Notice

Since the production of this document, Solar Gard has been purchased by Saint-Gobain Performance Plastics Corporation. Solar Gard is now a subsidiary of Saint-Gobain. All references within this document to Bekaert, Bekaert Specialty Films or Bekaert Specialty Films LLC, including but not limited to legal notes, copy and or copyrights are null and void. All rights and responsibilities expressed or written within this document have been transferred from Bekaert Specialty Films, LLC to Saint-Gobain.

The company name in the following report could not be retroactivly changed from Bekaert to Solar Gard. The integrity of the product represented in the test has not changed and the results for this product are still valid. As the test is update the new report will reflect the Solar Gard name.

Saint-Gobain Performance Plastics 4540 Viewridge Avenue San Diego, CA 92123 USA Tel: 877 345 3478 E-mail: info@solargard.com www.solargard.com





ASTM E 1886 / ASTM E 1996 AND ASTM E 283, ASTM E 330, ASTM E 331 TEST REPORT

Rendered to:

BEKAERT SPECIALTY FILMS, LLC

SERIES/MODEL: Panorama 8-mil Film PRODUCT TYPE: Fixed Window with Applied Film

This report contains in its entirety: Cover Page: 1 page Report Body: 10 pages Sketches: 4 pages Drawings: 5 pages



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Date: 2008.10.07 07:55:07 -04'00'

2250 Massaro Blvd Tampa, FL 33619 phone: 813-628-4300 fax: 813-628-4433 www.archtest.com
 Report No.:
 85700.02-401-44

 Revision 1:
 10/03/08

 Test Date:
 09/18/08

 Report Date:
 10/01/08

 Expiration Date:
 09/18/12



ASTM E 1886 / ASTM E 1996 AND ASTM E 283, ASTM E 330, ASTM E 331 TEST REPORT

Rendered to:

BEKAERT SPECIALTY FILMS, LLC 8575-A Somerset Drive Largo, Florida 33773

Report No.:	85700.02-401-44
Revision 1:	10/03/08
Test Date:	09/18/08
Report Date:	10/01/08
Expiration Date:	09/18/12

Project Summary: Architectural Testing, Inc. was contracted by Bekaert Specialty Films, LLC to perform testing on three Series/Model Panorama 8-mil Film, fixed window with applied film. The samples tested met the performance requirements set forth in the referenced test procedures for a ± 2394 Pa (± 50.0 psf) Design Pressure with missile impacts corresponding to Missile Level C and Wind Zone 2. Test specimen description and results are reported herein. The samples were provided by the client.

Test Procedures: The test specimens were evaluated in accordance with the following:

ASTM E 283-04, Test Method for Determining Rate of Airflow Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen

ASTM E 330-02, Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference

ASTM E 331-00, Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference

ASTM E 1886-02, Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

ASTM E 1996-02, Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.

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Test Specimen Description:

Series/Model: Panorama 8-mil Film

Product Type: Fixed Window with Applied Film

Overall Size: 1308 mm (4' 3-1/2") wide by 2540 mm (8' 4") high

Daylight Opening Size: 1181 mm (3' 10-1/2") wide by 2400 mm (7' 10-1/2") high

Finish: All aluminum was mill finish.

Glazing Details: The glass was comprised of one sheet of 4.76 mm (3/16") clear tempered glass and an 8-mil (0.008") thick applied film on the interior side of the glass. The glass was exterior glazed onto a bed of Dow 995 silicone sealant, cap sealed and secured from the exterior perimeter with a vinyl wedge gasket.

Weatherstripping:

Description	Quantity	Location
Custom snap-in vinyl molding	1	Exterior perimeter of the fixed lite

Frame Construction: The frame was constructed of extruded aluminum members with straight-cut and butted corners. The corners were sealed and secured with two $#8 \times 1-1/4"$ Philips head screws per corner through the jambs into the head and sill.

Hardware: No hardware was utilized.

Drainage: No drainage was utilized.

Reinforcement: No reinforcement was utilized.

Installation: The fixed window was installed into a 2 x 10 Spruce-Pine-Fir #2 wood test buck. The aluminum window frame was secured to the interior perimeter with $#14 \times 3-1/2"$ wood screws spaced 6" from the ends and 22" on center securing the frame members to the buck. The exterior was sealed with silicone.



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Test Results:

The results are tabulated as follows:

Test Method	<u>Title of Test</u>	Results
ASTM E 283	Air Infiltration 1.60 psf (25 mph) 6.27 psf (50 mph)	0.09 cfm/ft^2 0.19 cfm/ft^2
ASTM E 331	Water Resistance 7.52 psf	No leakage
ASTM E 330	Uniform Load Deflection (Deflections reported were taken on the alumir fasteners with a 22" span) (Loads were held for 10 seconds) 2400 Pa (50.16) psf (positive) 2400 Pa (50.16) psf (negative)	num frame between <0.01" 0.01"
ASTM E 330	Uniform Load Structural (Permanent sets reported were taken on the between fasteners with a 22" span) (Loads were held for 10 seconds) 3600 Pa (75.24) psf (positive) 3600 Pa (75.24) psf (negative)	e aluminum frame <0.01" <0.01"



