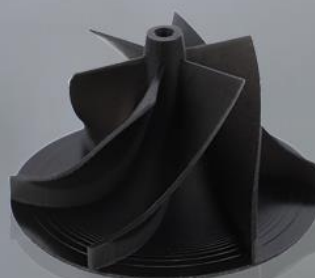


Ultracur3D[®] RG 1100 B

Rigid | HDT 110 | Black

Extended TDS

Complete Technical Documentation
and Testing Summary



Version: 2.0

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Technical Data Sheet

Rigid resin with superior stiffness and temperature resistance.

| General Properties | Norm | Typical Values |
|--|------------------------------------|------------------------|
| Appearance | - | Black |
| Viscosity, 25°C | Cone/Plate Rheometer ¹⁾ | 280 mPas |
| Viscosity, 30°C | Cone/Plate Rheometer ¹⁾ | 190 mPas |
| Density (Printed Part) | ASTM D792 | 1.2 g/cm ³ |
| Density (Liquid Resin) | ASTM D4052-18a | 1.11 g/cm ³ |
| Tensile Properties ²⁾ | Norm | Typical Values |
| E Modulus | ASTM D638 | 2950 MPa |
| Ultimate Tensile Strength | ASTM D638 | 70 MPa |
| Elongation at Break | ASTM D638 | 5% |
| Flexural Properties | Norm | Typical Values |
| Flexural Modulus | ASTM D790 | 2790 MPa |
| Flexural Strength | ASTM D790 | 125 MPa |
| Impact Properties | Norm | Typical Values |
| Notched Izod (Machined), 23°C | ASTM D256 | 21 J/m |
| Notched Charpy (Machined), 23°C | ISO 179-1 | 1.11 kJ/m ² |
| Thermal Properties | Norm | Typical Values |
| HDT at 0.45 MPa | ASTM D648 | 100°C |
| HDT at 1.82 MPa | ASTM D648 | 78°C |
| Glass transition temperature (DMA, tan(d)) | ASTM D4065 | 141°C |
| Degradation temperature (TGA, 5% mass loss, air) | ISO 11358 | 339°C |

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.

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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 BASF 3D Printing Solutions GmbH directly at sales@basf-3dps.com.

| Thermal Properties | Norm | Typical Values |
|-------------------------|------------------------------|----------------------------|
| Glow-wire Test | IEC 60695-2-12/-13 (2 mm) | GWIT: 675°C GWFI: 650°C |
| Flammability | UL 94 (1.5 mm) | HB |
| Hot-Wire Ignition (HWI) | UL 746 A (0.75 mm) | PLC 4 |
| Hot-Wire Ignition (HWI) | UL 746 A (1.0 mm) | PLC 3 |
| Hot-Wire Ignition (HWI) | UL 746 A (2.0 mm) | PLC 2 |
| Hot-Wire Ignition (HWI) | UL 746 A (3.0 mm) | PLC 1 |

| Other | Norm | Typical Values |
|--|------------|----------------|
| Hardness Shore D | ASTM D2240 | 84 |
| Water Absorption, Short-Term (24 hours) | ASTM D570 | 0.14% |
| Water Absorption, Long-Term (>2500 hours) | ASTM D570 | 2.0% |

Mechanical properties overview

- 1) Determined with TA-Instrument DHR rheometer, cone/plate, diameter 60 mm, shear rate 100 s⁻¹
- 2) Tensile type ASTM D638 type IV, Pulling speed 5 mm/min
- 3) 120 K/h, 50N
- 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): ASTM D790 80 x 4 x 10 mm, ASTM D256 63 x 12,7 x 12 mm, ASTM D648 127 x 3.2 x 13 mm, ISO 179-1 80 x 4 x 10 mm, UL 94 125 x 1.5 x 13 mm, IEC 60695-2-12/-13 60 x 2 x 60 mm.

International Material Data System (IMDS)

This material is listed in the IMDS (International Material Data System), which contains information on materials used in the automotive industry. Access to the database can be granted on request by sharing the IMDS ID with us (sales@basf-3dps.com).

Printing Performance

The combination of 3D printer and material has a huge impact on the quality of the parts produced. The measured design characteristics as well as the printing speed can be found in the [Printing Evaluation Guideline of Ultracur3D® Resins](#).

