stratasys

MATERIAL DATA SHEET
SLA

Somos® WaterShed® Black

Stereolithography

Multipurpose resin that prints 50% faster than alternatives, eliminates the need for painting.

Somos WaterShed Black, with similar properties and processing as Somos WaterShed XC 11122, has up to a 50% faster processing speed than alternative black resins, offering minimal finishing and more consistent processing over time. Compared to alternatives currently on the market, Somos WaterShed Black prints a more true black color off the machine. The material offers a smooth surface finish, as well as higher moisture and chemical resistance.

Key Benefits

- Best-in-class environmentally durability performance - measured using industry standard testing methods rather than just UV light
- Ease-of-use and fast processing with minimal finishing, more consistent processing over time
- A more true black color off the machine
- Based on proven technology of Somos WaterShed XC 11122
- Smooth surface finish
- Higher moisture and chemical resistance

Ideal Applications

- Durable, stiff, tough parts
- Automotive components
- Electronic housings
- Packaging
- Functional prototypes and end use parts

Liquid Properties		PhotoChemical Properties		
Appearance	Black	E_C	8.4 mJ/cm^2	Critical exposure
Viscosity	~300 +/-50 Cps @ 30 °C	D_p	4.1 mils	Slope of cure-depth vs. ln (E) curve
Density	~1.13 g/cm^3 @ 25 °C	E_{10}	96 mJ/cm^2	Exposure that gives 0.254 mm (0.01 inch) thickness

Mechanical Properties	Property Description	UV Postcure	
ASTM		Metric	Imperial
D638M	Tensile Modulus (MPa)	2,300 ± 300	334 ± 44 ksi
D638M	Ultimate Tensile Strength (MPa)	35 ± 5	5.1 ± 0.7 ksi
D638M	Elongation at Break (%)	12 ± 3	
D790M	Poisson's Ratio	0.41	
D2240	Flexural Modulus	1,750 ± 250	254 ± 36 ksi
D2240	Flexural Strength	66 ± 5	9.6 ± 1 ksi
D256A	Izod Impact (Notched)	22 ± 5 J/m	0.41 ± 0.09 ft-lb/in
D2240	Hardness (Shore D)	79 ± 0.2	
D570-98	Water Absorption (24 hrs)	0.30 ± 0.05%	

Thermal/Electrical Properties	Property Description	UV Postcure	
ASTM	Property Description	Metric	Imperial
E831-05	C.T.E -40 – 0° C (-40 – 32 °F)	62 ± 3.1 µm/m °C	34 ± 1.7 µin/in °F
E831-05	C.T.E 0 – 50 °C (32 – 122° F)	89 ± 4.8 µm/m °C	52 ± 4.1 µin/in °F
E831-05	C.T.E 50 – 0 0 °C (122 – 212 °F)	166 ± 5.7 µm/m °C	92 ± 7.1 µin/in °F
E831-05	C.T.E 100 – 150 °C (212 – 302 °F)	150 ± 4.3 µm/m °C	83 ± 2.4 µin/in °F
D150-98	Dielectric Constant 60 Hz	4.0 ± 0.04	
D150-98	Dielectric Constant 1 KHz	3.9 ± 0.02	
D150-98	Dielectric Constant 1 MHz	3.5 ± 0.01	
D5023	Dielectric Strength	17.9 KV/mm	454 V/mil
D648	HDT @ 0.46 MPa (66 psi)	52 ± 3 °C	120 ± 5 °F
D648	HDT @ 1.81 MPa (264 psi)	46 ± 0.76 °C	115 ± 0.48 °F

General Test Information Text

All samples were printed using standardized, Neo800+ parameters, User Guide cleaning procedures and conditioned for at least 7 days at 25°C/50% RH before testing.

Mechanical and Thermal/Electrical Properties based on Somos WaterShed XC 11122. The Liquid and Optical Properties are specific to WaterShed Black.

Stress Strain Curve

This stress strain curve visualizes the behavior of the material as force is applied.
Somos WaterShed Black exhibits plastic behavior, with a yield point, followed by plastic deformation.

