

Chemical resistance test on Ultracur3D® RG 35

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® RG 35. 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
Isopropanol

Test method and specimens

65 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

It can be seen from the graphs below that the elongation modulus and tensile strength remains stable for all the specimens after 30 minutes of exposure. However, Elongation at break changes almost 50% in case of Hydraulic oil, Engine Oil and Brake fluid and acetone when the material exposed these chemicals.

30 minutes

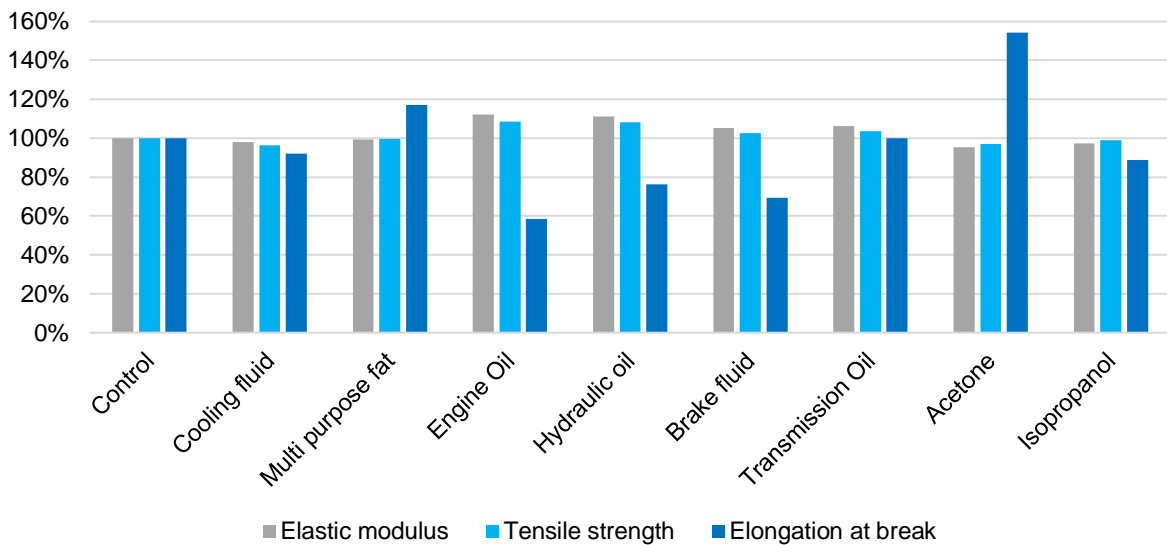


Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

Exposure of acetone for 7 days leads to significant change in all three properties, but the specimens remained intact. In addition to this, elongation at break increases when exposed to isopropanol. For the rest of the solvents, the changes are not so high.

7 days

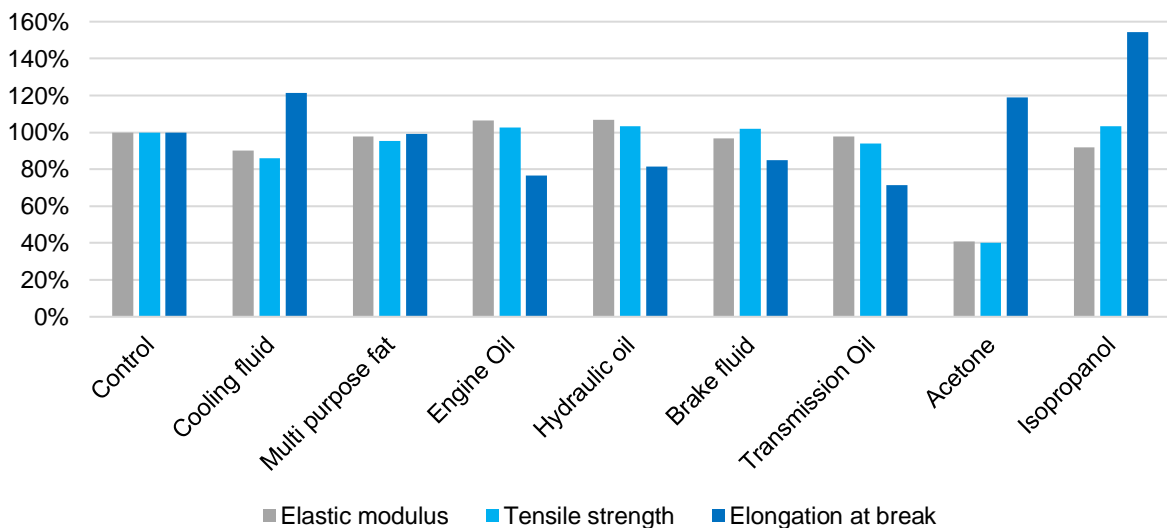


Figure 3 Change in mechanical properties in chemical fluid for 7 days

Weight

Slight increase in weight can be seen only after immersion in Acetone.

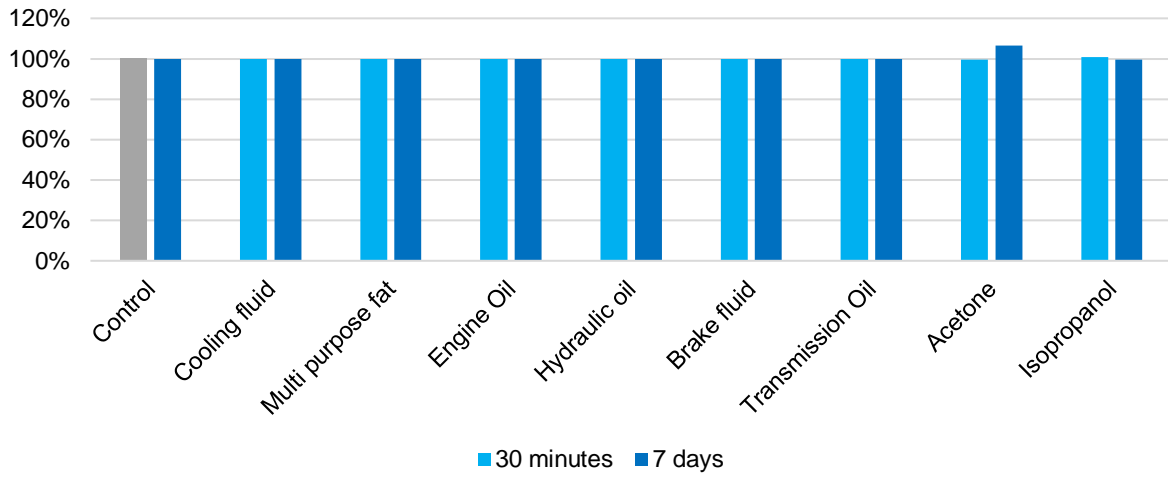


Figure 4 Change in weight in chemical fluid

Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® RG 35** can be summarized in the table below.

Legend

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

Ultracur3D® RG 35	30 minutes			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	=	=	=	=
Multipurpose fat	=	=	↑	=
Engine oil	↑	=	↓	=
Hydraulic oil	↑	=	↓	=
Brake fluid	=	=	↓	=
Transmission oil	=	=	=	=
Acetone	=	=	↑	=
Isopropanol	=	=	↓	=

Ultracur3D® RG 35	7 days			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	=	↓	↑	=
Multipurpose fat	=	=	=	=
Engine oil	=	=	↓	=
Hydraulic oil	=	=	↓	=
Brake fluid	=	=	↓	=
Transmission oil	=	=	↓	=
Acetone	↓	↓	↑	=
Isopropanol	=	=	↑	=

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