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Long-Term UV

Durability is a key feature for the components utilized within many industries, as they expect the materials used to withstand years of exposure to the elements. Through the effects of UV radiation, photopolymers can degrade over time. The aging can be caused by the influence of UV light, heat and water. The degree of ageing depends on duration and intensity.

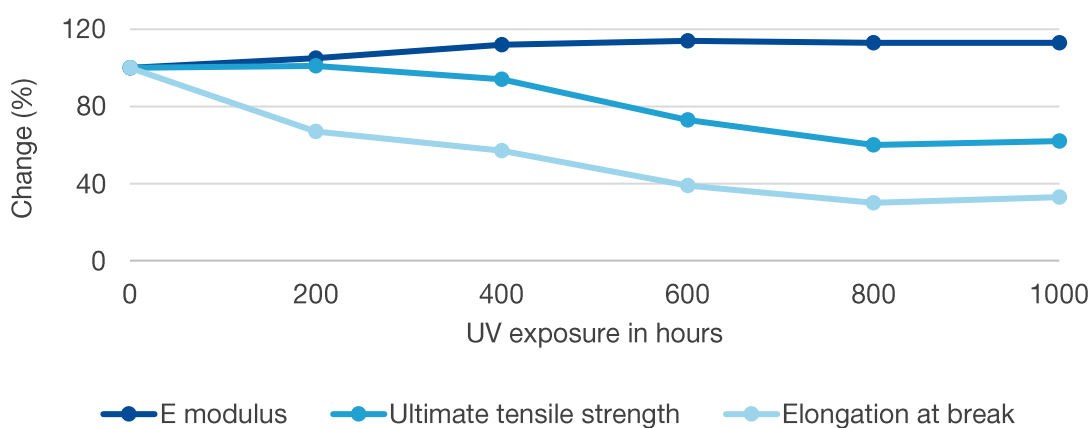
Test Method and Specimens

The ageing tests were performed with ASTM D638 type IV tensile bars and color cones as per ISO 4892-2:2013 method A, cycle 1. Exposed samples were always removed at the end of a dry cycle, and conditioned for 24 hours at 22°C before mechanical testing.

| Cycle No. | Exposure period | Irradiance | | Black standard temperature in °C | Chamber temperature in °C | Relative humidity in % |
|-----------|--------------------|--|--|----------------------------------|---------------------------|------------------------|
| | | Broadband (300 nm to 400 nm) in W/m ² | Narrowband (340 nm) in W/(m ² nm) | | | |
| 1 | 102 min dry | 60 ± 2 | 0.51 ± 0.02 | 65 ± 3 | 38 ± 3 | 50 ± 10 |
| | 18 min water spray | 60 ± 2 | 0.51 ± 0.02 | - | - | - |

Testing conditions for ISO 4892-2 method A, cycle 1

Mechanical Testing



Change in mechanical properties after accelerated weathering

The final values after 1000 hours of long-term UV exposure can be found below.

| Property | Before long-term UV exposure | After 1000 hours of UV exposure |
|---------------------------|------------------------------|---------------------------------|
| E modulus | 2700 MPa | 3000 MPa |
| Ultimate tensile strength | 67 MPa | 41 MPa |
| Elongation at break | 4.6% | 1.5% |

Mechanical properties before and after 1000 hours of UV exposure as per ISO 4892:2 method A

Coloration

After being exposed up to 1000 hours, Ultracur3D® RG 1100 B did not show significant change in color.



