



October 29, 2024

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

**Subject: VOC Emissions Testing Report per California Department of Public Health Standard Method Version 1.2
Solar Gard Pressure Sensitive Window Film
MAS Project No.: 2400652**

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.

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

Manager, Emissions Group

Senior Analytical Chemist

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



EMISSIONS TESTING REPORT

California Department of Public Health Standard Method Version 1.2
 Compliance Evaluation

SAMPLE DESCRIPTION & TESTING PARAMETERS

Product Name: Pressure Sensitive Window Film	MAS Assigned ID: 2400652
Manufacturer: Solar Gard® San Diego, CA	Product Description: window film with pressure sensitive adhesive Dimensions: 6” x 6” as tested
Manufacture Date: September 24, 2024	Testing Period: October 11 – 25, 2024
Collection Date: September 24, 2024	In-Chamber Sampling Dates: Oct. 22 @ 24 hrs.; Oct. 23 @ 48 hrs.; Oct. 25 @ 96 hrs.
Shipping Date: September 24, 2024	Date of Sample Analysis: October 26 and October 28, 2024
Laboratory Arrival Date: September 26, 2024	Age of Sample at Testing: 17 days



The Pressure Sensitive Window Film as received, cut to size (left) and tested (right)

To prepare the sample for chamber testing, a six-by-six-inch piece was cut from the sample. The piece’s adhesive was then exposed, and taped onto an aluminum foil sheet. The sample was then 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)	4.4	0.11	0.32	NA†
Formaldehyde ^{1,2}	<3.1	<0.073	<0.22	9
Acetaldehyde ^{1,2}	<4.2	<0.10	<0.30	70
Isopropanol	<2.8	<0.067	<0.20	3500
Dichloroethylene (1,1)	<2.8	<0.067	<0.20	35
Methylene chloride ²	<2.8	<0.067	<0.20	200
Carbon disulfide ^{1,2}	<2.8	<0.067	<0.20	400
MTBE ²	<2.8	<0.067	<0.20	4000
Vinyl acetate ²	<2.8	<0.067	<0.20	100
Hexane (n-) ²	<2.8	<0.067	<0.20	3500
Chloroform ^{1,2}	<2.8	<0.067	<0.20	150
2-methoxyethanol ¹	<2.8	<0.067	<0.20	30
1,1,1-trichloroethane ²	<2.8	<0.067	<0.20	500
Benzene ^{1,2}	<2.8	<0.067	<0.20	1.5
1-methoxy-2-propanol	<2.8	<0.067	<0.20	3500
Carbon tetrachloride ^{1,2}	<2.8	<0.067	<0.20	20
Ethylene glycol ²	<2.8	<0.067	<0.20	200
Dioxane (1,4-) ^{1,2}	<2.8	<0.067	<0.20	1500
Trichloroethylene ^{1,2}	<2.8	<0.067	<0.20	300
Epichlorohydrin ^{1,2}	<1.4	<0.033	<0.10	1.5
2-ethoxyethanol ¹	<2.8	<0.067	<0.20	35
Dimethylformamide (n,n-) ²	<2.8	<0.067	<0.20	40
Toluene ^{1,2}	<2.8	<0.067	<0.20	150
2-methoxyethanol acetate ¹	<2.8	<0.067	<0.20	45
Tetrachloroethylene ^{1,2}	<2.8	<0.067	<0.20	17.5
Chlorobenzene ²	<2.8	<0.067	<0.20	500
Ethylbenzene ^{1,2}	<2.8	<0.067	<0.20	1000
Styrene ^{1,2}	<2.8	<0.067	<0.20	450
2-ethoxyethyl acetate ¹	<2.8	<0.067	<0.20	150
Phenol ²	<2.8	<0.067	<0.20	100
Dichlorobenzene (1,4-) ^{1,2}	<2.8	<0.067	<0.20	400
Isophorone ²	<2.8	<0.067	<0.20	1000
Naphthalene ^{1,2}	<1.4	<0.033	<0.10	4.5
Xylenes, (m-,o-,p-xylene combined) ²	<2.8	<0.067	<0.20	350

* 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® Saint-Gobain, 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, information provided by the client, and the bracketed products listed. MAS assumes no responsibility for the accuracy of the information provided by the client.

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	2.282 m/h
Loading Factor	0.438 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 points.

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	3.8	8.6
48	5.8	13
96	1.9	4.4

*TVOC values are background corrected



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

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	<3.1
48	Formaldehyde	<1.4	<3.1
96	Formaldehyde	<1.4	<3.1

Table A-III present the individual volatile organic compounds (IVOC) identified by GC/MS after 96 hours.

Table A-III
Speciation of Tentatively Identified IVOCs* by GC/MS after 96 hours

CAS Number	Tentatively Identified Compounds	Concentration ($\mu\text{g}/\text{m}^3$)	Emission Factor ($\mu\text{g}/\text{m}^2 \text{ h}$)
No IVOCs were identified above the laboratory's Limit of Quantitation.			

*All IVOCs detected were identified using the average response factor of toluene calibration standards. The sum concentration of IVOC's does not necessarily correlate with the TVOC concentration under the analytical conditions.



APPENDIX B

Chain-of-Custody



Materials Analytical Services LLC
 3945 Lakefield Court
 Suwanee, Georgia 30024
 Phone: 770-866-3200
 Fax: 770-866-3259

California 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: Miguel Detres				
Title: Technical Services Manager				
Phone Number: O 727-437-1025 M 813-760-9026				
Fax Number:				
Email Address: miguel.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 Laminate <input type="checkbox"/> , Melamine <input type="checkbox"/> , UV <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: 9-24-24				
Sample Location: Factory <input type="checkbox"/> , Warehouse <input type="checkbox"/> , Production Stack/Roll X, Container <input type="checkbox"/>				
Sample Submitted by: Miguel Detres				
Date of Sample Shipment : 9-24-24				
Number of Boxes or Pallets: 1		Laboratory Receipt (to be completed by Laboratory Representative)		
Packed By: Eugene Podolyak		Received By:		
Shipping Date: 9-24-24		Received Date: 09/26/2024		
Carrier/Airbill Number:		Condition of Shipping Package:		
		Condition of Sample:		
		Remarks:		
Sample Handling				
Relinquished By	Company	Received By	Company	Date/Time
			MAS	09/26/2024



APPENDIX C

Bracketed Products

Solar Gard® Saint-Gobain

Thermal Window Films Bracket:

Solar Gard® Window Films with Pressure Sensitive Adhesive*

Solar Gard® Safety Window Films with Pressure Sensitive Adhesive

Solar Gard® Anti-Graffiti/Vandalism 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.