xMODEL35

Available Colors: Black and Gray

Basic Properties

Measurement	Unit	Test Method	2x30min in XiP Cure, 1x60min in xCure, 2x5min 50% xCure Desktop
Tensile Properties			
Young's Modulus	MPa	ASTM D638	1765
Ultimate Tensile Strength	MPa	ASTM D638	53
Elongation at Break	%	ASTM D638	9
General Properties			
Viscosity at 25°C (77°F)	cP	ASTM D7867	950
Viscosity at 30°C (86°F)	cP	ASTM D7867	630
Liquid Density	g/cm^3	ASTM D4052-18a	1.11
Solid Density	g/cm^3	ASTM D792	1.2

BASF Extended Properties

Measurement	Unit	Test Method	Post Processed
Flexural Properties			
Flexural Modulus	MPa	ASTM D790	2300
Flexural Stress	MPa	ASTM D790	108
Impact Properties			
IZOD Impact (Notched)	J/m	ASTM D256	21
IZOD Impact (Unnotched)	J/m	ASTM D256	112
Charppy (Notched)	kJ/m^2	ISO179-1	1.3
Thermal Properties			
HDT at 1.82 Mpa	°C	ASTM D648	87
HDT at 0.45 Mpa	°C	ASTM D648	64
Glass Transition Temperature (DMA, tan(d))	°C	ASTM D4065	112
FST Properties			
Flammability		UL94	HB (1.5mm)
Glow-wire Test	°C	IEC 60695-2-12-13 (2mm)	GWIT: 675 GWFI: 650
Other Properties			
Water Absorption (24hr)	%	ASTM D570	0.42
Water Absorption (>2800hrs)	%	ASTM D570	2
Shore Hardness	D	ASTM D2240	83
Biocompatibility			
Cytotoxicity		ISO10993-5	Pass
Irritation		ISO10993-10	Pass (tested with non-dyed version)
Sensitization		ISO10993-10	Pass (tested with non-dyed version)

Printing Process

The material should be processed at room temperature. Before usage, the material should be shaken well. Pour it slowly into the vat and wait a couple of minutes, until a smooth, bubble-free surface is obtained before starting the print job.

The 3D printer examples and settings stated above are only for general guidance. The fully optimized settings should always be determined by the users themselves, according to their specific needs. Please always refer to the user manual of the employed 3D printer for instructions on printer settings and handling.

Remove the parts carefully from the build platform with a suitable tool, for more information, refer to the user manual of the used 3D printer.

Washing

xMODEL35 requires post processing to achieve specified properties. Prior to post curing, the part should be washed. Nexa3D recommends using xClean followed by IPA as standard cleaning procedure. Parts should not be submerged in xClean for longer than 2 minutes or in IPA for longer than 5 minutes to avoid any impact on performance.

UV Ageing

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 ageing can be caused by the influence of UV light, heat and water. The degree of ageing depends on duration and intensity.