Effect of UV exposure on color of the specimens

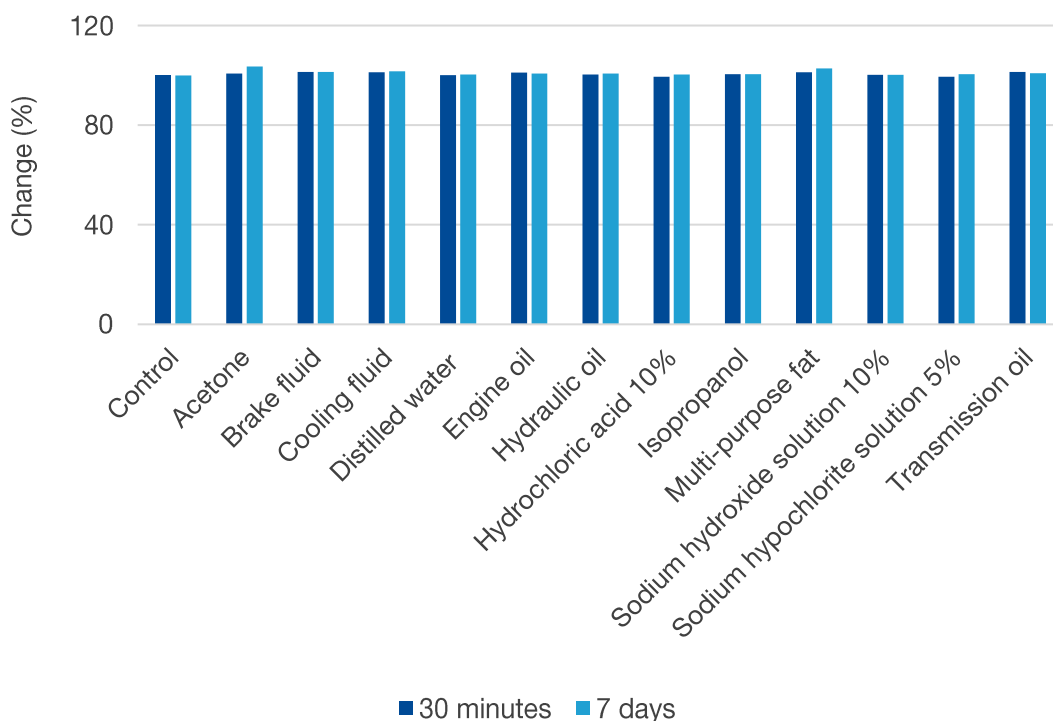
Industrial Chemical Resistance

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 D638 type IV 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 to measure the weight and the mechanical properties.

