



April 18, 2022
Revised May 4, 2022

Mr. Miguel Detres
Technical Services Manager
Solar Gard®
4540 Viewridge Avenue
San Diego, CA 92123

**Subject: VOC Emissions Testing Report per California Department of Public Health Standard Method Version 1.2 Revised
Solar Gard Pressure Sensitive Window Film
MAS Project No.: 2200216R1**

Dear Mr. Detres:

Materials Analytical Services, LLC is pleased to submit this report with results of VOC emissions testing from an application of Solar Gard Pressure Sensitive Window Film. This report was revised to correct the misspelling of your name, and to remove the Solar Gard Window Films with Clear Dry Adhesive as they are no longer offered.

MAS conducted this test in accordance with the California Department of Public Health (CDPH) *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2*. This report has been forwarded to the MAS Certified Green® Program for evaluation of compliance with Program certification criteria.

MAS is pleased to have been of service to you. If you have any questions or comments, or if we can be of further assistance, please contact us.

Sincerely,

Materials Analytical Services, LLC

Senior Analytical Chemist

Senior Analytical Chemist

Appendices: Appendix A – General Testing Parameters and Data
Appendix B – Chain-of-Custody
Appendix C – Bracketed Products



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Testing Cert. #2925.01

EMISSIONS TESTING REPORT

California Department of Public Health Standard Method Version 1.2
Window Film Evaluation

SAMPLE DESCRIPTION & TESTING PARAMETERS

Product Name: Solar Gard Pressure Sensitive Window Film	MAS Assigned ID: 2200216
Manufacturer: Solar Gard® San Diego, CA	Product Description: self-adhering window film with pressure sensitive adhesive backing
Manufacture Date: March 16, 2022	Testing Period: March 24 – April 7, 2022
Collection Date: March 16, 2022	In-Chamber Sampling Dates: April 4 @ 24 hrs.; April 5 @ 48 hrs.; April 7 @ 96 hrs.
Shipping Date: March 22, 2022	Date of Sample Analysis: April 12 – 15, 2022
Laboratory Arrival Date: March 24, 2022	Age of Sample at Testing: 8 days



Pressure Sensitive Window Film as prepared for testing (left) and tested (right)

To prepare the sample for chamber testing, a six-inch-by-six-inch piece of film was cut from the submitted roll, the protective backing was removed to expose the adhesive and the film was attached to a glass plate which was placed inside one of MAS's small-scale emissions chambers.

Sample conditioning, collection of samples, and analysis of compounds of interest were conducted in accordance with the California Department of Public Health (CDPH) *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2*. Test results are provided with reference to the maximum emission limits established by CDPH. Appendix A presents general testing parameters and data.

TEST RESULTS

To compare the chamber-derived data to the standards established under CDPH Standard Method and the CHPS criteria an emission factor for the tested sample is calculated based on the 96-hour test point data following ten days of in-chamber conditioning. This emission factor is used to predict airborne concentrations of target compounds in a CDPH-defined classroom with one 4-foot by 4-foot (16 square feet/1.49 square meters) window and one 4-foot by 8-foot (32 square feet/2.97 square meters) window for a total window area of 4.46 square meters, and a typical private office with one 4-foot by 4-foot (16 square feet) window for a total window area of 1.49 square meters. Table I presents the results of the modeled data.



Table I
Emission Factors and Predicted 96-Hour Airborne Concentrations
and CDPH Concentration Limits in Typical Building Environments

VOC Name	Calculated Emission Factor (µg/m ² hr)	Predicted Airborne Concentration (µg/m ³)*		Maximum Concentration Limits (µg/m ³)
		Classroom	Private Office	
Total VOCs (TVOC)	8.9	0.21	0.64	NA†
Formaldehyde ^{1,2}	<3.2	<0.076	<0.23	9
Acetaldehyde ^{1,2}	<4.3	<0.10	<0.31	70
Isopropanol	<2.9	<0.069	<0.21	3500
Dichloroethylene (1,1)	<2.9	<0.069	<0.21	35
Methylene chloride ²	<2.9	<0.069	<0.21	200
Carbon disulfide ^{1,2}	<2.9	<0.069	<0.21	400
MTBE ²	<2.9	<0.069	<0.21	4000
Vinyl acetate ²	<2.9	<0.069	<0.21	100
Hexane (n-) ²	<2.9	<0.069	<0.21	3500
Chloroform ^{1,2}	<2.9	<0.069	<0.21	150
2-methoxyethanol ¹	<2.9	<0.069	<0.21	30
1,1,1-trichloroethane ²	<2.9	<0.069	<0.21	500
Benzene ^{1,2}	<2.9	<0.069	<0.21	1.5
1-methoxy-2-propanol	<2.9	<0.069	<0.21	3500
Carbon tetrachloride ^{1,2}	<2.9	<0.069	<0.21	20
Ethylene glycol ²	<2.9	<0.069	<0.21	200
Dioxane (1,4-) ^{1,2}	<2.9	<0.069	<0.21	1500
Trichloroethylene ^{1,2}	<2.9	<0.069	<0.21	300
Epichlorohydrin ^{1,2}	<1.5	<0.036	<0.11	1.5
2-ethoxyethanol ¹	<2.9	<0.069	<0.21	35
Dimethylformamide (n,n-) ²	<2.9	<0.069	<0.21	40
Toluene ^{1,2}	<2.9	<0.069	<0.21	150
2-methoxyethanol acetate ¹	<2.9	<0.069	<0.21	45
Tetrachloroethylene ^{1,2}	<2.9	<0.069	<0.21	17.5
Chlorobenzene ²	<2.9	<0.069	<0.21	500
Ethylbenzene ^{1,2}	<2.9	<0.069	<0.21	1000
m & p-xylene ²	<2.9	<0.069	<0.21	350
Styrene ^{1,2}	<2.9	<0.069	<0.21	450
2-ethoxyethyl acetate ¹	<2.9	<0.069	<0.21	150
o-xylene ²	<2.9	<0.069	<0.21	350
Phenol ²	<2.9	<0.069	<0.21	100
Dichlorobenzene (1,4-) ^{1,2}	<2.9	<0.069	<0.21	400
Isophorone ²	<2.9	<0.069	<0.21	1000
Naphthalene ^{1,2}	<1.5	<0.036	<0.11	4.5