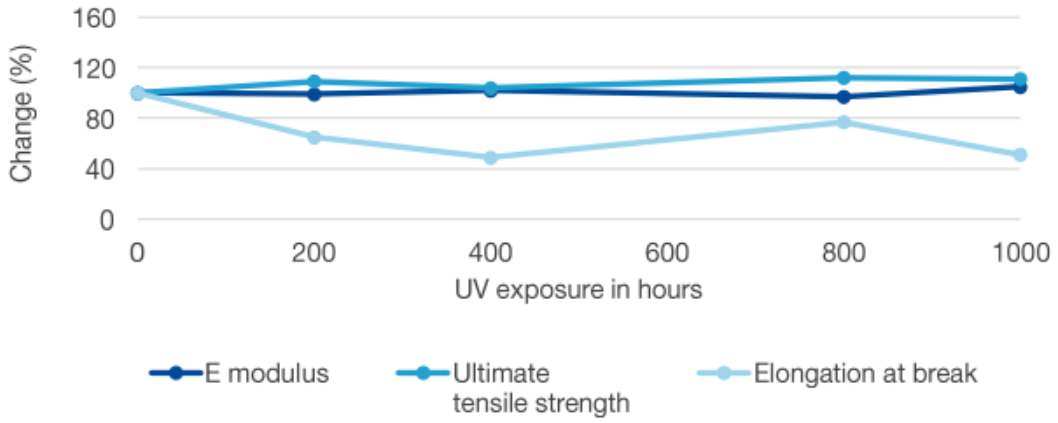
Test Method and Specimens

The aging 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/m²	Narrowband (340 nm in W/(m²nm)			
1	102 min dry	60 ± 2	0.51 ± 0.02	60 ± 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	2600 MPa	2740 MPa
Ultimate tensile strength	63 MPa	70 MPa
Elongation at break	9%	4%

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

Coloration

After being exposed up to 1000 hours, xPRO1100-Black did not show significant change in color.

Effect of UV exposure on color of the specimens

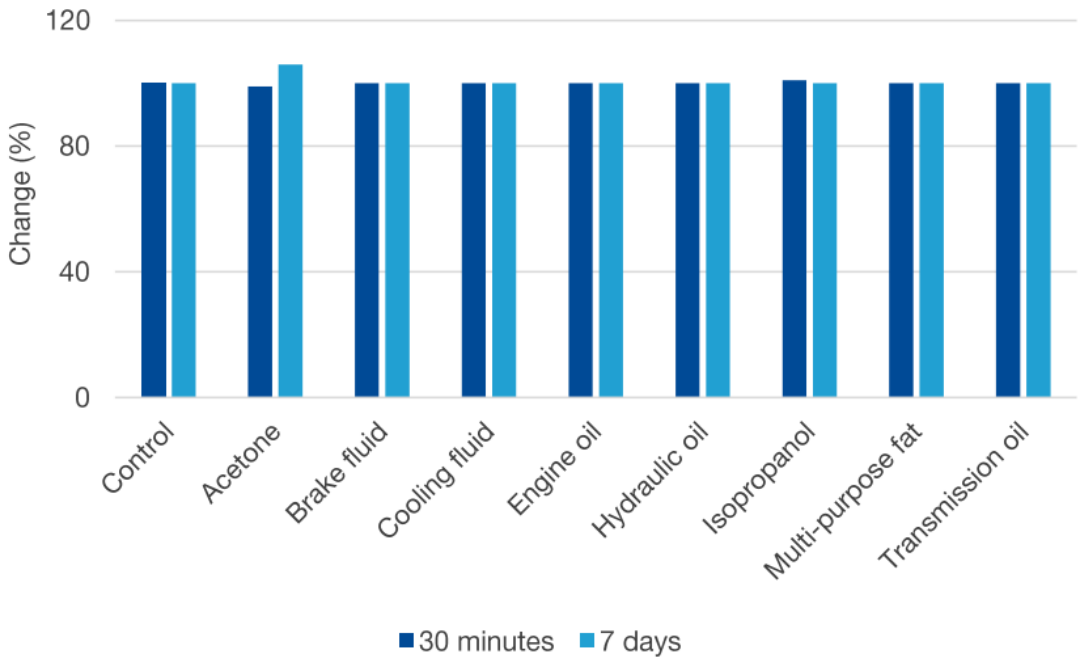
Industrial Chemical Resistance (below results are based on non-dyed version)

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.

