



TEST REPORT

Report No.: E2343.01-401-44

Rendered to:

SOLAR GARD SAINT-GOBAIN, LLC
San Diego, CA

PRODUCT TYPE: Filmed Glass Guardrail

SERIES/MODEL: Solar Gard[®] Sentinel[™] Plus 4 mil outside weatherable film

Reference must be made to Report No. E2343.01-401-44, dated 11/18/2015 for complete test specimen description and detailed test results.

1.0 Report Issued To: Solar Gard Saint-Gobain, LLC
4540 Viewridge Avenue
San Diego, CA 92123

2.0 Test Laboratory: Architectural Testing, Inc., an Intertek company ("Intertek-ATI")
2250 Massaro Boulevard
Tampa, Florida 33619
813-628-4300

3.0 Project Summary:

3.1 Product Type: Filmed Glass Guardrail

3.2 Series/Model: Solar Gard[®] Sentinel[™] Plus 4 mil outside weatherable film

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). Test specimen description and results are reported herein.

3.4 Test Date(s): 08/03/15 – 08/05/15

3.5 Test Record Retention End Date: All test records for this report will be retained until August 5, 2019.

3.6 Test Location: Intertek-ATI test facility in Tampa, Florida.

3.7 Test Specimen Source: The test specimen(s) were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek-ATI for a minimum of four years from the test completion date.

3.8 List of Official Observers:

<u>Name</u>	<u>Company</u>
Miguel Detres	Solar Gard Saint-Gobain, LLC
D. Scott Parker	Intertek-ATI

4.0 Test Method(s):

ASTM E330/E330M-14, *Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

5.0 Test Specimen Description:

5.1 Product Sizes:

Test Specimen #1: Un-filmed; Handrail Point Support System

Overall Area: 14 ft ² (1.3 m ²)	Width		Height	
	inches	millimeters	inches	millimeters
Overall size	48	1219	40-3/4	1035

Test Specimen #2: Filmed both sides; Handrail Point Support System

Overall Area: 14 ft ² (1.3 m ²)	Width		Height	
	inches	millimeters	inches	millimeters
Overall size	48	1219	40-3/4	1035

Test Specimen #3: Filmed one side; Point Support System with structural silicone at support anchors on film side only

Overall Area: 11.8 ft ² (1.1 m ²)	Width		Height	
	inches	millimeters	inches	millimeters
Overall size	45	1143	36-3/8	924

Test Specimen #4: Filmed one side; Cap rail System with structural silicone at top cap rail and shoe base on film side only

Overall Area: 12.9 ft ² (1.2 m ²)	Width		Height	
	inches	millimeters	inches	millimeters
Overall size	48	1219	39-7/8	1013

Test Specimen #5: Filmed one side; Point Support System

Overall Area: 11.8 ft ² (1.1 m ²)	Width		Height	
	inches	millimeters	inches	millimeters
Overall size	45	1143	36-3/8	924

5.2 Reinforcement: No reinforcement was utilized.

5.3 Weatherstripping: No weatherstripping was utilized.

5.4 Drainage: No drainage was utilized.

5.0 Test Specimen Description: (Continued)

5.5 Glazing: *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made. Prior to and during testing all glass remained conditioned.*

Specimen #	Glass Type	Glazing Method
Test Specimen #1: Handrail Point Support System	3/4" (18 mm) Tempered Transparent Monolithic (No film)	See Intertek-ATI Sketch #1
Test Specimen #2: Handrail Point Support System	3/4" (18 mm) Tempered Transparent Monolithic (film ¹ on both sides)	See Intertek-ATI Sketch #1
Test Specimen #3: Point Support System with structural silicone at support anchors	1/2" (12 mm) Tempered Transparent Monolithic (film ¹ on one side)	See Intertek-ATI Sketch #1
Test Specimen #4: Cap rail System	3/4" (18 mm) Tempered Transparent Monolithic (film ¹ on one side)	See Intertek-ATI Sketch #1
Test Specimen #5: Point Support System	1/2" (12 mm) Tempered Transparent Monolithic (film ¹ on one side)	See Intertek-ATI Sketch #1