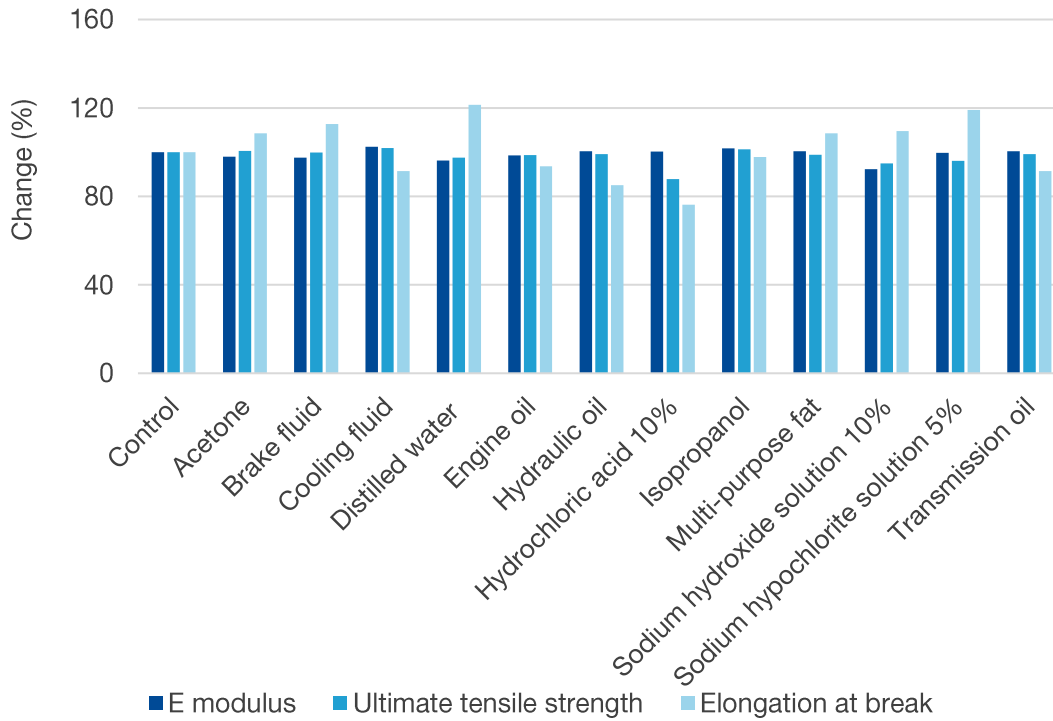
Weight Measurement



Change in weight after immersion time

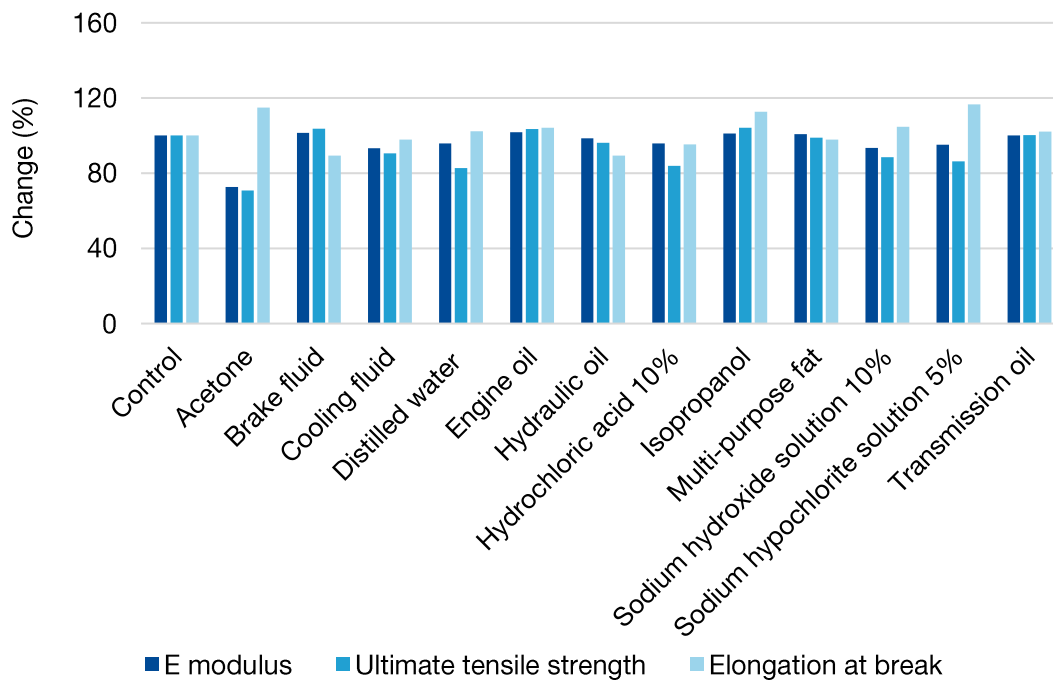
Mechanical Testing

30 minutes



Change in mechanical properties after 30 minutes immersion

7 days



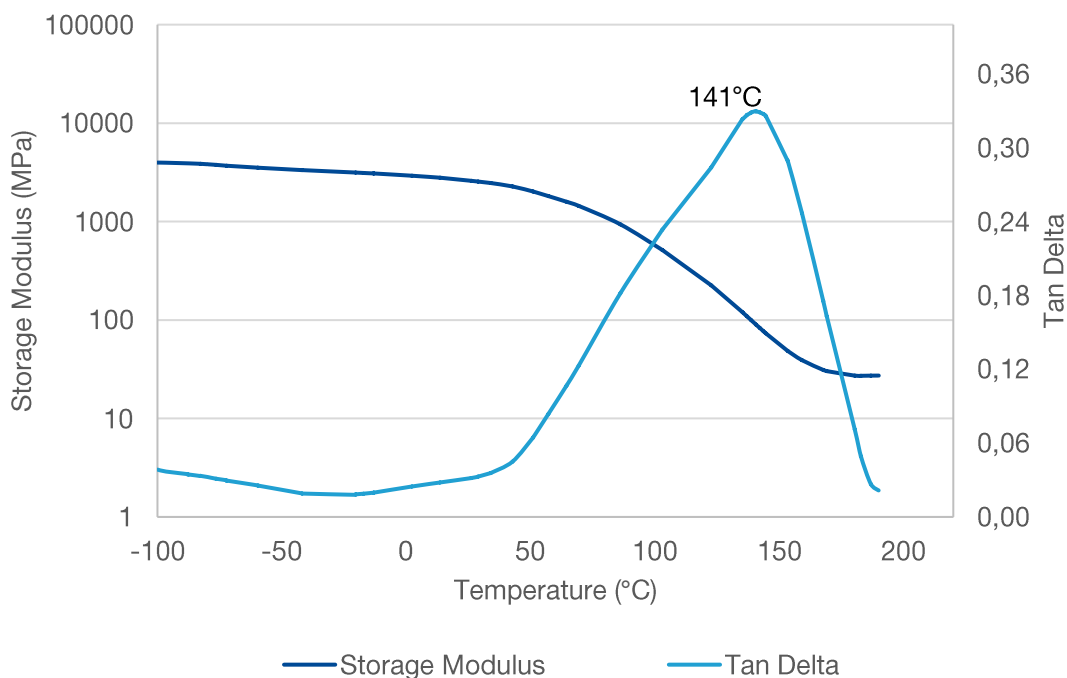
Change in mechanical properties after 7 days immersion

