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Ultracur3D® EL 4000 B

Flexible | 90 A | Black

Extended TDS

Complete Technical Documentation and Testing Summary

Version 1.4

Contents

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Technical Data Sheet

Flexible resin with superior strength, rebound and high hardness (Shore 90 A).

General Properties	Method	Typical Values
Appearance	-	Black
Viscosity, 25°C	Cone/Plate Rheometer[1)]	460 mPas
Viscosity, 30°C	Cone/Plate Rheometer[1)]	360 mPas
Density (Printed Part)	ASTM D792	1.13 g/cm³
Density (Liquid Resin)	ASTM D4052-18a	1.06 g/cm³

Tensile Properties[2)]	Method	Typical Values
Ultimate Tensile Strength	ASTM D412 C	13 MPa
Elongation at Break	ASTM D412 C	160%

Impact Properties	Method	Typical Values
Unnotched Izod, 23°C	ASTM D4812	No break

Mechanical Properties	Norm	Typical Values
Tear Strength (Graves)	ASTM D624 type C	49 N/mm
Rebound Resilience	ASTM D7121	26%
Relative Abrasion Loss	ISO 4649	254 mm³
Compression set at 23°C, 72h (constant force)	ASTM D395-A	7%
Compression set at 23°C, 72h (constant deflection)	ASTM D395-B	58%
Rossflex, 23°C, 60° angle	ASTM D1052 (2 mm)	>15.000 Cycles (no crack propagation)

Thermal Properties	Method	Typical Values
Glass transition temperature (DMA, tan(d))	ASTM D4065	-9.4°C
Vicat temperature[3)]	ASTM D1525	95°C

Other	Method	Typical Values
Hardness Shore A	ASTM D2240	90
Water Absorption, Short-Term (24 hours)	ASTM D570	2.1%
Water Absorption, Long-Term (>160 hours)	ASTM D570	>5%

Mechanical properties overview

1) Determined with TA-Instrument DHR rheometer, cone/plate, diameter 60 mm, shear rate 100 s^{-1}
2) Pulling speed 500 mm/min
3) 120 K/h, 10N
4) If not noted otherwise, all specimens are 3D printed. Samples were tested at room temperature, 23°C. ASTM sample size (L x W x H): D4812 63 x 3.2 x 12 mm, ASTM D1052 150 x 2 x 20 mm

Printing Performance

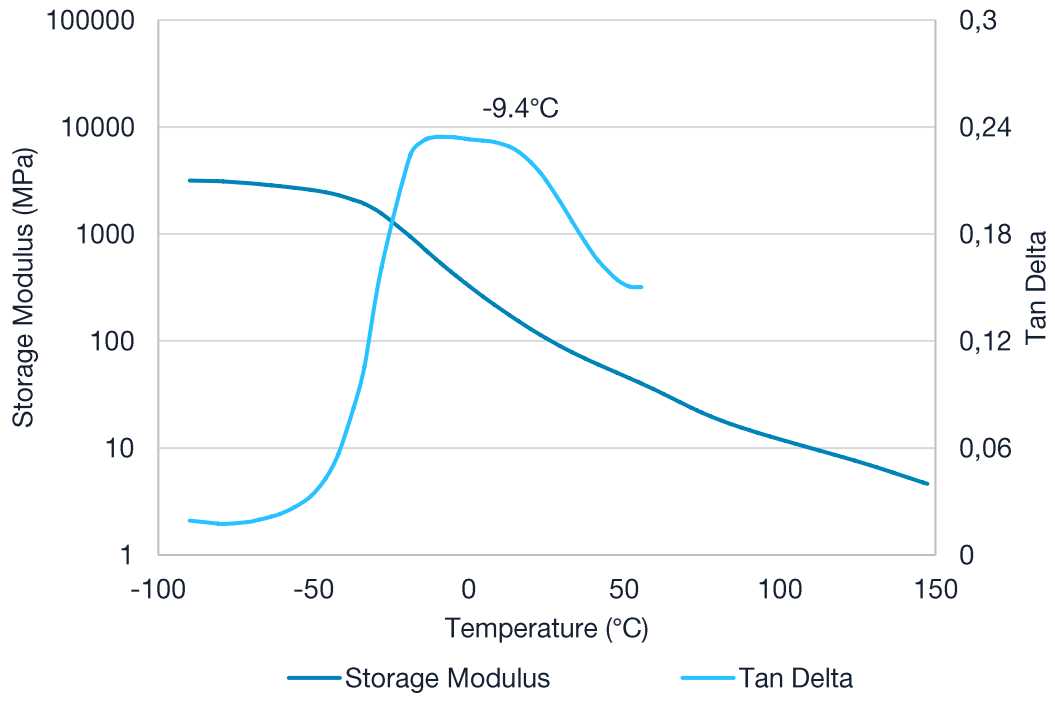
The combination of 3D printer and material has a huge impact on the quality of the parts produced. The measured lattice design characteristics can be found in the Design Guidelines for Lattice Structures of Ultracur3D® Resins.

