

# Ultracur3D<sup>®</sup> EL 4000 B

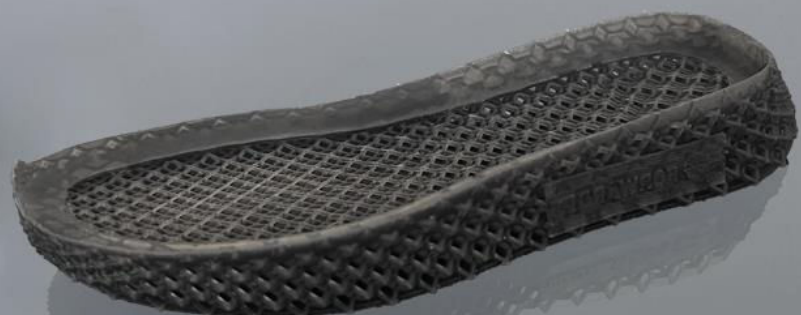
## Flexible | 90 A | Black

## Extended TDS

Complete Technical Documentation  
and Testing Summary



Version: 1.1



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# Technical Data Sheet

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

| General Properties                                 | Norm                               | Typical Values         |
|--|------------------------------------|------------------------|
| Appearance   | -                                  | Black                  |
| Viscosity, 25°C                                    | Cone/Plate Rheometer <sup>1)</sup> | 460 mPas               |
| Viscosity, 30°C                                    | Cone/Plate Rheometer <sup>1)</sup> | 360 mPas               |
| Density (Printed Part)                             | ASTM D792                          | 1.13 g/cm <sup>3</sup> |
| Density (Liquid Resin)                             | ASTM D4052-18a                     | 1.06 g/cm <sup>3</sup> |
| Tensile Properties <sup>2)</sup>                   | Norm                               | Typical Values         |
| Ultimate Tensile Strength                          | ASTM D412 C                        | 11 MPa                 |
| Elongation at Break                                | ASTM D412 C                        | 120%                   |
| Impact Properties                                  | Norm                               | Typical Values         |
| Unnotched Izod, 23°C                               | ASTM D256                          | 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 mm <sup>3</sup>    |
| Compression set at 23°C, 72h (constant force)      | ASTM D395-A                        | 7%                     |
| Compression set at 23°C, 72h (constant deflection) | ASTM D395-B                        | 58%                    |

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| Thermal Properties                         | Norm       | Typical Values |
|--|------------|----------------|
| Glass transition temperature (DMA, tan(d)) | ASTM D4065 | -9.4°C         |
| Vicat temperature <sup>3)</sup>            | ASTM D1525 | 95°C           |

| Other                                    | Norm       | 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*

- <sup>1)</sup> Determined with TA-Instrument DHR rheometer, cone/plate, diameter 60 mm, shear rate 100 s<sup>-1</sup>
- <sup>2)</sup> Pulling speed 500 mm/min
- <sup>3)</sup> 120 K/h, 10N
- <sup>4)</sup> 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): D256 63 x 3.2 x 12 mm

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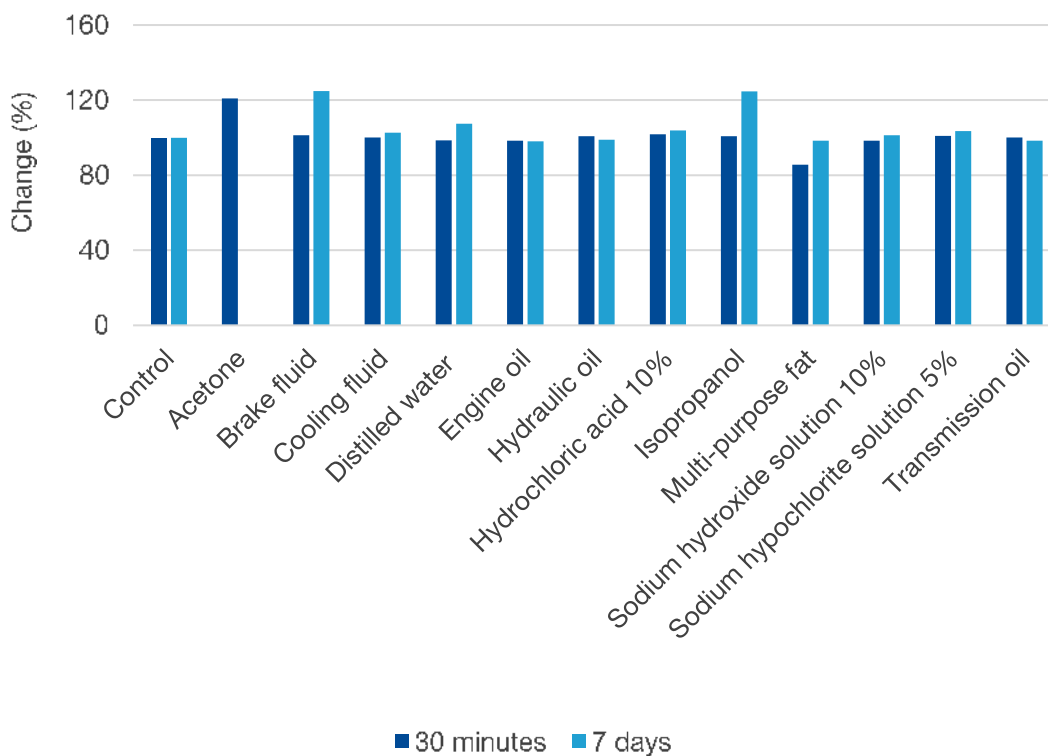
# Industrial Chemical Resistance

