

Ultracur3D® EL 60
Flexible | 75 A | Clear

Extended TDS

Complete Technical Documentation
and Testing Summary

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Technical Data Sheet

Flexible resin with quick elastic response and low hardness (Shore 75 A).

The data contained in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, this data does not relieve processors from carrying out their own investigations and tests; neither does this data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose.

Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

The safety data given in this publication is for informational purposes only and does not constitute a legally binding MSDS. The relevant MSDS can be obtained upon request from your supplier or you may contact Mass Additive Manufacturing GmbH directly at sales@forward-am.com.

General Properties	Method	Typical Values
Appearance	-	Clear
Viscosity, 25°C	Cone/Plate Rheometer ¹⁾	4900 mPas
Viscosity, 30°C	Cone/Plate Rheometer ¹⁾	3400 mPas
Density (Printed Part)	ASTM D792	1.12 g/cm ³
Density (Liquid Resin)	ASTM D4052-18a	1.08 g/cm ³

Tensile Properties ²⁾	Method	Typical Values
Ultimate Tensile Strength	ASTM D412 C	9 MPa
Elongation at Break	ASTM D412 C	95%

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	18 N/mm
Tear Strength (Trouser)	ASTM D624 type T	3 kN/m
Rebound Resilience	ASTM D7121	21%
Relative Abrasion Loss	ISO 4649	781 mm ³
Compression set at 23°C, 72h (constant force)	ASTM D395-A	3%
Compression set at 23°C, 72h (constant deflection)	ASTM D395-B	9%
Rosflex, 23°C, 60° angle	ASTM D1052 (2 mm)	>10.000 Cycles (no crack propagation)

Thermal Properties	Method	Typical Values
Glass transition temperature (DMA, tan(d))	ASTM D4065	29°C

Biocompatibility	Method	Typical Values
Cytotoxicity – Neutral Red	EN ISO 10993-5 (2009)	PASS ⁴⁾
Human Skin Irritation ³⁾	EN ISO 10993-10 (2013)	PASS ⁴⁾
In vitro Sensitization Testing-KeratinoSens™	prEN ISO 10993-10 (2020)	PASS ⁴⁾

Other	Method	Typical Values
Hardness Shore A	ASTM D2240	75
Water Absorption, Short-Term (24 hours)	ASTM D570	1.12%
Water Absorption, Long-Term (>600 hours)	ASTM D570	1.7%

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) Patch test on 30 volunteers
- 4) For the statement on Biocompatibility data see Chapter: [Biocompatibility](#).
- 5) 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](#).

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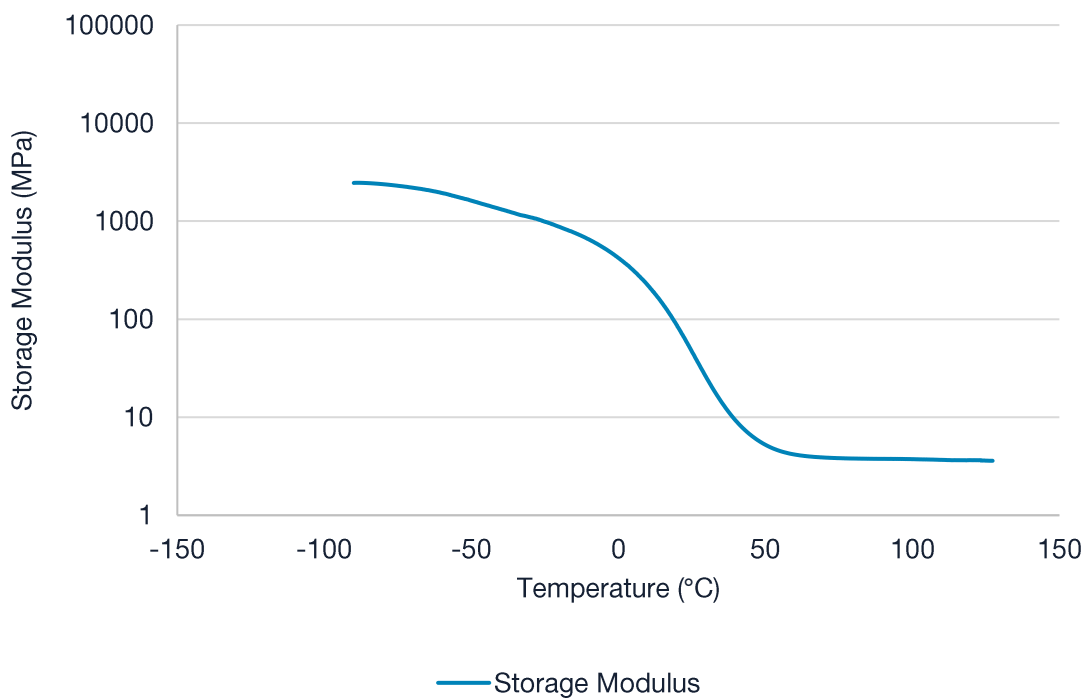
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Dynamic Mechanical Analysis (DMA)