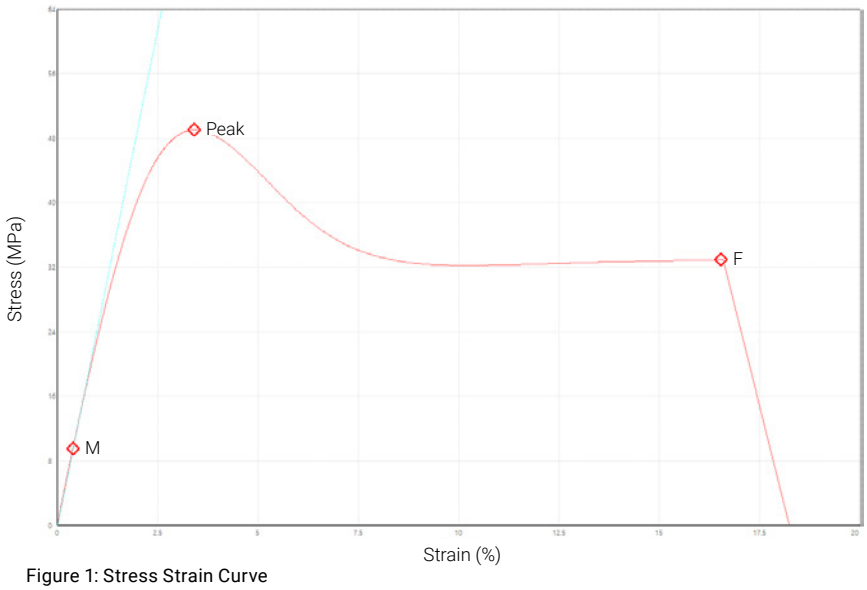

Figure 1: Stress Strain Curve

Environmental Durability

There are many accelerated tests available to determine the aging performance of materials. Since these are accelerated tests, understanding the key exposure factors in the application is critical to choosing the appropriate test. This is because materials respond differently to the conditions of irradiation, heat and moisture. It is also critical when sharing data, to explicate test conditions so that users can determine how to factor performance to their requirements. Finally, showing correlations to actual weathering is only valid if one has weathered their materials in those real conditions. Below results illustrate the case for exterior exposure.

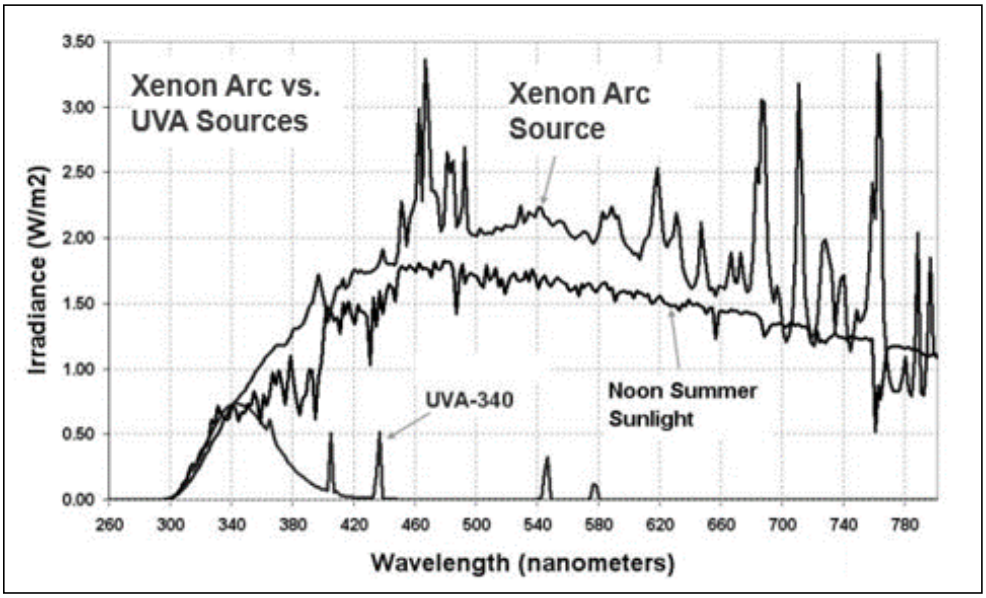

Figure 2: Xenon Arc Irradiation (Source: Q-Lab)

A standard test developed for the automotive industry for exterior exposure is SAE J2527. This standard utilizes a light source that replicates sunshine across the spectrum. Figure 1 compares a Xenon source to the commonly used UVA lamp source.