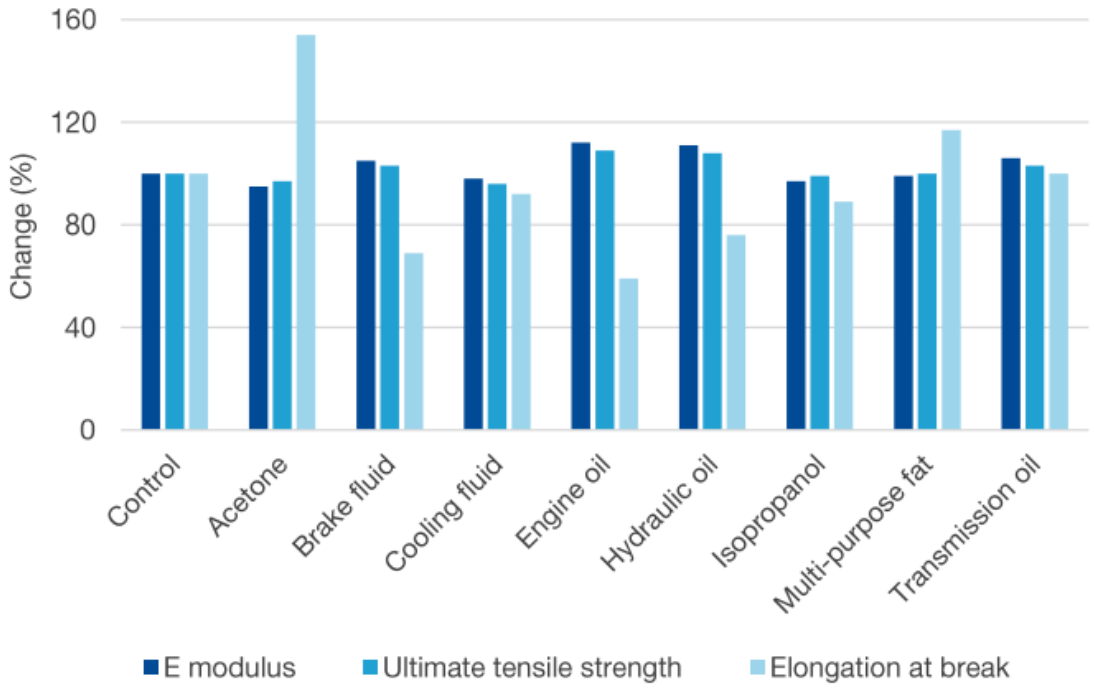
Weight Measurement



Change in weight after immersion time

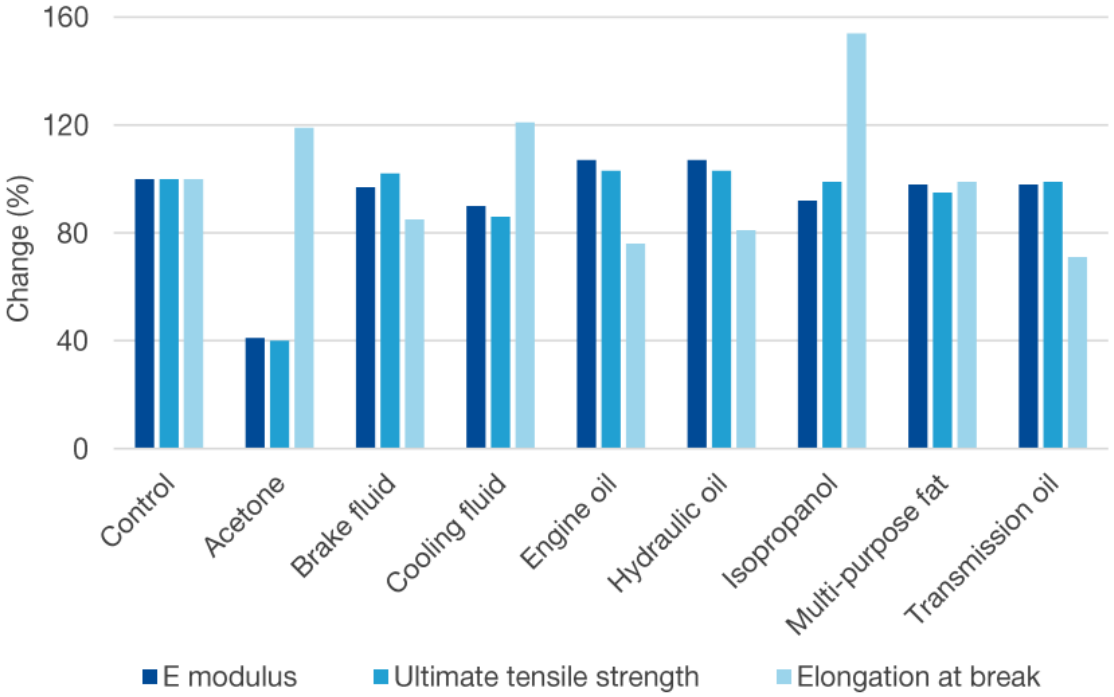
Mechanical Testing

30 minutes



Change in mechanical properties after 30 minutes immersion

7 days



Change in mechanical properties after 7days immersion

Sterilization (below results are based on non-dyed version)

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

Four different sterilization techniques were tested according to the conditions listed below, and their effect on mechanical properties and part color was investigated.

E-Beam Sterilization

The samples were exposred to 36.04-39.26 kGy (calculated dose).

Ethylene Oxide (EtO) Sterilization

EtO sterilization parameters	Settings
Preconditioning temperature	4°C
Preconditioning humidity	60%