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.

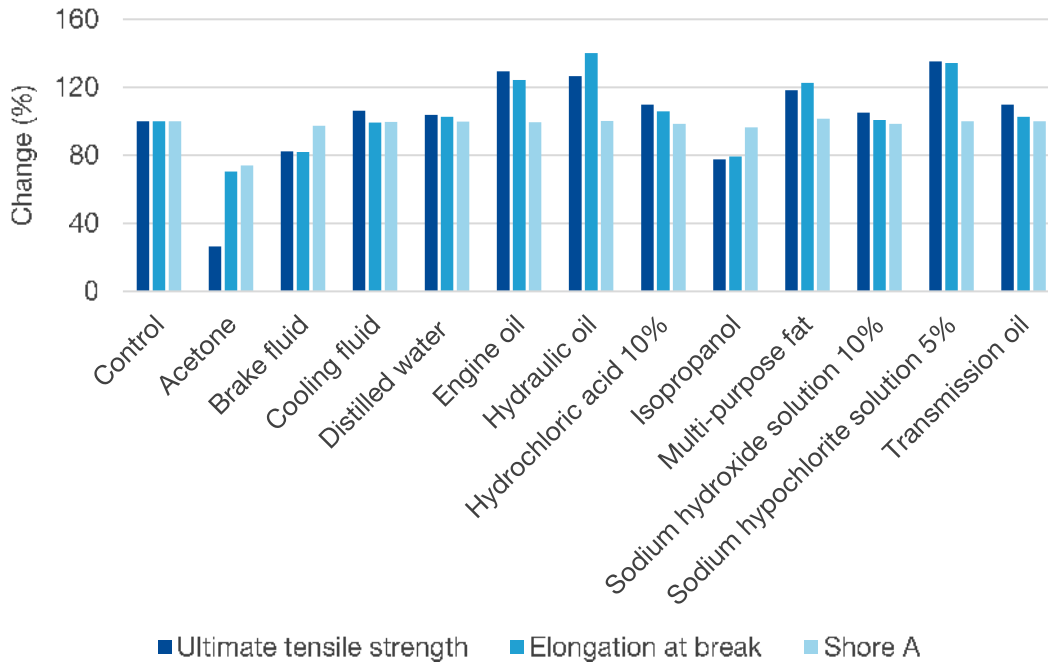
## Weight Measurement



Change in weight after immersion time

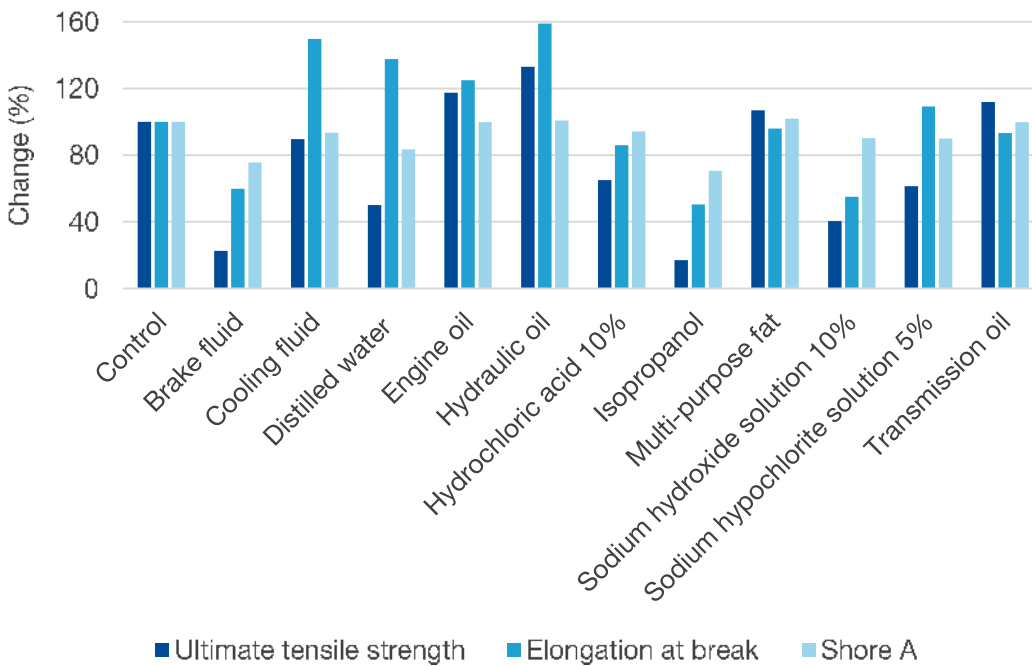