5.6 Hardware:

Description	Quantity	Location
Shoe Base; 48" (1219 mm) long by 4-1/4" (108 mm) high by 2-3/4" (70 mm) deep, extruded aluminum base with 1-1/4" (31.8 mm) wide by 3-1/2" (89 mm) deep pocket with 3/4" (19 mm) thick walls	1 each	Specimens #1, 2 and 4
Point Support Handrail; 58-1/2" (1485 mm) long by 1-1/2" (38 mm) diameter, stainless steel hollow rail with point support arms at 35-3/4" (908 mm) on center	1 each	Specimens #1 and 2
Vertical Post; 43" (1092 mm) high stainless steel post	2 each	Specimens #3 and 5
Spider Clamp, 1.9" (48 mm) diameter, stainless steel arms, secures glass to vertical posts	4 each	Specimens #3 and 5

5.0 Test Specimen Description: (Continued)**5.6 Hardware:** (Continued)

Description	Quantity	Location
Top rail for point support; 54-1/2" (1384 mm) long by 1-1/2" (38 mm) diameter, stainless steel hollow rail, secured to vertical posts	1 each	Specimens #3 and 5
Top Cap Rail; 48" (1219 mm) long by 1-1/2" (38 mm) diameter, stainless steel hollow rail	1	Specimen #4

6.0 Installation:

The specimens were installed into a Pine wood buck per Clients instructions.

7.0 Test Results:

Test Specimen #1: Un-filmed; Handrail Point Support System

Title of Test	Results	Observation	Note
Center Punched	Glass breakage	30% glass loss	1
Displacement taken at midspan of top edge of glass	0.03" (0.8 mm)	No visible movement	2
Displacement taken at midspan of glass	0.02" (0.5 mm)	No visible movement	2
Maximum pressure achieved, per ASTM E330 00.00 psf (0000 Pa)	Glass released	80% glass loss	4

Note: The non-filmed glass failed with outward pressure of 1.9 psf.

Test Specimen #2: Filmed both sides; Handrail Point Support System

Title of Test	Results	Observation	Note
Center Punched	Glass breakage	No glass loss	1
Displacement taken at midspan of top edge of glass	0.09" (2.3 mm)	No visible movement	2
Displacement taken at midspan of glass	0.10" (2.5 mm)	No visible movement	2
Maximum pressure achieved on interior side, per ASTM E330 135 psf (6464 Pa)	Glass retained	No glass loss	3, 4

7.0 Test Results: (Continued)

Test Specimen #3: Filmed one side; Point Support System with structural silicone at support anchors

Title of Test	Results	Observation	Note
Center Punched	Glass breakage	No glass loss	1
Displacement taken at 2-1/8" (54 mm) from left edge 6-1/2" (165 mm) from top edge of glass	0.03" (0.8 mm)	No visible movement	2
Displacement taken at 6-1/2" (165 mm) from top edge of glass at midspan of glass	0.06" (1.5 mm)	No visible movement	2
Displacement taken at 2-1/8" (54 mm) from right edge 6-1/2" (165 mm) from top edge of glass	0.04" (1.0 mm)	No visible movement	2
Maximum pressure achieved on filmed side, per ASTM E330 1436 Pa (30.0 psf)	Glass retained	Minimal glass fragment loss	3, 4
Maximum pressure achieved on non-filmed side, per ASTM E330 45.0 psf (2155 Pa)	Glass retained	Minimal glass fragment loss	3, 4

Test Specimen #4: Filmed one side; Cap rail System

Title of Test	Results	Observation	Note
Center Punched	Glass breakage	No glass loss	1
Displacement taken at top left edge of glass	0.06" (1.5 mm)	No visible movement	2
Displacement taken at midspan of glass	0.02" (0.5 mm)	No visible movement	2
Displacement taken at top right edge of glass	0.06" (1.5 mm)	No visible movement	2
Maximum pressure achieved on filmed side, per ASTM E330 65.0 psf (3112 Pa)	Glass retained	Minimal glass fragment loss	3, 4
Maximum pressure achieved on non-filmed side, per ASTM E330 80.0 psf (3830 Pa)	Glass retained	Minimal glass fragment loss	3, 4

