

Chemical resistance test on

Ultracur3D® ST 45

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® ST 45. 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

Storage in Cooling fluid and Acetone for 30 min show more prominent changes in all mechanical properties. The other fluids only show prominent changes of the Elongation at break. Acetone severely damages the samples during the immersion of 7 days. Cooling fluid severely changes the mechanical behavior of Ultracur3D® ST 45 after 7 days of immersion. The same time in brake fluid leads also to changes in Elongation at break, Tensile strength and E modulus, but less strongly. Multipurpose fat leads only to changes in Elongation at break, whereas the Tensile strength and E modulus are stable. The rest of the fluids almost are not affected the after 7 days.

30 minutes

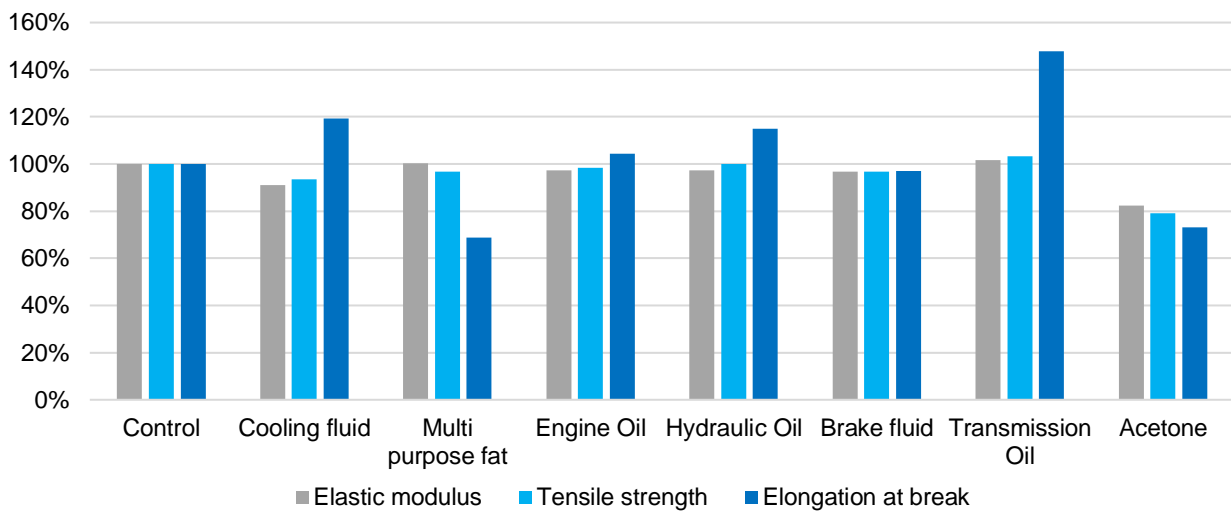


Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

7 days

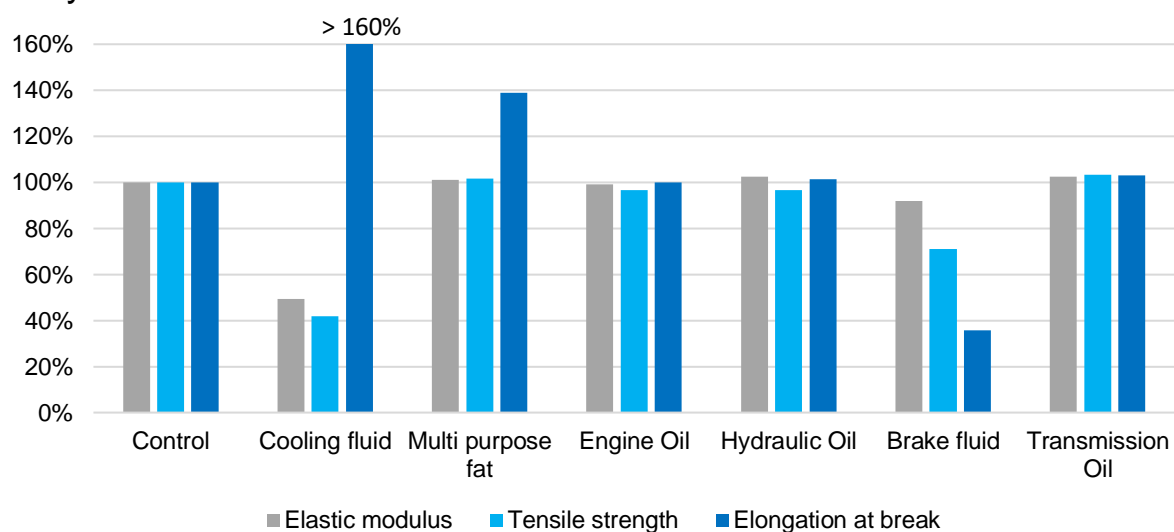


Figure 3 Change in mechanical properties in chemical fluid for 7 days

Weight

All measurable samples show no difference in weight after soaking time, therefore no fluids were taken up by Ultracur3D® ST 45. The samples placed in Acetone for seven days were severely damaged.

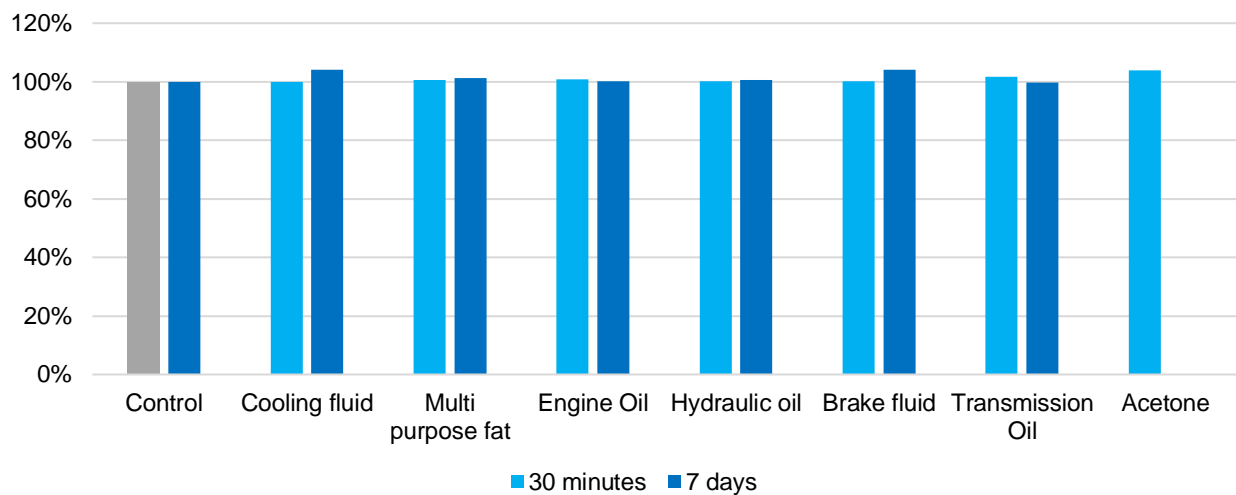


Figure 4 Change in weight in chemical fluid

Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® ST 45** can be summarized in the table below.

Legend

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

Ultracur3D® ST 45	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® ST45	7 days			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	↓	↓	↑	=
Multipurpose fat	=	=	↑	=
Engine oil	=	=	=	=
Hydraulic oil	=	=	=	=
Brake fluid	=	↓	↓	=
Transmission oil	=	=	=	=

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