Dynamic Mechanical Analysis (DMA)

In this DMA measurement, a cyclic strain is applied to the sample, and the response of the sample is recorded as a function of temperature. This can give a good impression of the changes in material behavior, both at low and high temperatures. The measured Storage modulus is a good indication of the stiffness of the material. The maximum in Tan Delta gives the glass transition temperature.

	Setting
Measurement	Strain-controlled
Temperature sweep	3°C / min
Strain	0.06% (linear viscoelastic regime)
Type of loading	Single cantilever
Frequency	1 Hz

Testing conditions DMA



DMA curve

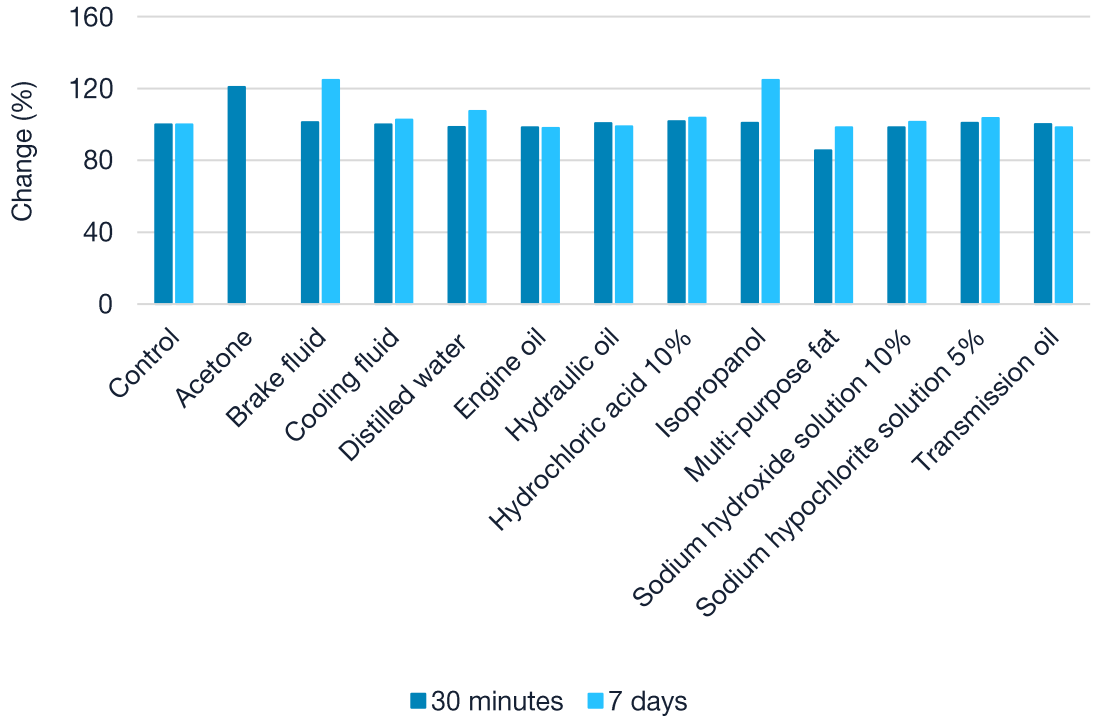
Industrial Chemical Resistance

The resistance of resin materials against chemicals, solvents and other contact substances is an important criterion of selection for many industrial applications. General chemical resistance depends on the period of exposure, the temperature, the quantity, the concentration and the type of the chemical substance. When exposed to industrial chemicals, the chemical bonds of photopolymers can break or degrade, causing a change in the mechanical properties.

Test Method and Specimens

ASTM D412 C tensile bars and Shore A samples were soaked in each fluid at room temperature, one set for 30 minutes and one set for 7 days. Upon completion of the soaking time, the parts were removed from the test fluid and were dried to measure the weight and the mechanical properties.