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Test Results: (Continued)

ASTM E 1886, Large Missile Impact

Conditioning Temperature: 25.5°C (78°F) **Missile Weight:** 1717 g (4.6lbs) **Missile Length:** 1.25 m (4' 1") **Muzzle Distance from Test Specimen:** 1.83 m (6' 0")

Test Unit #1

Impact #1: Missile Velocity: 11.9 m/s (39.2 fps); orientation within ±5° of vertical

Impact Area:Center of glazingObservations:Missile impacted the target area fractured the filmed glass
with no penetration.Results:Pass

Test Unit #2

Impact #1: Missile Velocity: 12.5 m/s (41.1 fps); orientation within $\pm 5^{\circ}$ of vertical

Impact Area:Lower left corner of glazingObservations:Missile impacted the target area fractured the filmed glass
with no penetration.Results:Pass

Test Unit #3

Impact #1:Missile Velocity: 12.3 m/s (40.4 fps); orientation within ±5° of verticalImpact Area:Upper right corner of glazingObservations:Missile impacted the target area fractured the filmed glass
with no penetration.Results:Pass

Note: See Architectural Testing Sketches #1, #2 and #3 for impact locations.



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Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #1

Design Pressure: ±2394 Pa (±50.0 psf)

Pressure	Number of	Average			
Range Pa (psf)	Cycles	Cycle Time (seconds)	#1	#2	#3
478.8 to 1197	3500	2.47	0.76	1.02	0.76
(10 to 25)	3300	2.47	(0.03)	(0.04)	(0.03)
0.0 to 1436.4	300	3.13	1.27	1.02	0.76
(0 to 30)			(0.05)	(0.04)	(0.03)
1197 to 1915.2	(00	1.97	1.52	1.78	1.52
(25 to 40)	600		(0.06)	(0.07)	(0.06)
718.2 to 2394	100	2.67	2.03	2.03	1.78
(15 to 50)	100		(0.08)	(0.08)	(0.07)
			Permanent Set		
			1.52	1.27	0.51
			(0.06)	(0.05)	(0.02)

POSITIVE PRESSURE

NEGATIVE PRESSURE

Pressure	Number of	Average	Maximum Deflection at Indicator mm (inch)			
Range Pa (psf)	Cycles	Cycle Time (seconds)	#1	#2	#3	
718.2 to 2394	50	3.26	2.79	3.56	3.05	
(15 to 50)	50	5.20	(0.11)	(0.14)	(0.12)	
1197 to 1915.2	1050	1.78	2.79	3.30	2.79	
(25 to 40)			(0.11)	(0.13)	(0.11)	
0.0 to 1436.4	50	2.98	2.54	3.05	2.54	
(0 to 30)	50		(0.10)	(0.12)	(0.10)	
478.8 to 1197	2250	1.00	2.03	2.54	1.78	
(10 to 25)	3350	1.89	(0.08)	(0.10)	(0.07)	
			Permanent Set			
			1.52	1.52	1.27	
			(0.06)	(0.06)	(0.05)	

Observations: At the conclusion of the test, there was no tear or delaminating of the glass.

Results: Pass

Note: See Architectural Testing Sketch #4 for indicator locations. Test Specimens 1, 2, and 3 were cycled in a common chamber.



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Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #2

Design Pressure: ±2394 Pa (±50.0 psf)

Pressure	Number of	Average	Maximum Deflection at Indicator mm (in		ator mm (inch)
Range Pa (psf)	Cycles	Cycle Time (seconds)	#1	#2	#3
478.8 to 1197 (10 to 25)	3500	2.47	1.27 (0.05)	1.27 (0.05)	1.27 (0.05)
0.0 to 1436.4 (0 to 30)	300	3.13	1.27 (0.05)	1.52 (0.06)	1.27 (0.05)
1197 to 1915.2 (25 to 40)	600	1.97	2.54 (0.10)	2.54 (0.10)	2.03 (0.08)
718.2 to 2394 (15 to 50)	100	2.67	2.79 (0.11)	2.79 (0.11)	2.54 (0.10)
			Permanent Set		
			1.52	1.52	1.02
			(0.06)	(0.06)	(0.04)

POSITIVE PRESSURE

NEGATIVE PRESSURE

Pressure	Number of	Average	- ITAGENERATE D'OTTO OTTO OTTO ALL CALOGO OT ANALAN (A)		
Range Pa (psf)	Cycles	Cycle Time (seconds)	#1	#2	#3
718.2 to 2394	50	3.26	5.08	4.57	4.32
(15 to 50)	50	5.20	(0.20)	(0.18)	(0.17)
1197 to 1915.2	1050	1050 1.78	4.57	4.32	2.81
(25 to 40)			(0.18)	(0.17)	(0.15)
0.0 to 1436.4	50	2.98	4.06	3.81	3.30
(0 to 30)	50		(0.16)	(0.15)	(0.13)
478.8 to 1197	2250	1.00	3.56	3.30	2.79
(10 to 25)	3350	1.89	(0.14)	(0.13)	(0.11)
			Permanent Set		
			2.54	2.54	2.28
			(0.10)	(0.10)	(0.09)

Observations: At the conclusion of the test, there was no tear or delaminating of the glass.

