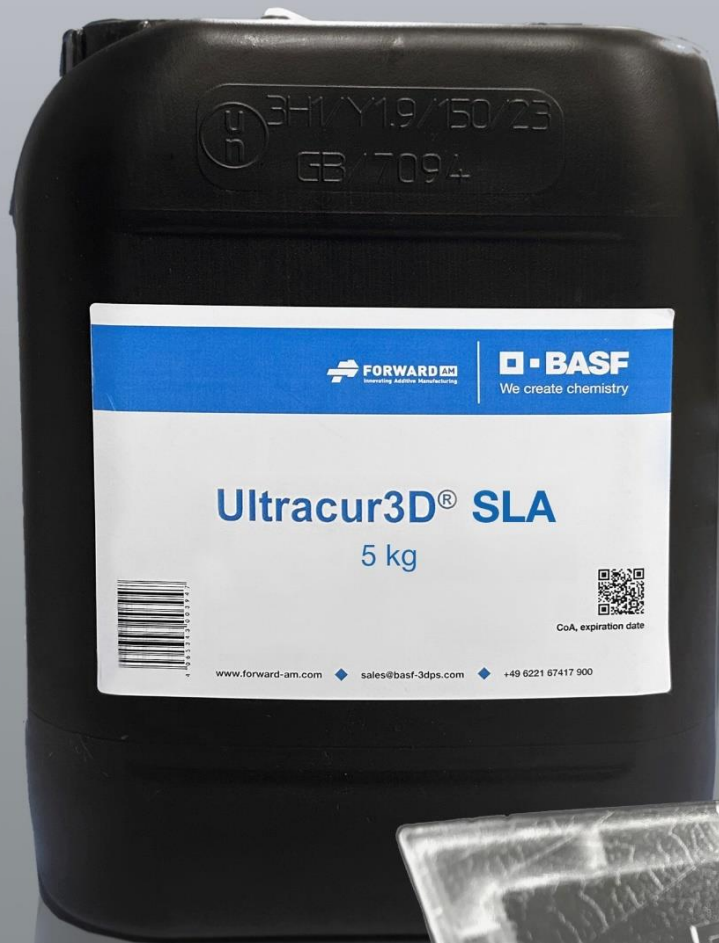


Ultracur3D[®] SLA 7700

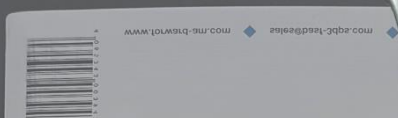
SLA | General-Purpose | Ultraclear

Extended TDS

Complete Technical Documentation and
Testing Summary



Version: 2.0



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Technical Data Sheet

General-Purpose SLA resin, easy-to-print and exceptional part clarity

General Properties	Norm	Typical Values
Appearance	-	Ultraclear
Viscosity, 25°C	Cone/Plate Rheometer ¹⁾	490 mPas
Viscosity, 30°C	Cone/Plate Rheometer ¹⁾	330 mPas
Density (Printed Part)	ASTM D792	1.15 g/cm ³
Density (Liquid Resin)	ASTM D4052-18a	1.11 g/cm ³

Tensile Properties ²⁾	Norm	Typical Values ³⁾
E Modulus	ASTM D638	2250-2550 MPa
Ultimate Tensile Strength	ASTM D638	46-51 MPa
Elongation at Break	ASTM D638	5-15 %

Flexural Properties	Norm	Typical Values ³⁾
Flexural Modulus	ASTM D790	2200-2450 MPa
Flexural Strength	ASTM D790	85-90 MPa

Impact Properties	Norm	Typical Values
Notched Izod (Machined), 23°C	ASTM D256	25 J/m
Unnotched Izod, 23°C	ASTM D256	417 J/m
Notched Charpy (Machined), 23°C	ISO 179-1	1.77 kJ/m ²