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	0.12% (linear viscoelastic regime)
Type of loading	Single cantilever
Frequency	1 Hz

Testing conditions DMA



DMA curve

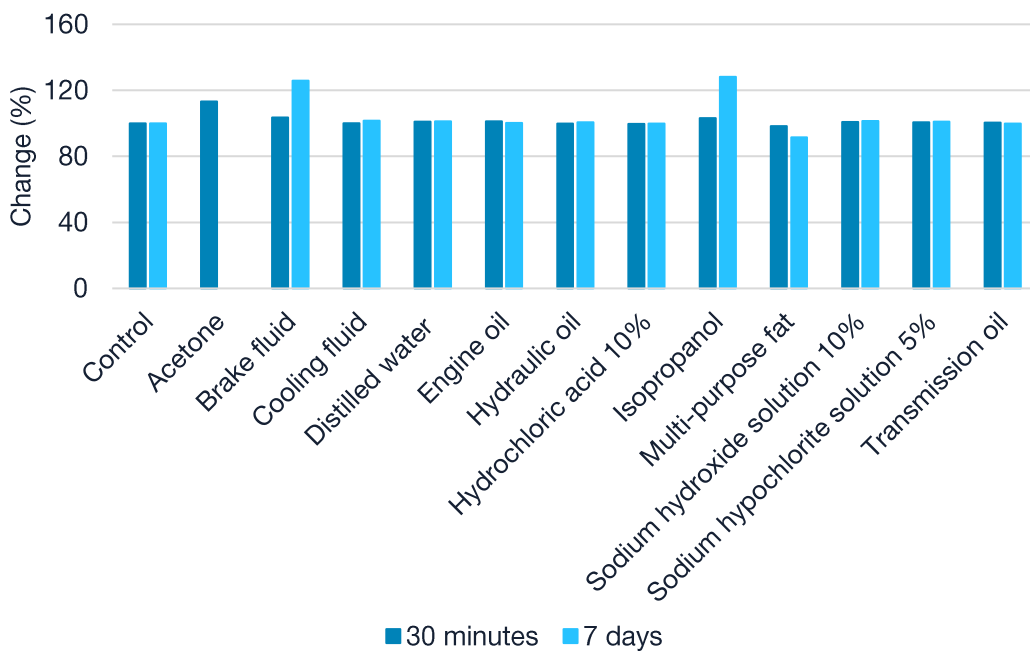
Industrial Chemical Resistance

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 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, conditioned for 24 hours at 22°C before measuring the weight and the mechanical properties.