Irradiation Intensity	340 mm	295-400 mm	300-800 mm
Xenon Light (J2527)	0.55 W/m^2	60 W/m^2	550 W/m^2
Fluorescent (UVA-340)	0.55 W/m^2	32 W/m^2	-

Xenon arc lamps represent very well solar radiation spectral distribution. Total Irradiance is much higher with a Xenon source:

The SAE J 2527 Test is conducted using conditions and cycle as shown in Figure 3:

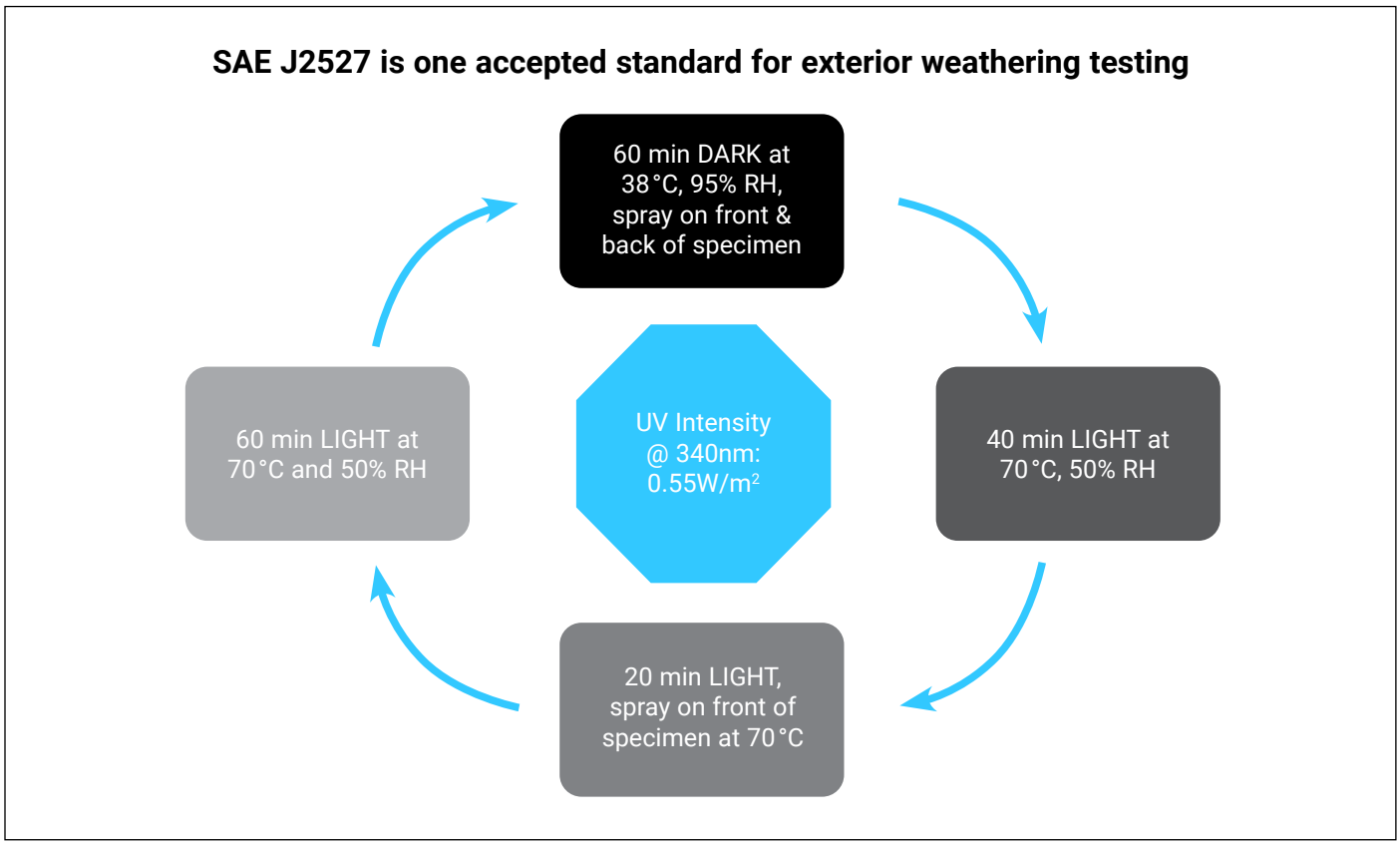

Figure 3: SAE J2527 Test Cycle

Weathering Performance

Figure 4 shows the weathering performance of Somos WaterShed Black and compares it to an alternative photopolymer commercialized for weatherable applications. The alternative shows good property retention when exposed to UV light with the commonly used UVA lamp. When exposing the resin to a Xenon Arc lamp - a test method that mimics more closely actual sun light - the performance goes