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 | 1°C / min |
| Strain | 0.32% (linear viscoelastic regime) |
| Type of loading | Dual cantilever |
| Frequency | 1 Hz |

Testing conditions DMA



DMA curve

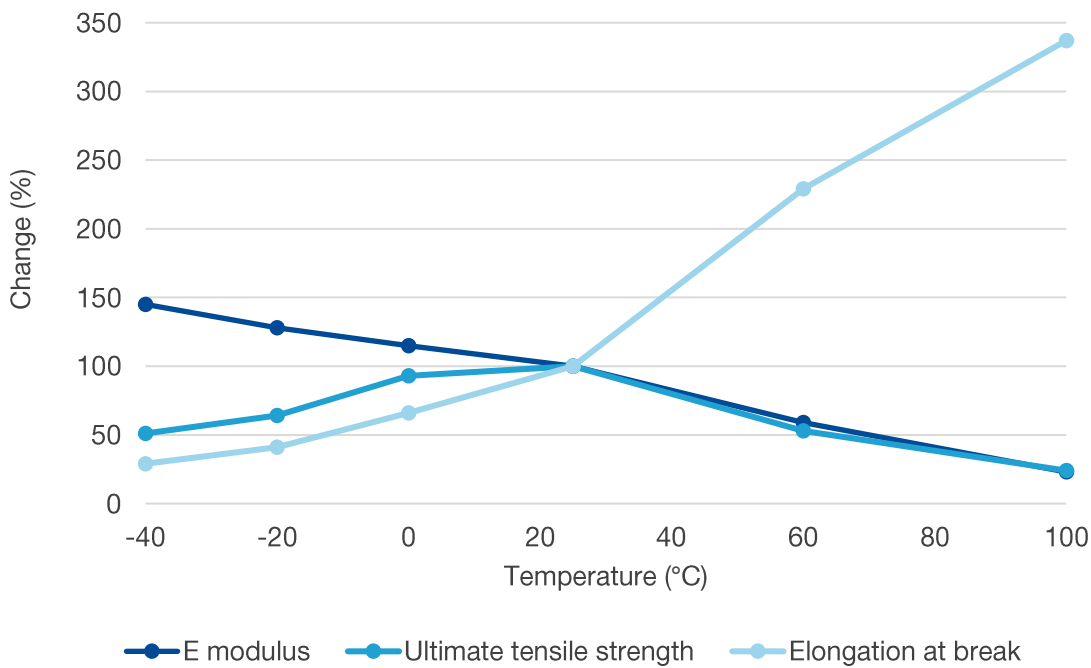
Temperature Dependence of Mechanical Properties

Temperature can have a substantial effect on material performance. Measuring these data can help to determine whether the material is suitable for applications that require a certain performance at very low or very high temperatures.

Test Method and Specimens

Tensile bars were tested at various temperatures, ranging from -40°C to 100°C. Samples were conditioned for 60 minutes at their respective test temperatures before measurements were started. The data at 25°C were taken as the reference point.

Mechanical Testing



Change in mechanical properties at -40°C to 100°C

Pressure & Temperature Resistance

The pressure and temperature performance of a material is key to enable a broad range of applications and industries. Both can have a drastic effect on mechanical properties, therefore testing under these certain conditions can give an idea of the resistance of a photopolymer.