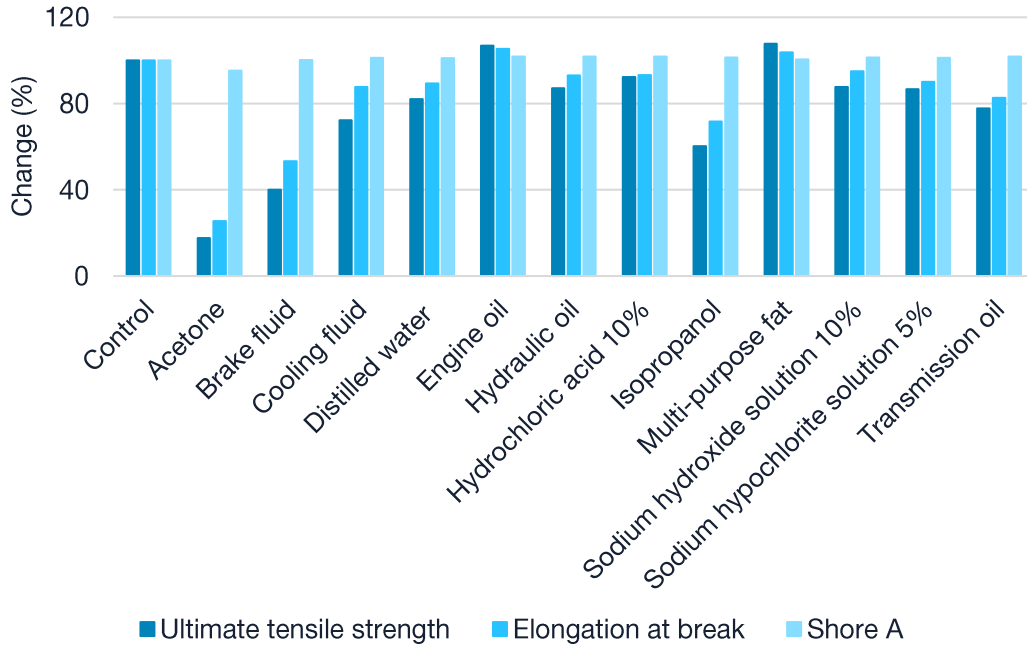
Weight Measurement



Change in weight after immersion time

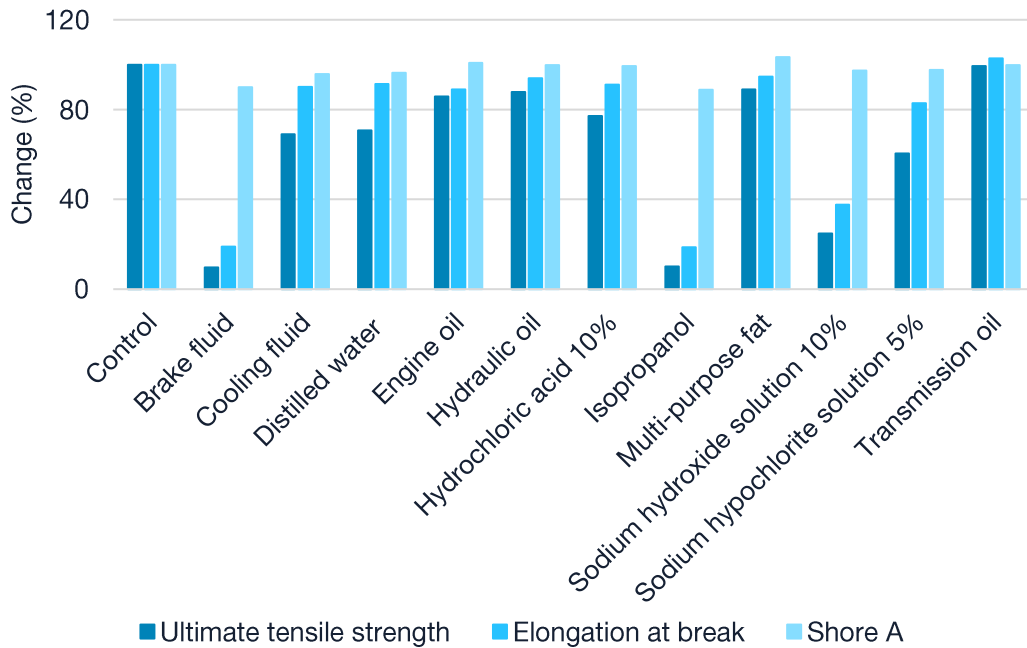
Mechanical Testing

30 minutes



Change in mechanical properties after 30 minutes immersion

7 days



Change in mechanical properties after 7 days immersion

Sterilization

Sterilization is an essential requirement in many applications especially when used in the medical field. Testing not only ensures the material quality but also determines how effectively the chosen sterilization process is eliminating potential microorganisms.

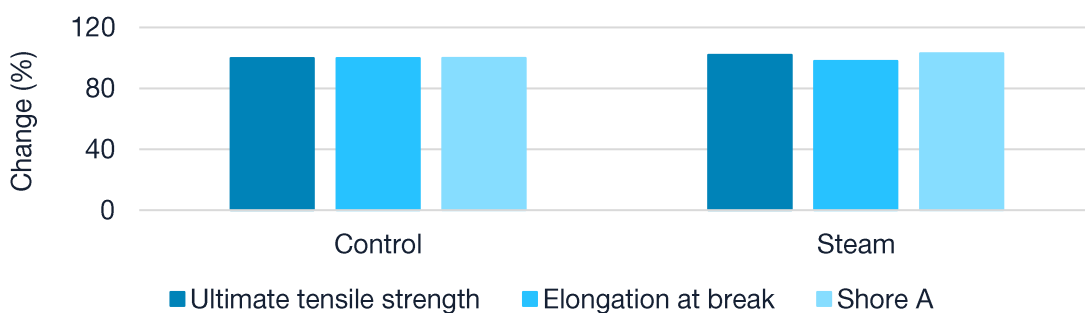
Test Method and Specimens

Steam Sterilization

Steam sterilization parameters	Settings
Vacuum pulses	4
Temperature	134°C
Pressure	210 kPa
Holding time	4 minutes
Drying time	20 minutes

Testing conditions steam sterilization

Mechanical Testing



Change in mechanical properties after sterilization

Coloration



Color samples before and after sterilization

Biocompatibility

Product: Ultracur3D® EL 60

Revision: 05th of May 2021

3D printed test items of the above stated product have fulfilled the requirements of tests as stated below:

Cytotoxicity Testing- Neutral Red:

(EN ISO 10993-5 (2009))

Human Skin Irritation Test:

(EN ISO 10993-10 (2013))⁶⁾

In vitro Sensitization Testing- KeratinoSens™

(prEN ISO 10993-10 (2020))

⁶⁾ Patch test on 30 volunteers

The biocompatibility tests were recorded on test specimen of the referenced product to show compatibility of the material in general. The biocompatibility tests listed are not part of any continuous production protocol. The test assessments reflect only the test specimen and have to be retested on the final product. It remains the responsibility of the device manufacturers and /or end-users to determine the suitability of all printed parts for their respective application.

For notice:

We give no warranties, expressed or implied, concerning the suitability of mentioned product for use in any medical device and pharmaceutical applications.

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