Thermal Properties	Norm	Typical Values
HDT at 0.45 MPa	ASTM D648	51°C
HDT at 1.82 MPa	ASTM D648	50°C
Glass transition temperature (DMA, tan(d))	ASTM D4065	61°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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Advanced Thermal Properties	Norm	Typical Values
C.T.E. (-40°C to 0°C)	ASTM E831	62 µm/(m°C)
C.T.E. (0°C to 50°C)	ASTM E831	81 µm/(m°C)
C.T.E. (50°C to 100°C)	ASTM E831	181 µm/(m°C)
C.T.E. (100°C to 150°C)	ASTM E831	169 µm/(m°C)

Other	Norm	Typical Values
Hardness Shore D	ASTM D2240	80
Dielectric Strength	DIN EN 60243-1	34 kV/mm
Water Absorption, Short-Term (24 hours)	ASTM D570	0.36%
Water Absorption, Long-Term (>2500 hours)	ASTM D570	2.16%

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) Data ranges are given because for SLA materials, there is a strong influence of the exact process used (printer, print settings and postprocessing) and properties may also still change during the first 1-2 weeks after printing. In our experience, this is mainly evident in tensile and flexural properties, not so much in the other properties listed above.
- 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 3.2 x 12 mm, ASTM D648 127 x 3.2 x 13 mm, ISO 179-1 80 x 4 x 10 mm.

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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.

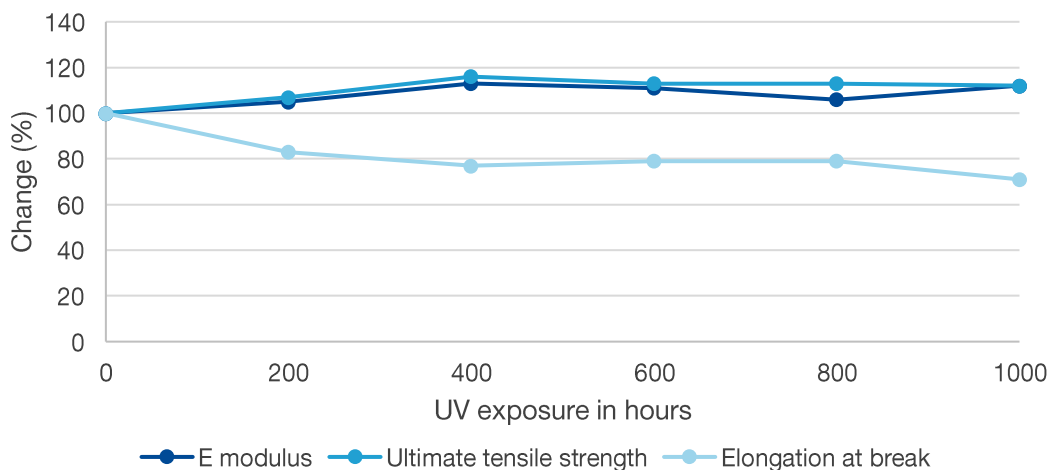
Test Method and Specimens

The ageing tests were performed with ASTM D638 type IV tensile bars and color plates as per ISO 4892-2:2013 method A, cycle 1.

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	2450 MPa	2740 MPa
Ultimate tensile strength	47 MPa	53 MPa
Elongation at break	5.2%	3.7%

