

WHAT'S NEW UNDER THE SUN?

SOLARGUARD®

A unique SMC system for maximizing polymer chain and crosslink bonding.

Up to 60% more UV-resistant compared with other available formulations.

Meets UL 94 5V Fire-Retardancy Standards plus NFPA No. 101 Class A Flame Spread Index.

Eliminates toxic bromine and antimony.

Now available to you at **NO** additional finished-product cost.





Market-Leading Non-Metallic Enclosure Brands

SOLARGUARD®

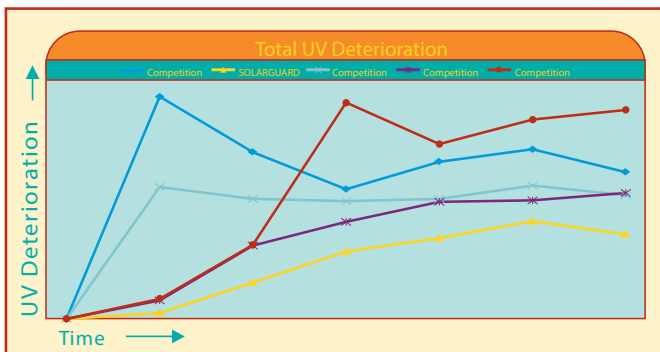
PATENTED UV PROTECTION

A non-halogenated, patented fiberglass system that beats the effects of outdoor exposure plus provides the chemical and flame resistance you've come to expect from Robroy Enclosures Fiberglass Enclosures!

 SOLARGUARD®, in extensive comparison testing, outperformed other available SMC formulations by as much as 60% in its ability to retain gloss and color after exposure to concentrated UV light.

 SOLARGUARD® requires less maintenance than paint, wax or gel-coat alternatives used to prolong the life of electrical enclosures in outdoor environments.

How Does SOLARGUARD®
Do What It Does?




SOLARGUARD's® patented double-protection formula was developed in Robroy Enclosures' FormRight lab. Due to its chemical composition and other additives, SOLARGUARD® is able to reduce the effects of UV degradation such as surface roughening and fiber blooming.

How does SOLARGUARD®
achieve this level of performance?


SOLARGUARD® features new, proprietary double-protection formulation technology that significantly enhances the molecular bond strength and crosslinking that occurs during the curing process in thermosetting polyester sheet molding compounds (SMC). Robroy Enclosures' SOLARGUARD® system fights polymer degradation by making it much more difficult for UV light to attack molecular bonds of both primary chains and crosslinks.

A special UV Absorber is added to the SOLARGUARD® formulation which acts to absorb UV energy, then to release it without damaging the polymer chain. The neo-pentyl glycol (NPG) isophthalic based resin system of SOLARGUARD® ensures UL 94 5V fire retardancy, but provides a much stronger bond of the polymer chain resulting in significantly improved weathering resistance.

As the standard SMC formulation for all U.S.A. made Robroy Enclosures fiberglass electrical products, SOLARGUARD® provides an unsurpassed level of UV resistance, fire retardancy, chemical resistance and safe, durable performance...all without adding cost to Robroy Enclosures world class electrical enclosures.

 SOLARGUARD® maintained stability in thickness proving that its physical properties remain very much intact despite EMMAQUA testing that concentrates natural sunlight using 10 highly reflective mirrors to create an intensity level of approximately 8 suns!

 SOLARGUARD® meets a NFPA No. 101 Class A flame spread index. Fire retardancy, achieved through use of alumina trihydrate fillers, meets UL 94 5V standards.

 SOLARGUARD® is a non-halogenated system...meaning that it contains no bromine and no antimony, thereby reducing the risk of smoke-borne toxicity.

How SOLARGUARD® Benefits You!

AT A GLANCE: DOUBLE PROTECTION THAT WORKS!