Result: Pass

Note: See Architectural Testing Sketch #4 for indicator locations.



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Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #3

Design Pressure: ±2394 Pa (±50.0 psf)

POSITIVE PRESSURE					
Pressure Range	Number of	Average Cycle Time	Maximum Deflection at Indicator mm (i		
Pa (psf)	Cycles	(seconds)	#1	#2	#3
478.8 to 1197	2500	2.47	0.76	0.76	0.51
(10 to 25)	3500	2.47	(0.03)	(0.03)	(0.02)
0.0 to 1436.4	300	300 3.13	0.76	0.76	0.51
(0 to 30)			(0.03)	(0.03)	(0.02)
1197 to 1915.2	600	1.97	1.27	1.27	1.02
(25 to 40)			(0.05)	(0.05)	(0.04)
718.2 to 2394	100	100 2.67	1.52	1.52	1.27
(15 to 50)	100		(0.06)	(0.06)	(0.05)
			Permanent Set		
			0.76	0.76	0.51
			(0.03)	(0.03)	(0.02)

POSITIVE PRESSURE

NEGATIVE PRESSURE

Pressure	Number of	Average	Maximum De	flection at Indic	ator mm (inch)
Range Pa (psf)	Cycles	Cycle Time (seconds)	#1	#2	#3
718.2 to 2394	50	3.26	3.05	3.05	2.03
(15 to 50)	50	3.20	(0.12)	(0.12)	(0.08)
1197 to 1915.2	1050	1050 1.78	3.30	3.05	2.54
(25 to 40)			(0.13)	(0.12)	(0.10)
0.0 to 1436.4	50	2.98	3.30	2.79	2.54
(0 to 30)	50		(0.13)	(0.11)	(0.10)
478.8 to 1197	3350	1.00	3.05	2.54	2.03
(10 to 25)	3330	1.89	(0.12)	(0.10)	(0.08)
			Permanent Set		
			2.29	2.03	1.52
			(0.09)	(0.08)	(0.06)

Observations: At the conclusion of the test, there was no tear or delaminating of the glass.

Result: Pass

Note: See Architectural Testing Sketch #4 for indicator locations.



General Note: Upon completion of testing, the specimens met the requirements of Section 7 of *ASTM E 1996.*

Test Equipment:

Cannon: Constructed from steel piping utilizing compressed air to propel the missile

Missile: 2x4 Southern Pine

Timing Device: Electronic Beam Type

Cycling Mechanism: Computer controlled centrifugal blower with electronic pressure measuring device

Deflection Measuring Device: 1" dial indicators

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.

Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen reported herein.

List of Official Observers:

Name

Company

Nick Routh Steven Schroer Miguel Detres Scott Parker John C. McClane Bekaert Specialty Films, LLC Bekaert Specialty Films, LLC Bekaert Specialty Films, LLC Architectural Testing, Inc. Architectural Testing, Inc.



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Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. 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 specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

1 Cling

John C. McClane Laboratory Manager

ha. Reed v Signed by: Joseph A. Reed

Joseph A. Reed, P.E. Director - Engineering and Product Testing

JCM:ck/cmd

Attachments (pages): This report is complete only when all attachments listed are included. Appendix-A: Sketches (4) Appendix-B: Drawings (5)



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Revision Log

<u>Rev. #</u>	Date	Page(s)	Revision(s)
0	10/01/08	N/A	Original report issue
1	10/03/08	Cover page	Reverse the heading
		Page 1	Reverse the heading
		Page 4	Corrected "laminated glass" to "filmed glass"

This report produced from controlled document template ATI 00165, revised 12/01/07.



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Appendix A

Sketches

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09/23/08 1-0F-4

ATI SKETCH#1 Specimen#1 Impact Locations

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ATI SKETCH#3 09/23/08 3-0F-A Specimen#3 ImpacTLocations 7 ø .

ATI SKETCH#4 09/23/08 4-0F-1 Specimen#1, 2, 3 And 4 INdicATOR LOCATIONS INDICATOR INDICATOR 22" 5par INDOCATOR 3



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Appendix B

Drawings



# NOTE:

Film, Glass and Dow 995 Coverage not to scale.

Dow coverage is 3/8" on film and 3/8" on frame.

Architectural Testing

Test sample complies with these details. Deviations are noted.

Report# 85700.02 Date 7 68 'z4 Tech JCm

# YKK AP America Inc.

YHS 50 - Hurricane Storefront System RIGHT JAMB DETAIL







YKK AP America Inc. YHS 50 - Hunicane Storefront System HEAD DETAIL



#### YKK AP America Inc.

YHS 50 - Hurricane Storefront System SILL DETAIL





# YKK AP America Inc.

YHS 50 - Hurricane Storefront System LEFT JAMB DETAIL