7.0 Test Results: (Continued)

Test Specimen #5: Filmed one side; Point Support System

Title of Test	Results	Observation	Note
Center Punched	Glass breakage	No glass loss	1
Displacement taken at 2-1/8" (54 mm) from left edge 6-1/2" (165 mm) from top edge of glass	0.02" (0.5 mm)	No visible movement	2
Displacement taken at 6-1/2" (165 mm) from top edge of glass at midspan of glass	0.08" (2.0 mm)	No visible movement	2
Displacement taken at 2-1/8" (54 mm) from right edge 6-1/2" (165 mm) from top edge of glass	0.01" (0.3 mm))	No visible movement	2
Maximum pressure achieved on filmed side, per ASTM E330 45.0 psf (2155 Pa)	Glass retained	Minimal glass fragment loss	3, 4
Maximum pressure achieved on non- filmed side, per ASTM E330 30.0 psf (1436 Pa)	Glass retained	Minimal glass fragment loss	3, 4

Note: See Intertek-ATI Sketch #1 for indicator locations.

General Note: All testing was performed in accordance with the referenced standard(s).

Note 1: Glass was center punched to initiate breakage.

Note 2: After a 24 hour period, glass displacement (deflections) was taken without pressure.

Note 3: Loads were held for 10 seconds.

Note 4: Tape and film were used to seal against air leakage during structural testing. In our opinion, the tape and film did not influence the results of the test.

Intertek-ATI will service this report for the entire test record retention period. Test records such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For ARCHITECTURAL TESTING, INC.:

D. Scott Parker
Laboratory Manager

Gerald M. Middleton
Manager-Regional Operations

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Attachments (pages): This report is complete only when all attachments listed are included.

Appendix A: Sketches (1)

Appendix B: Photographs (3)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	10/14/15	N/A	Original report issue
1	11/13/15	5, 6, 7	Result descriptions, observation descriptions, note references
		8	Notes divided into 4 categories from 3
2	11/18/15	Appendix A	Changed sketch package

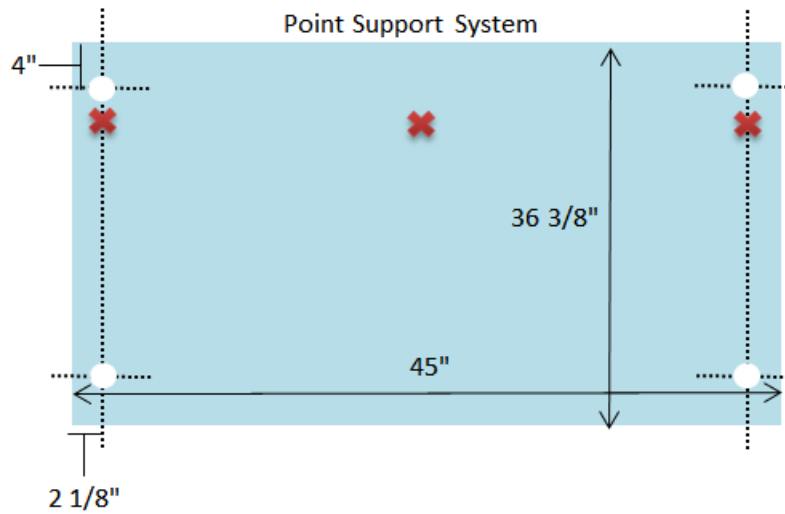
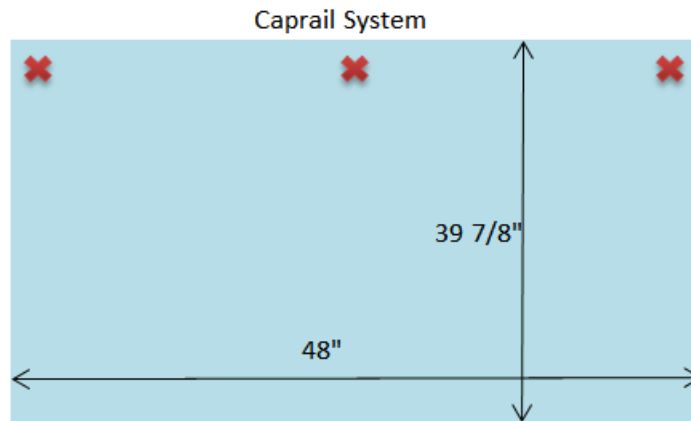
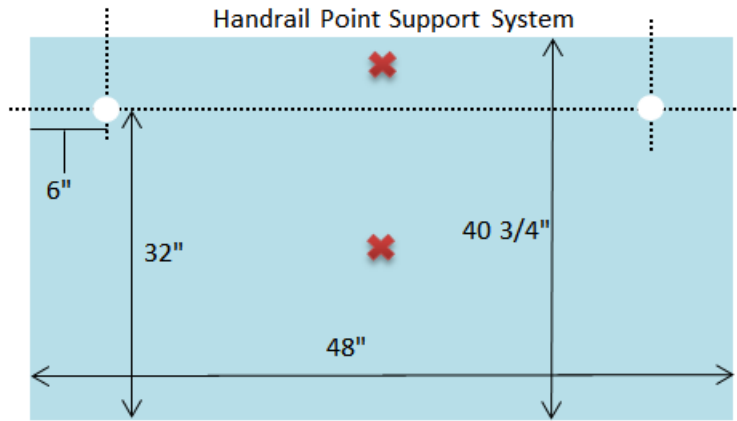
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Appendix A

