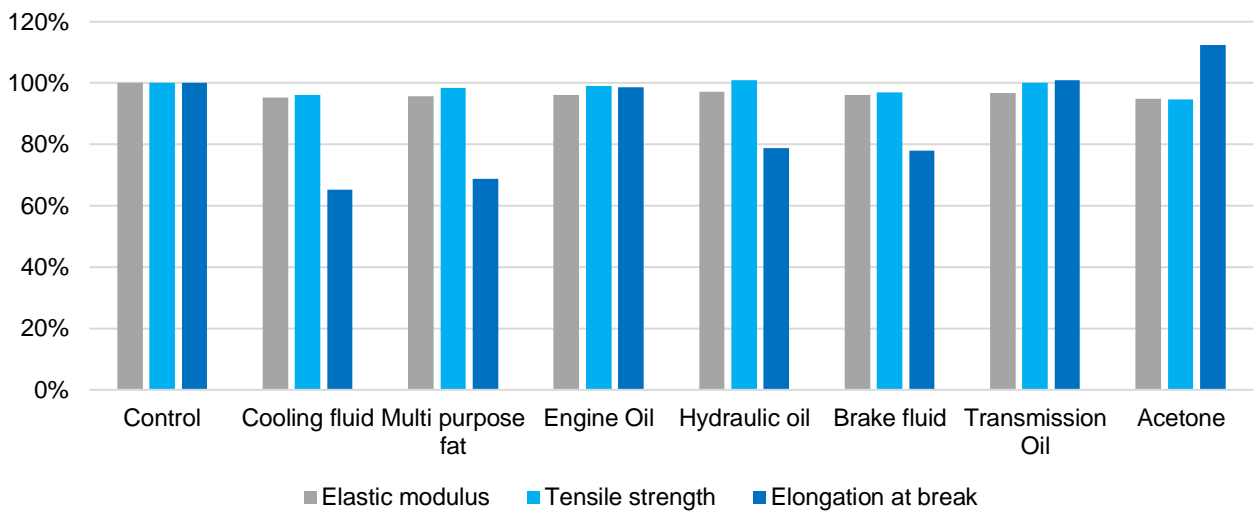


Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

The E Modulus and Tensile strength remain constant throughout the 7 days test. A considerable increase in the elongation break was seen when immersed in cooling fluid. A noticeable decrease in the elongation at break is observed when immersed in Hydraulic oil and Break fluid. Drastic decrease in elongation of break is seen when immersed in multipurpose fat. The specimens showed serious deterioration in contact with acetone when tested for 7 days. Hence no further test was carried out.

7 days

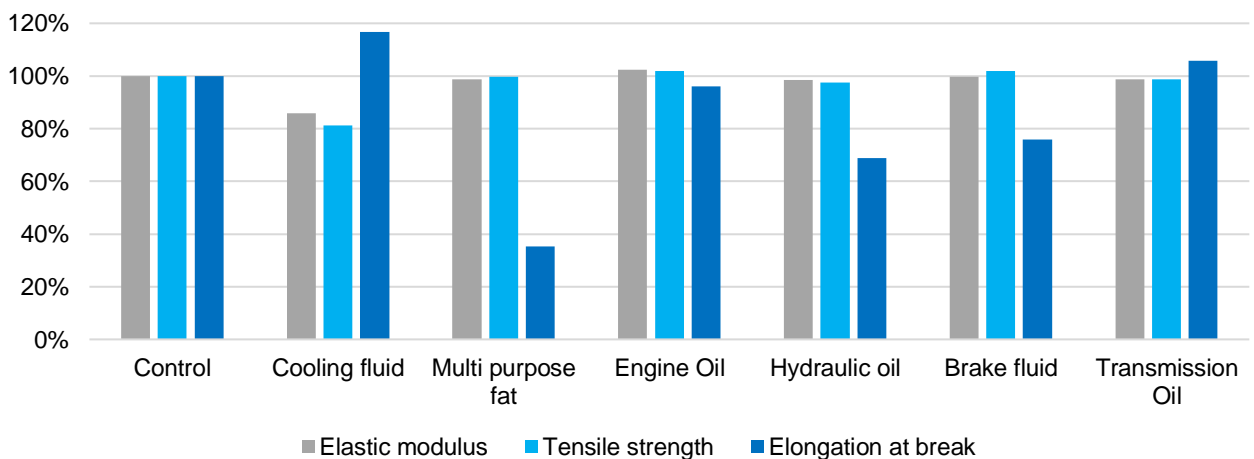


Figure 3 Change in mechanical properties in chemical fluid for 7 days

Weight

No change in weight was seen in all the specimens. The specimens showed serious deterioration in contact with acetone when tested for 7 days.

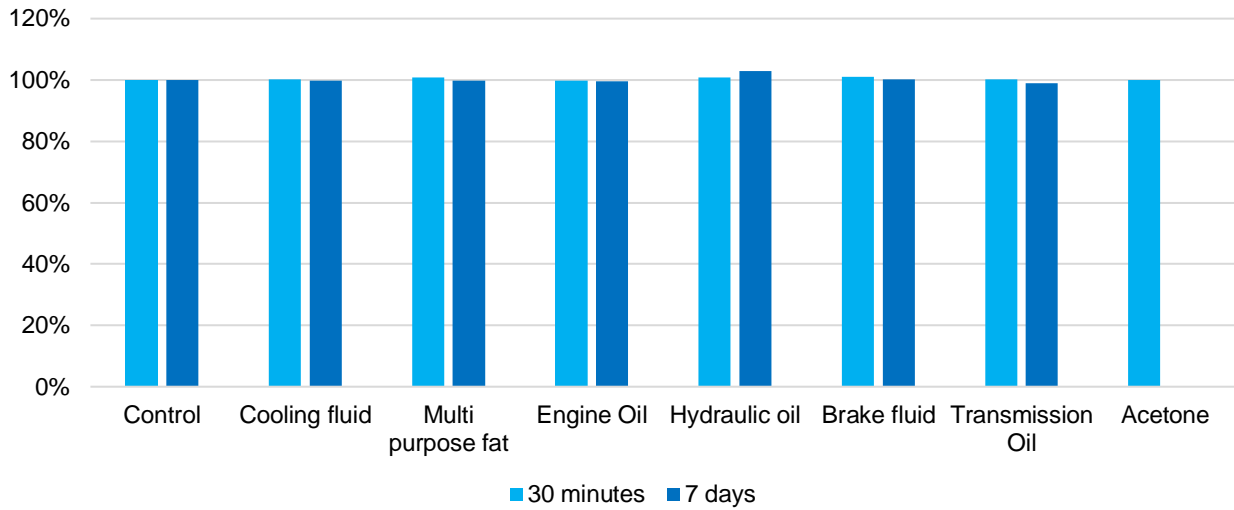


Figure 4 Change in weight in chemical fluid

Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® EPD 3500** can be summarized in the table below.

Legend

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

Ultracur3D® EPD 3500	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 3500	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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