* Assumes a 24' x 40' x 8.5' classroom with a ventilation rate of 0.82 h⁻¹ and a 10' x 12' x 9' private office with a ventilation rate of 0.68 h⁻¹ as defined by CDPH/EHLB/Standard Method V.1.2

† TVOC is not included as a target compound in the CDPH Standard, but is reported as part of the requirements of the Standard.

1 Compound included on Cal/EPA OEHHA Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) list

2 Compound included on Cal/EPA ARB list of Toxic Air Contaminants (TAC)



LIMITATIONS

This report is for the exclusive use of Materials Analytical Services, LLC's client, Solar Gard®, and is provided pursuant to the agreement between MAS and its client. MAS's responsibility and liability are limited to the terms and conditions of the agreement. If other parties wish to rely on this report, please contact MAS so an agreement on the terms and conditions for its use can be established prior to the use of this information. MAS assumes no liability to any party, other than the client in accordance with the agreement, for any loss, expense or damage caused by the use of this report. This report shall not be reproduced, except in full, without written approval from Materials Analytical Services, LLC. The observations and test results contained in this report are relevant only to the sample tested.

Emissions generally decay over time, and the representativeness of the analytical data reported is directly dependent upon the age and conditions under which the tested sample was received.



APPENDIX A

GENERAL TESTING PARAMETERS AND DATA

Under the provisions of the testing method referenced in this report, testing consisted of the following procedural steps:

- Storage of test specimens in original shipping containers prior to emissions testing for up to 10 days in a ventilated and conditioned room maintained at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50\% \pm 15\%$.
- For quality assurance purposes the emission chamber was cleaned and air purged prior to testing. Air samples were collected and analyzed from the chamber exhaust prior to loading to establish background levels.
- Collection of air samples at method-specified intervals from the chamber exhaust port utilizing mass flow controllers calibrated at 180 cc/min for VOCs and 150 cc/min for aldehydes.
- Tenax TA® tubes are used for VOC analysis performed by thermal desorption gas chromatography/mass spectrometry (TD-GC/MS) using a modified EPA TO-17 method. Samples are also collected on DNPH tubes for aldehyde analysis performed using high performance liquid chromatography (HPLC) using a modified NIOSH 2016 method. All samples are drawn and analyzed in duplicate.
- Instrument calibration, analysis of quality control samples and quantitation of the CDPH target list of 35 chemicals of concern, and reporting and speciation of top 10 tentatively identified compounds.
- All data, including but not limited to raw instrument files, calibration fits, and quality control checks used to generate the test results are available to the client upon request.

The operating parameters for the small-scale emissions chamber used for this project included:

Parameter	Value	Parameter	Value
Chamber Volume	0.053 m ³	Area Specific Flow Rate	2.4 m/h
Loading Factor	0.425 m ² /m ³	Temperature	23 ± 1 °C
Air Exchange Rate	1.0 ± 0.05 h ⁻¹	Relative Humidity	50 ± 5%

Total volatile organic compounds (TVOC) are defined as the compounds eluting between hexane (*n*-C₅) and hexadecane (*n*-C₁₇) and in this protocol quantified as toluene. Table A-I presents the measured concentration and emission factor of TVOC at each of the three sampling intervals.

Table A-I
Total Volatile Organic Compounds (TVOC) between *n*-C₅ and *n*-C₁₇ Measured by GC/MS*

Sample Interval (hours)	TVOC Concentration (µg/m ³)	TVOC Emission Factor (µg/m ² h)
24	6.0	14
48	9.6	23
96	3.8	8.9

*TVOC values are background corrected



Table A-II presents measured concentrations and emission factors of formaldehyde at each of the three sampling intervals.