Weight Measurement



Change in weight after immersion time

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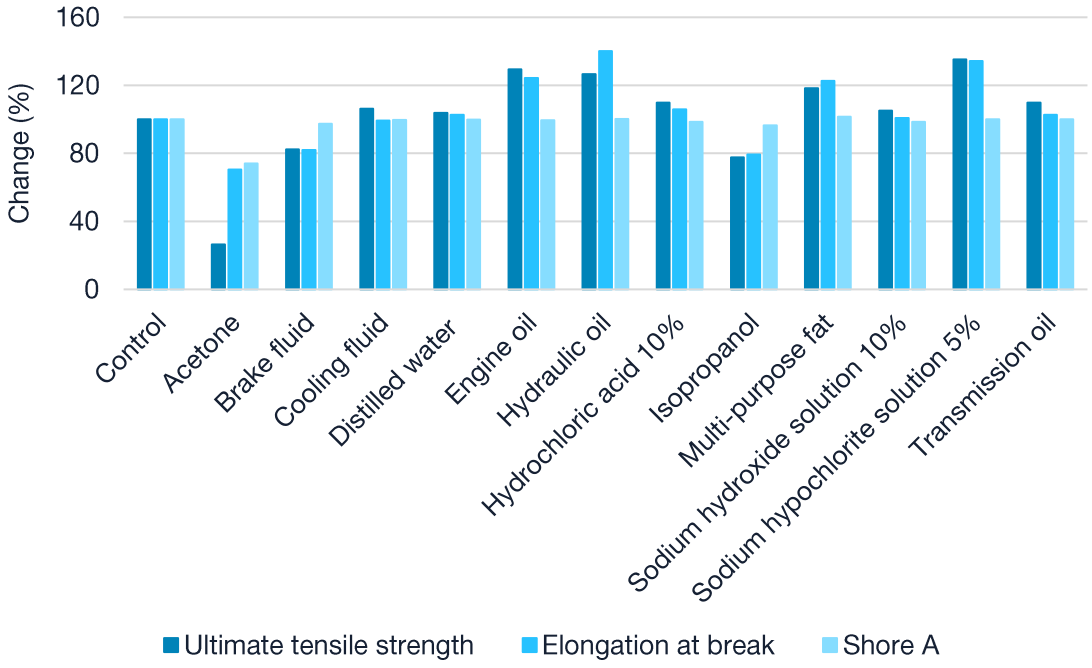
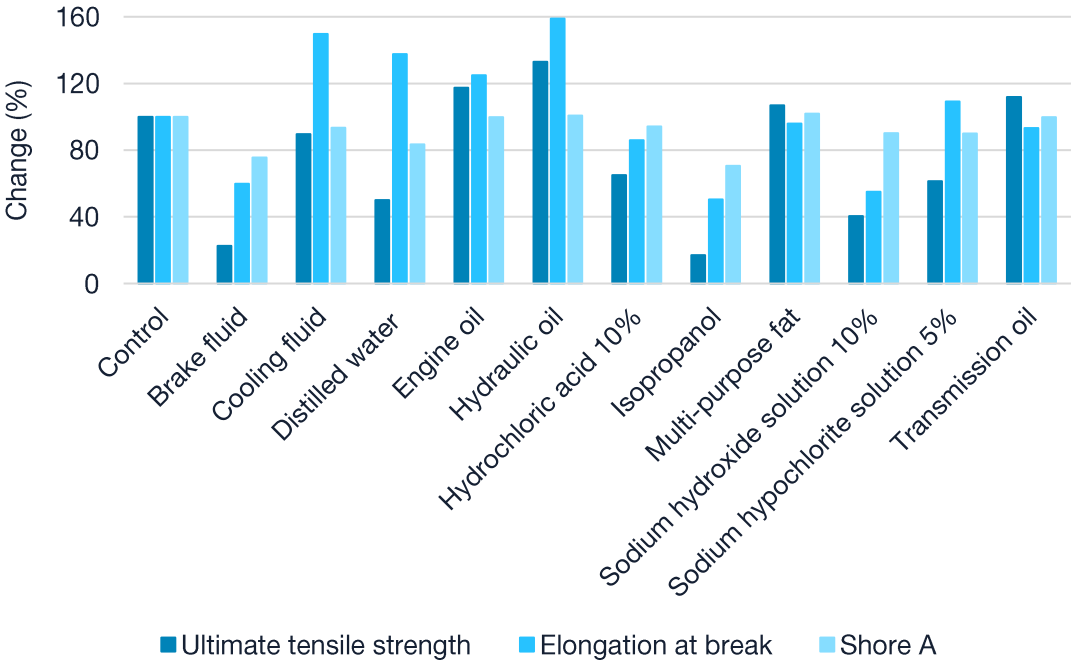
Mechanical Testing

30 minutes



Change in mechanical properties after 30 minutes immersion

7 days



Change in mechanical properties after 7 days immersion

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