Sketches

Sketch #1

*Indicator locations



Appendix B

Photographs



Photo No. 1

Typical Set-up for Glass Displacement Deflection Readings



Photo No. 2
Typical Set-up for Pressure Applied to Non-filmed Side of Specimen



Photo No. 3
Typical Set-up for Pressure Applied to Filmed Side of Specimen

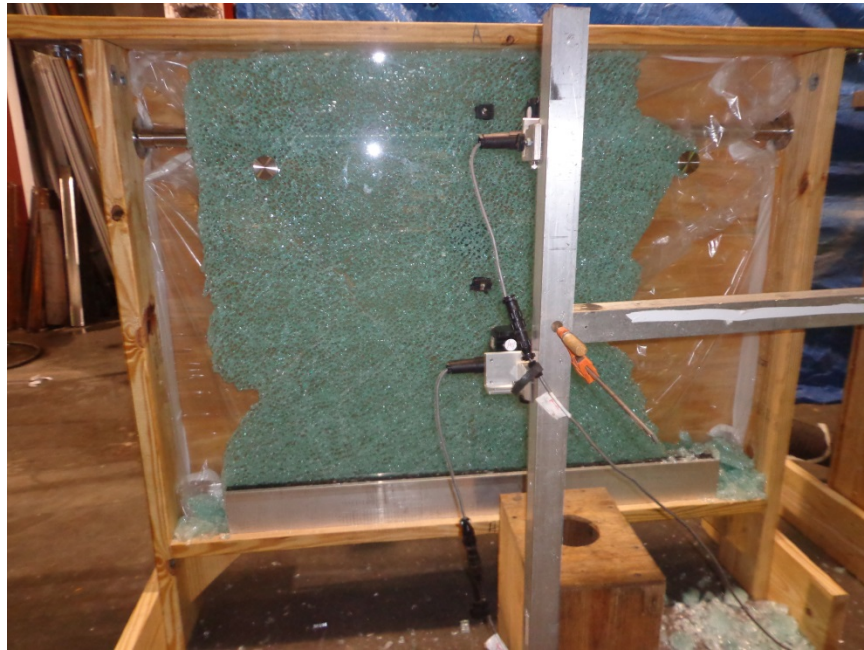


Photo No. 4
Test Specimen #1 – Center Punch