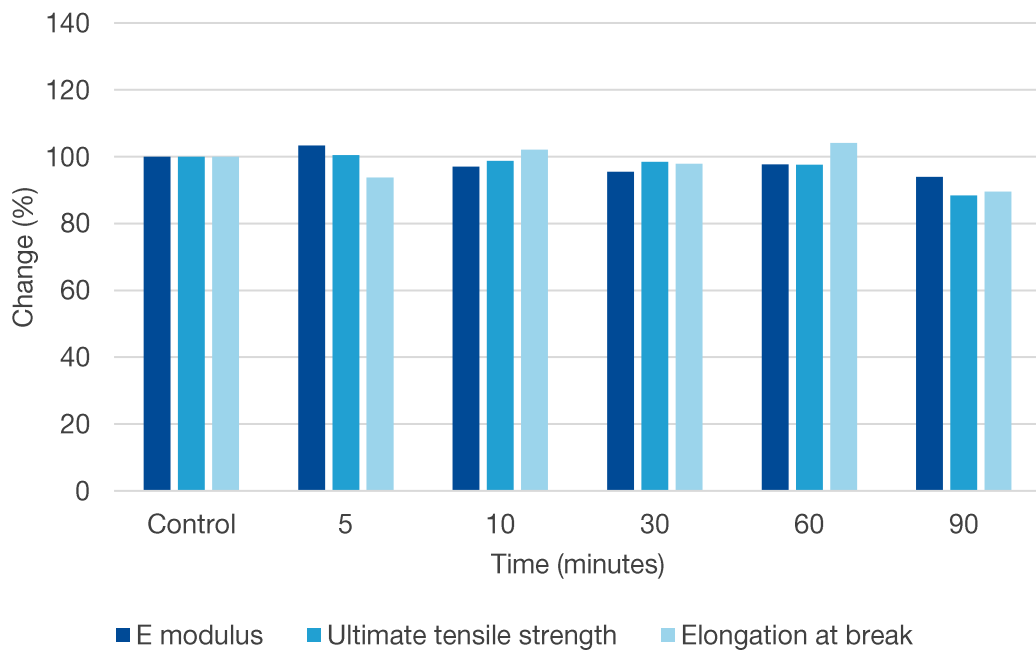
Test Method and Specimens

ASTM D638 type IV tensile bars were immersed in water with exposed to pressure from all sides and tested according to the conditions listed below, the effect on mechanical properties was investigated.

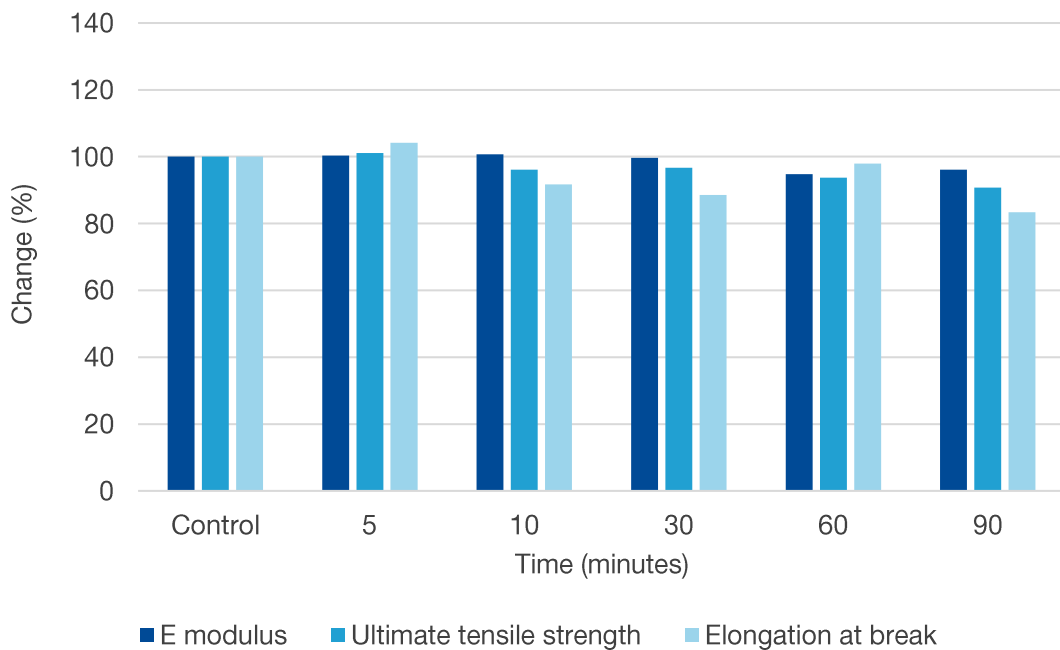
| Pressure from all sides | Temperature | Time |
|-------------------------|-------------|--|
| 5 bar | 75°C | 5 minutes, 10 minutes, 30 minutes, 60 minutes and 90 minutes |
| 5 bar | 90°C | 5 minutes, 10 minutes, 30 minutes, 60 minutes and 90 minutes |

Testing conditions pressure, temperature and time

Mechanical Testing



Change in mechanical properties, 75°C



Change in mechanical properties, 90°C