## Mechanical Testing

### 30 minutes



Change in mechanical properties after 30 minutes immersion

### 7 days



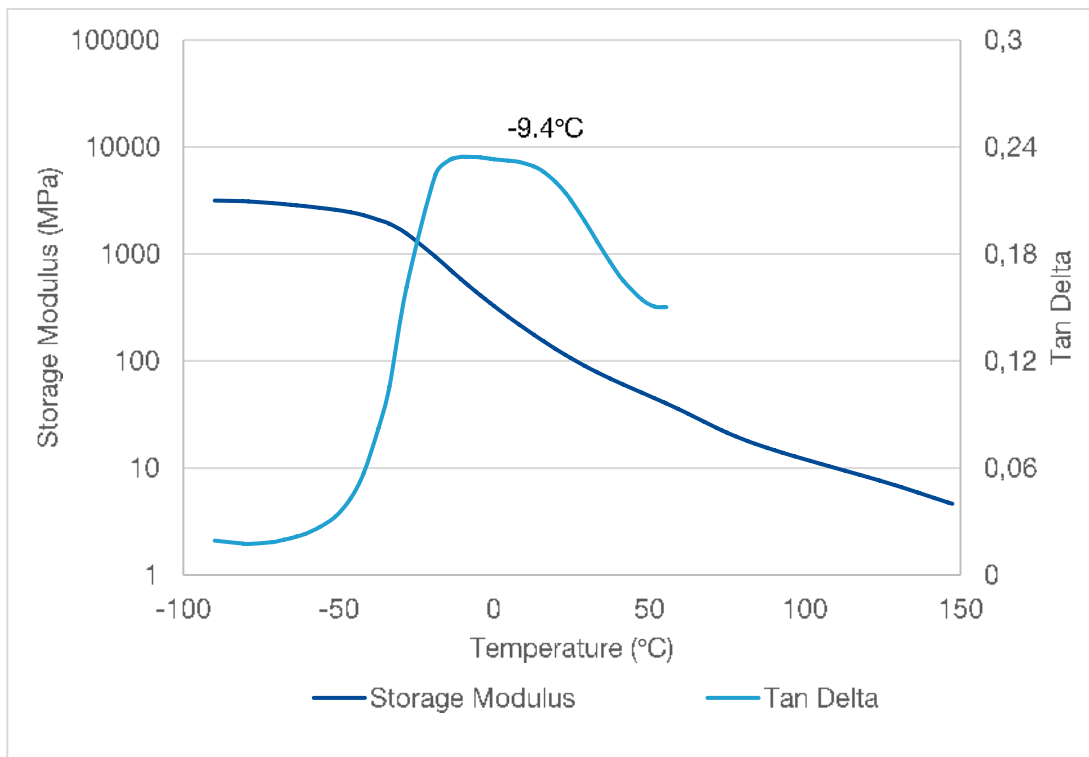
Change in mechanical properties after 7 days immersion

# 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*