down faster and stabilizes on a much lower level. To avoid major discrepancy between anticipated material behavior and actual material behavior of parts in the field, matching accelerated test with real live conditions is critical.

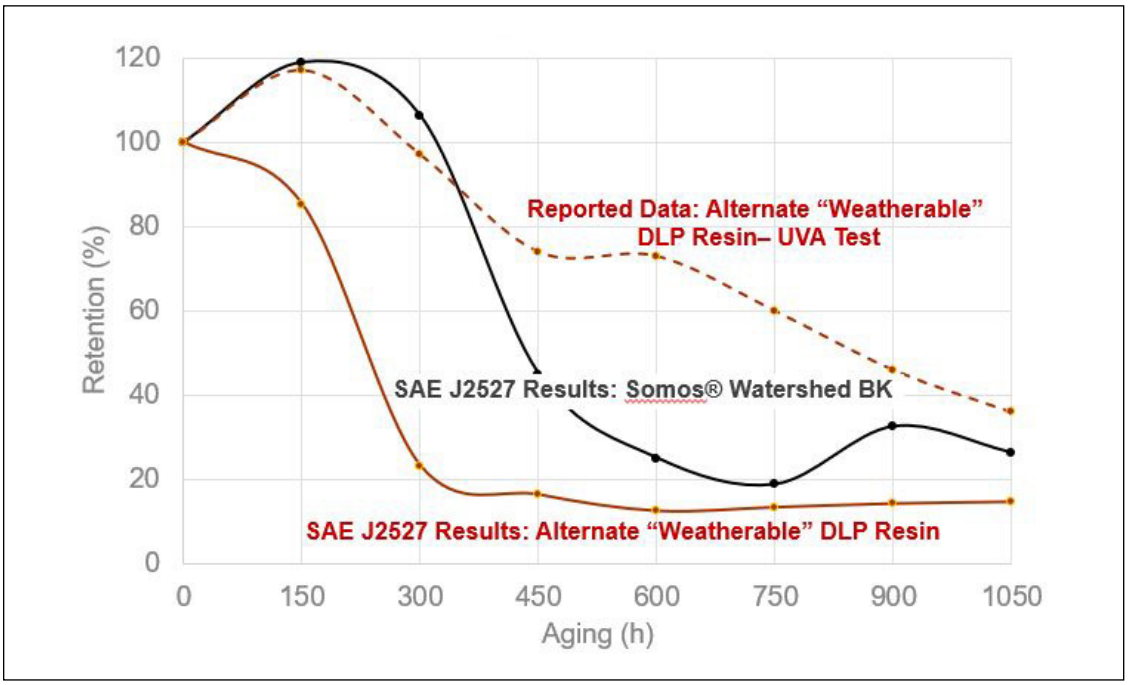

Figure 4: Xenon Arc Irradiation (Source: Q-Lab)

Substance	Resistance
Water	Excellent
Saline (0.9%)	Excellent
Gasoline	Excellent
Diesel Fuel	Excellent
Engine Oil	Excellent
Windshield Wash	Good
Ethylene Glycol	Excellent
Brake Fluid	Excellent
Transmission Fluid	Excellent
Acetone	Good
Isopropanol	Excellent
Ethanol	Good
Methanol	Fair
Bleach	Good

Figure 5: Chemical resistance

Chemical Compatibility

Somos WaterShed Black shows good resistance to many common chemicals.[1]

Chemical compatibility tests performed on the transparent version, Somos WaterShed XC11122.