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

Coloration

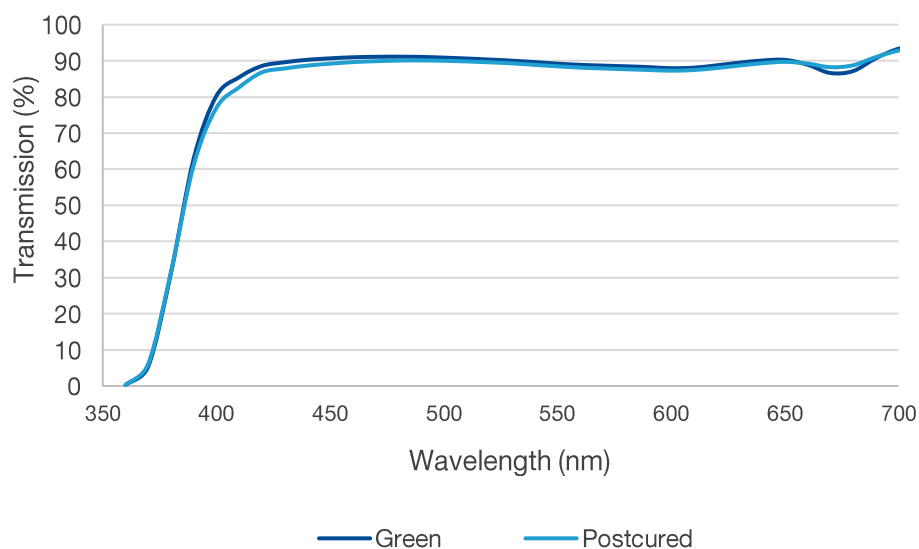
Similar to other epoxy acrylate-based SLA materials, the color of the material changes with time. If color stability is important for your application, we recommend using a transparent UV protective coating.

Part color and clarity

Having truly transparent material can enable many specific prototyping and end-use applications. There are various ways to quantify the optical clarity of a material.

Visible light transmission

This test looks at the light transmission of printed parts (thickness 3 mm) across the entire visual spectrum. In this scale, 0% transmission means completely opaque, no light is transmitted, whereas 100% means entirely clear, transmitting all light. The below results show that the transmission is around 90% for the entire visible light spectrum (400 to 700 nm), indicating a very high material clarity.



Change in transmission across the entire visual spectrum

L*a*b* color measurement and stability over time

Another way to quantify part color and clarity is through an L*a*b* color measurement:

- L* represents lightness, ranging from black at 0 and white at 100.
- a* represents the red/green color specification, a value of 0 means neutral, negative a* is green and positive a* is red.
- b* represents the yellow/blue color specification, a value of 0 means neutral, negative b* is blue and positive b* is yellow.

The L*a*b* values of the parts (thickness 3 mm) were measured directly after the printing. In addition, these parts were measured again after 5 weeks in office daylight to check the change in color of the specimens with time. No other extra post processing like polishing

or coating was done. The measured values indicate a very clear, neutral color. In addition, the color difference (Delta E) calculated between the two data points is 1.32. Values below 2 are generally considered as not perceptible by regular observation, in this case indicating good color stability over time.

Property	Directly after printing and post curing	After 5 weeks
L*	95.44	95.39
a*	-0.85	-0.84
b*	1	-0.32