Table A-II
Formaldehyde Concentrations and Emission Factors as Measured by HPLC

Sample Interval hours	Target Compound	Concentration ($\mu\text{g}/\text{m}^3$)	Emission Factor ($\mu\text{g}/\text{m}^2 \text{ h}$)
24	Formaldehyde	<1.4	<3.2
48	Formaldehyde	<1.4	<3.2
96	Formaldehyde	<1.4	<3.2

No individual volatile organic compounds (IVOC) were identified by GC/MS after 96 hours.



APPENDIX B

Chain-of-Custody

2200216



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Georgia Department of
 Public Health
 Standard Method (section 01350)
 Emission Testing
 Chain-of-Custody

Client Information		Testing Specifications (per MAS) check appropriate test below		
Company: Solar Gard®		<input type="checkbox"/> R&D (custom): Specify Details		
Street Address: 4540 Viewridge Avenue		<input type="checkbox"/> 24-hour Comparative R&D Test		
City/State: San Diego, CA		<input type="checkbox"/> 72-hour Comparative R&D Test		
Zip/Postal Code: 92123		<input checked="" type="checkbox"/> 14-day CDPH Compliance Test		
Country: United States				
Contact Name: Miquel Detres				
Title: Technical Services Manager				
Phone Number: O 727-437-1025 M 813-760-9026				
Fax Number:				
Email Address: miquel.detres@saint-gobain.com				
Manufacturer Information (if different than client)		Construction Details (as applicable)		
Company: Same as above		Covering Type: Fabric <input type="checkbox"/> (Primary Fiber type: _____), Vinyl <input type="checkbox"/> , Leather <input type="checkbox"/>		
City/State/Country:		Plastic Type(s): Nylon <input type="checkbox"/> , PVC <input type="checkbox"/> , PE <input type="checkbox"/> , PP <input type="checkbox"/> , PU <input type="checkbox"/> , PS <input type="checkbox"/> , PC <input type="checkbox"/> , ABS <input type="checkbox"/> , Acrylic <input type="checkbox"/> , Lexan <input type="checkbox"/>		
Contact Name/Title:		Substrate Type(s): MDF <input type="checkbox"/> , Particle Board <input type="checkbox"/> , Plywood <input type="checkbox"/> , Solid Wood <input type="checkbox"/> , Other <input type="checkbox"/>		
Phone Number:		Outer Finish Type(s): Oil Base <input type="checkbox"/> , Water Base <input type="checkbox"/> , Catalyzed/Conversion Var <input type="checkbox"/> , Polyurethane <input type="checkbox"/> , Plastic Laminates <input type="checkbox"/> , Melamine <input type="checkbox"/> , UVc <input type="checkbox"/> , Other <input type="checkbox"/>		
		Foam Type: Polyurethane <input type="checkbox"/> , Memory <input type="checkbox"/> , Latex <input type="checkbox"/> , Evlon <input type="checkbox"/> , High Resilience <input type="checkbox"/> , High Density <input type="checkbox"/>		
		Paint Type: Latex <input type="checkbox"/> , Oil <input type="checkbox"/> , Low VOC <input type="checkbox"/> , No VOCs <input type="checkbox"/> , PowderCoat <input type="checkbox"/> , Chrome <input type="checkbox"/>		
Sample Details		Special Notes or Comments from Manufacturer:		
Unique Sample ID (if applicable): Solar Gard Pressure Sensitive				
Product Name & Catalog #: Solar Gard				
Product Type: Ceiling/Wall Panels <input type="checkbox"/> , Flooring <input type="checkbox"/> , Trim <input type="checkbox"/> , Wall Paint <input type="checkbox"/> , Wall Coverings <input type="checkbox"/> , Thermal Insulation <input type="checkbox"/> , Adhesives <input type="checkbox"/> , Ceiling Tiles <input type="checkbox"/> , Other X				
Date of Product Manufacturing Completion: 3-16-22				
Sample Location: Factory <input type="checkbox"/> , Warehouse <input type="checkbox"/> , Production Stock/Roll X, Container <input type="checkbox"/>				
Sample Submitted by: Miquel Detres				
Date of Sample Shipment: 3-22-22				
Number of Boxes or Pallets: 1				
Shipping Details		Laboratory Receipt (to be completed by Laboratory Representative)		
Packed By: Eugene Podolyak		Received By:		
Shipping Date: 3-22-22		Received Date:		
Carrier/Airbill Number:		Condition of Shipping Package:		
		Condition of Sample:		
		Remarks:		
Sample Handling				
Relinquished By	Company	Received By	Company	Date/Time
		Tony Mable	MAS	3/24/22



APPENDIX C

Bracketed Products

Solar Gard®

Solar Gard Window Film with Pressure Sensitive Adhesive*

Solar Gard Safety Window Film with Pressure Sensitive Adhesive

Solar Gard Graffitigard Window Films with Pressure Sensitive Adhesive

* Product tested as representative exemplar of products listed above.

Per CDPH standards, products must be re-evaluated if significant changes to materials, processes, or the facility occur that affect the eligibility of the products for any credits available under these or other applicable standards.