Retention of Mechanical Properties After Exposure

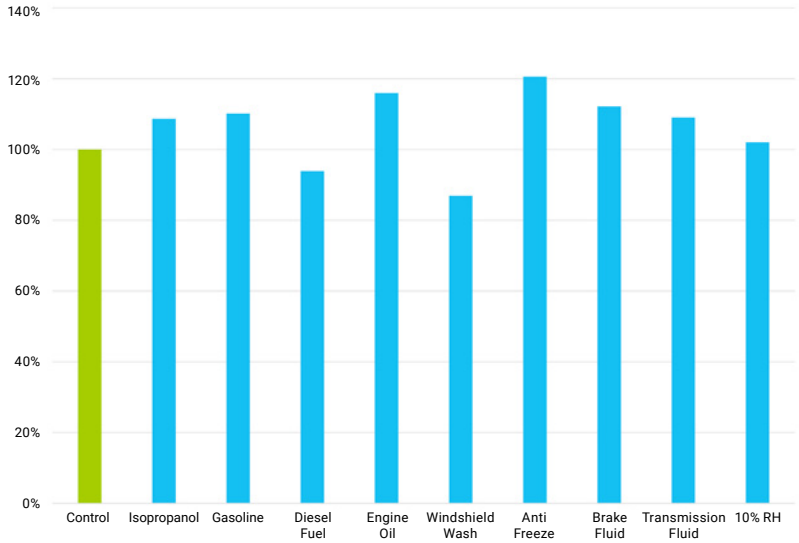

Figure 6: Tensile Modulus Retention of Somos WaterShed Black after 7-Day Immersion

This graph shows the retention of tensile modulus after 7-day immersion in the listed substance. Somos WaterShed Black maintains properties well when subjected to these materials. If you require data from other chemicals, please reach out to our Technical Service Team.

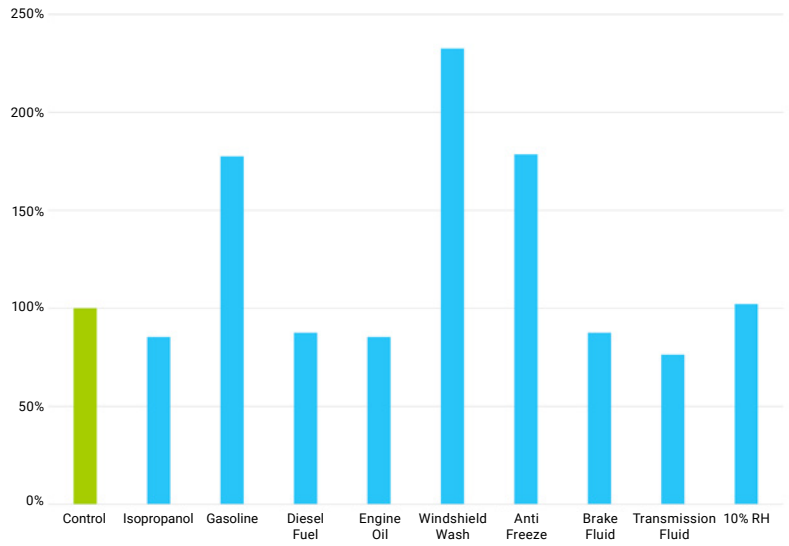

Figure 7: Elongation at Break Retention of Somos WaterShed Black after 7-Day Immersion

This graph shows the retention of tensile elongation after 7-day immersion in the listed substance. Somos WaterShed Black maintains elongation and ductility well when subjected to these materials. If you require data from other chemicals, please reach out to our Technical Service Team.

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