Preconditioning time	8 hours
Chamber temperature	45°C
Vacuum	75 mbar A
EO dwell time	3 hours
EO concentration (calculated)	610 mg/l
Postconditioning time	48 hours
Postconditioning temperature	45°C

Testing conditions Ethylene Oxide

Gamma Sterilization

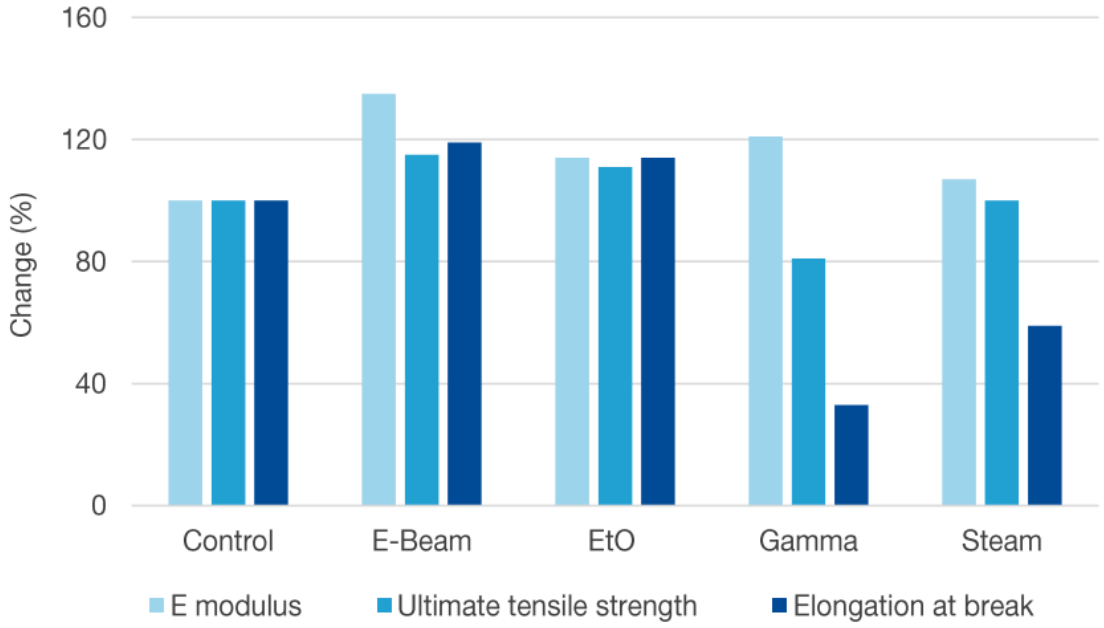
The samples were exposed to 37.1-37.5 kGy gamma radiation (measured via dosimeter)

Steam Sterilization

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

Testing conditions steam sterilization

Mechanical Testing



Change in mechanical properties after sterilization

Coloration

Depending on the sterilization process used, different changes in color (with non-dyed version) could be observed as shown below.

Color samples before and after sterilization

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