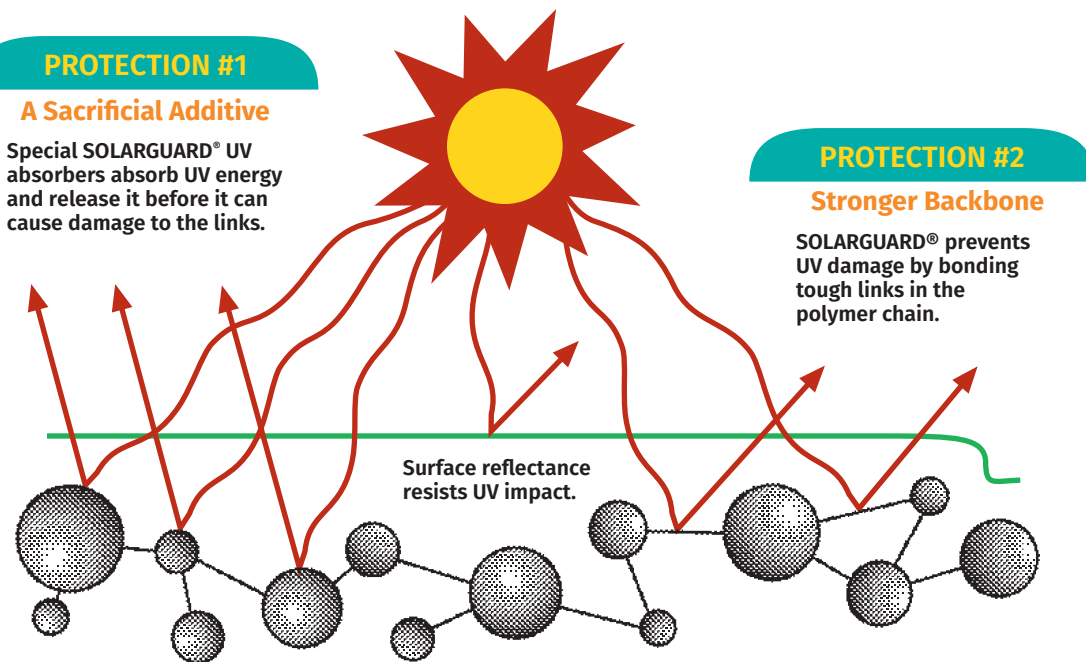
1.) THE SOLARGUARD® WAY

The SOLARGUARD® formulation is a neo-pentyl glycol (NPG) isophthalic based resin system that contains no bromine. Therefore, there are no weak links in the polymer chain making the UV energy required to break these links significantly greater. The result? SOLARGUARD® SMC material provides much better UV weathering characteristics. Fire retardancy requirements are still achieved and maintained via fillers that meet UL 94 5V standards.

2.) THE SOLARGUARD® WAY

The special UV absorber is also added into SOLARGUARD® and works to absorb UV energy and release it without damaging the polymer chain. This is achieved by absorbing UV energy and emitting the light at a different wavelength and frequency than that of the electrons in the carbon-carbon bonds. This prevents the polymer bonds from breaking apart. This material will also absorb UV energy more readily than the links of the polymer chain thus providing increased protection of the polyester material and increased resistance to the damaging effects of UV radiation.

SOLARGUARD® DOUBLE PROTECTION



THE SOLARGUARD® DIFFERENCE

- Between a 32-and-60 % improvement, compared to other SMC formulations, in its ability to retain gloss and color after exposure to concentrated UV light.

- Material thickness remains very stable, demonstrating that the physical properties of SOLARGUARD® are still very much intact after rigorous testing.

- Excellent chemical resistance in both exposed vapor and total submersion applications.

- ASTM flame spread testing meets a NFPA No. 101 Class A (I) Flame Spread Index.

- Potential toxic emissions have been eliminated or substantially reduced from elimination of materials such as bromine, tin and antimony. Other acid gasses have been reduced or eliminated along with significant reductions of black smoke when burned. This new formulation is considered to be non-halogenated.



Proof Through Performance

Physical Properties of SOLARGUARD®

MATERIALS TYPICAL PROPERTIES	TEST METHOD ASTM	SOLARGUARD POLYESTER FIBERGLASS (SMC)
Flexural Strength (psi)	D790	17k
Notched Izod (ft-lb/in @ 1/8")	D256	11
Impact Resistance (lb-in)	UL 746C	>216
Compressive Strength (psi)	D695	20k
Tensile Strength (psi)	D638	8k
Specific Gravity	D792	1.71
Flammability	UL94	5V
Heat Deflection (°F at 264 psi)	D648	375-500
Service Temperature Range (°F)		-76°F to 266°F
K Factor, Thermal Conductivity (BTU-in/hr-ft ² -°F)		1.68
Dielectric Strength (VPM)	D149	380
Arc Resistance (sec)	D495	190
Water Absorption (% in 24 hr)	D570	0.10-0.25
Hardness (Barcol-Rockwell M-Shore A)		50-70 Barcol
Shrinkage in/in Minimum		0.002