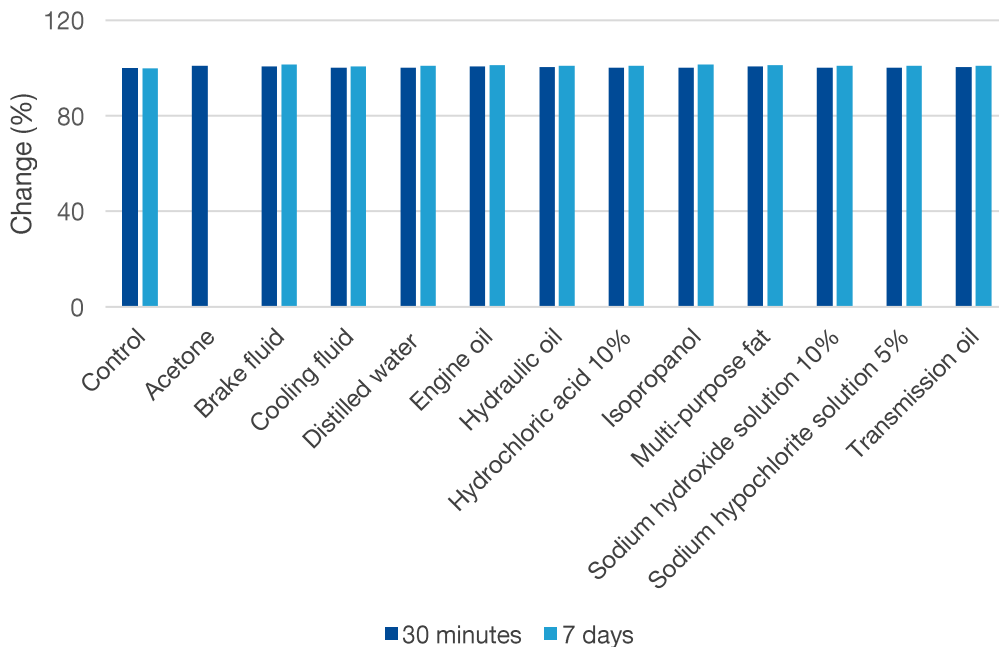
Industrial Chemical Resistance

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.