SOLARGUARD® Flame Spread Classification Per NFPA No 101 ASTM E162 Surface Flammability Of Materials

CLASS	RANGE	TYPE	SOLARGUARD TEST RESULTS
Class A (I)	0 to 25	Flame Spread	Robroy Enclosures SOLARGUARD® flame spread index 20.59
Class B (II)	26 to 75	Flame Spread	
Class C (III)	76 to 100	Flame Spread	

SOLARGUARD® optical Density Test Result Summary ASTM E662 Specific Optical Density Of Smoke Generated By Solid Material

	NON-FLAMING	FLAMING
Ds @ 1.5 min. (avg)	0.0	0.3
Ds @ 4.0 min. (avg)	0.0	9.9
Dm (corr) (avg)	10.8	181.9

Note: Product comparison data resulting from independent, third-party accelerated testing can be obtained by contacting Robroy Enclosures.

Testing Procedures Used To Ensure That **SOLARGUARD®** Meets Or Exceeds All Relative Industry Standards

- UL 746C Polymeric Materials Used In Electrical Equipment Evaluations
- UL 50 Enclosures For Electrical Equipment
- UL 508 Industrial Control Panels.



Additional tests have been performed above and beyond these industry guidelines to aid in providing the end user with a premium product for a broad range of uses. These tests were performed using ASTM standards and other government approved procedures. Test standards and evaluation criteria are:

- Chemical resistance testing (submerged and vapor), 37 various chemicals (acids, bases)
- ASTM E162 Flame Spread
- ASTM E662 Smoke Density
- Particulate dust weight (NIOSH 05000), Acid gases HBr, HCl, HNO₃, HPO₄, H₂SO₄ (NIOSH 7903), Cyanide (NIOSH 7904), Metals (NIOSH 7300), VOC's with TIC's (EPA TO-14/TO-15), PAH (NIOSH 5506), Carbon Monoxide, Carbon Dioxide, Visual Fiberglass (NIOSH 7400), Ammonia, NO, NO₂, HS₂.



Additional UV testing has been performed under the following guidelines and evaluation criteria. Exposure testing is performed in Arizona in accordance with ASTM G90-98, Spray Cycle 1 (EMMAQUA, day spray with nighttime wetting).

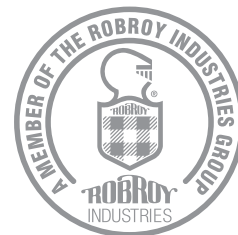
- ASTM G147-96 Standard Practice for Conditioning and Handling of Non-Metallic Materials for Natural and Artificial Weathering Test
- ASTM G90-98 Standard Practice for Performing Accelerated Outdoor Weathering of Non-Metallic Materials Using Concentrated Natural Sunlight
- ASTM D660-93 Method for

Evaluating Degree Checking of Exterior Paints

- ASTM D2244-93 Test Method for Calculation of Color Difference from Instrumentally Measured Color Coordinates
- ASTM E308-96 Standard Practice for Computing the Colors of Objects by Using the CIE System
- ASTM D1729-96 Practice for Visual Appraisal of Color and Color Difference of Diffusely-Illuminated Opaque Materials
- ASTM D661-93 Method for Evaluating Degree of Cracking of Exterior Paints
- SFTS-1 (Wash) 92-03-30 Method of Cleaning Exposed Specimens Prior to Inspection, Method A, Washed With Deionized Water and Soft Sponge
- ASTM D523-89 (1999) Test Method for Specular Gloss
- ASTM D4214-89 Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films, Method D, Transparent Tape Method



UV correlation testing has been performed using accelerated artificial weathering devices. Tests were performed using a QUV A Fluorescent Bulb Weatherometer. The test method utilizes a QUV machine, which consists of 2 banks of 4 fluorescent lights each that emit light in the UV-A (340 nm) wavelength. This UV wavelength simulates normal outdoor sunlight. The second part of the test utilizes water vapor to simulate rain/fog. The exposure cycle consist of alternating 4 hours of UV-A at 65 degree C and 4 hours of 100% relative humidity at 50 degree C. Testing is in accordance with ASTM G154 specifications.



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