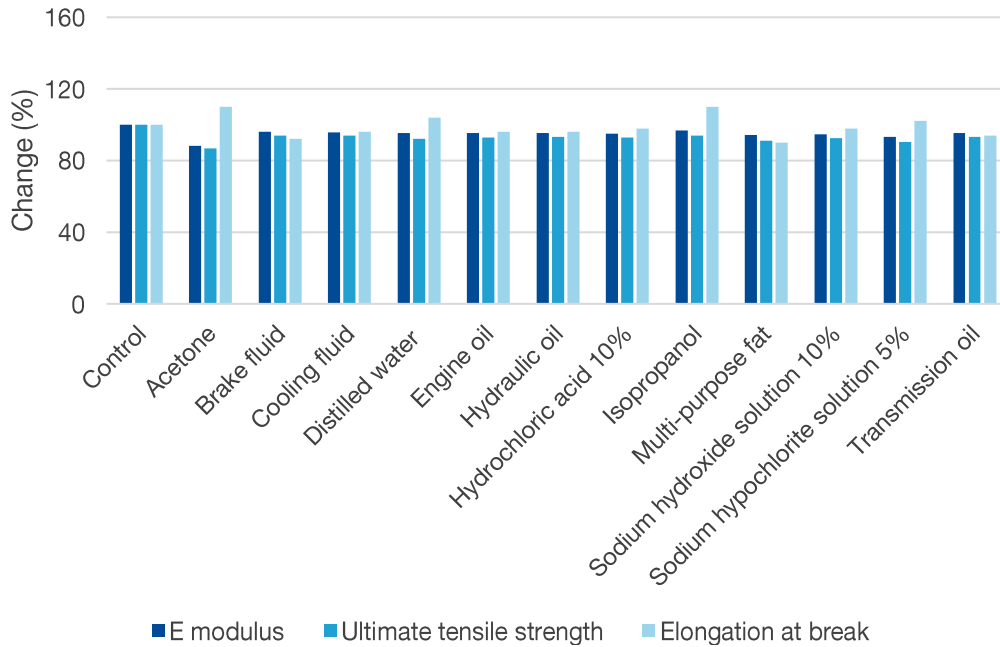
Weight Measurement



Change in weight after immersion time

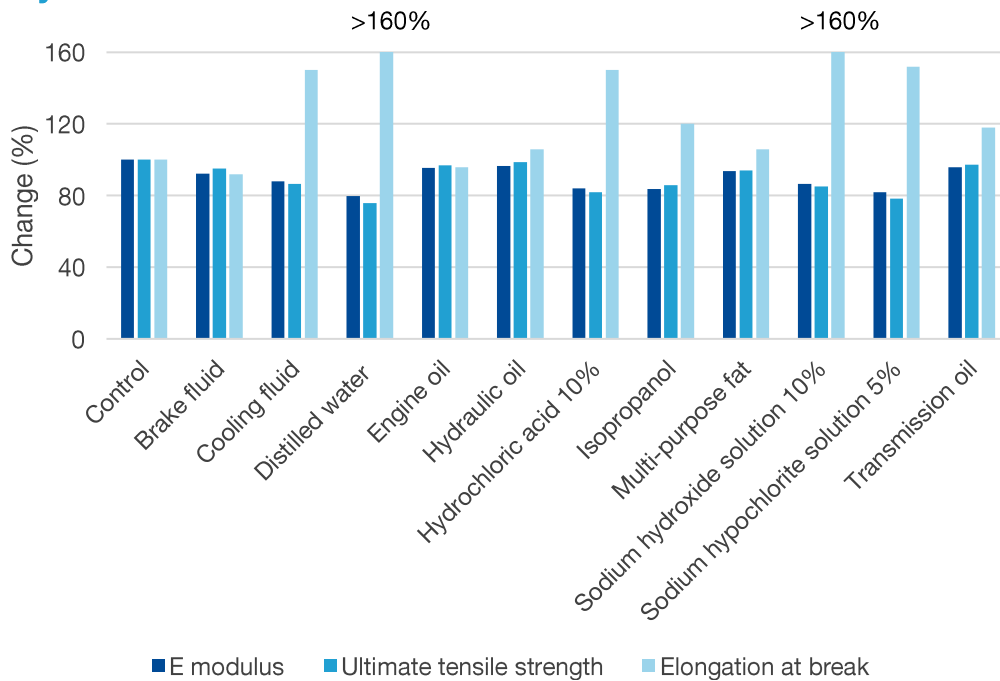
Mechanical Testing

30 minutes



Change in mechanical properties after 30 minutes immersion

7 days



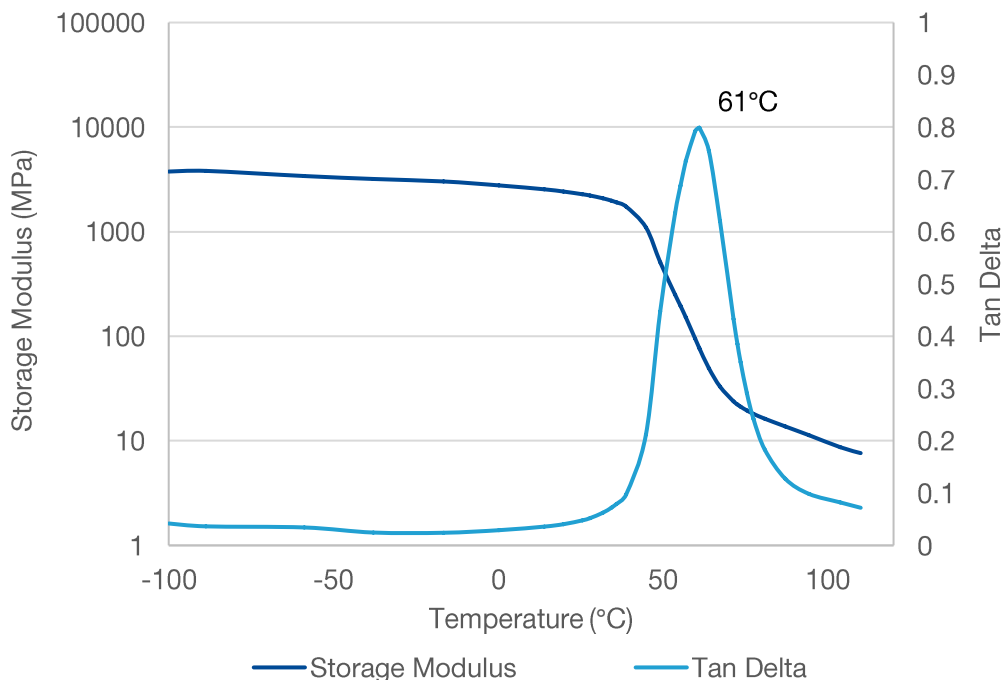
Change in mechanical properties after 7 days immersion

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	0.028% (linear viscoelastic regime)
Type of loading	Dual cantilever
Frequency	1 Hz

Testing conditions DMA



DMA curve