

**MIAMI-DADE COUNTY
TEST REPORT**

Rendered to:

PALRAM AMERICAS, INC.

**SERIES/MODEL: Sunlite XL
PRODUCT TYPE: Hurricane Panel**

This report contains in its entirety:

**Cover Page: 1 page
Report Body: 12 pages
Sketches: 2 pages
Drawings: 4 pages**

**Report No.: 68911.01-109-18
Test Date: 02/22/06
Report Date: 02/26/07
Expiration Date: 02/22/16
Miami-Dade County Notification No.: ATI 06058**

MIAMI-DADE COUNTY TEST REPORT

Rendered to:

PALRAM AMERICAS, INC.
Arcadia West Industrial Park
9735 Commerce Circle
Kutztown, Pennsylvania 19530

Report No.: 68911.01-109-18

Test Dates: 12/18/06

Through: 02/22/06

Report Date: 02/26/07

Expiration Date: 02/22/16

Miami-Dade County Notification No.: ATI 06058

Project Summary: Architectural Testing, Inc. (ATI) was contracted by Palram Americas, Inc. to perform testing per Florida Building Code, Test Protocols for High Velocity Hurricane Zone, Protocols TAS 201-94, TAS 202-94, and TAS 203-94 on five Series/Model Sunlite XL, polycarbonate hurricane panels. The samples tested met the performance requirements set forth in the protocols for a ± 60.0 psf *Design Pressure* rating. Test specimen description and results are reported herein. The sample was provided by the client.

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

TAS 201-94, *Impact Test Procedures.*

TAS 202-94, *Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading.*

TAS 203-94, *Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.*

Drawing Reference: The test specimen drawings have been checked by Architectural Testing, Inc. and are representative of the samples tested.

Test Specimen Description:

Series/Model: Sunlite XL

Product Type: Hurricane Panel

Overall Size: 4' 0" wide by 8' 0" high

Finish: Transparent polycarbonate

Panel Construction: The panel was constructed of an extruded, corrugated, polycarbonate material. The panel consisted of three parallel layers; inner, outer, and middle. The inner and outer layers were 0.035" thick. The middle layer was 0.005" thick. The layers were joined with perpendicular and diagonal ligaments. The panel was transparent.

Specimen #1 - #4 Installation: The test unit was installed into a Spruce-Pine-Fir wood buck with 3-3/8" Panelmate Screws (2-1/4" x 1/4" lag bolt with a 1-1/8" x 1/4-20 hex head bolt) with a 1" E.P.D.M. backed washer (See Palram Drawing #3 of 4). The fasteners were placed 2" inboard of all edges, 6" from each corner and 12" on center about the perimeter of the panels. The panels were pre-drilled placed over fasteners and secured with the washers and wing nuts.

Specimen #5 Installation: The test unit was installed into a grout filled CMU test buck. The CMU test buck utilized a 42" wide by 90" high rough opening. The unit was secured with 3-3/8" Panelmate Screws (2-1/4" x 1/4" lag bolt with a 1-1/8" x 1/4-20 hex head bolt) with a 1" E.P.D.M. backed washer (See Palram Drawing #3 of 4). The fasteners were placed 2" inboard of all edges, 6" from each corner and 12" on center about the perimeter of the panels. The panels were pre-drilled placed over fasteners and secured with the washers and wing nuts.

Test Results: The following results have been recorded:

Protocol TAS 202-94, Static Air Pressure Tests

Test Unit #1

Design Pressure: ± 60.0 psf

Title of Test	Results			
	Indicator Readings (inch)			
	#1	#2	#3	#4
Structural Loads				
50% of Test Pressure (+45.0 psf)				
Maximum Deflection	3.00	0.34	0.10	0.60
Permanent Set	0.12	0.05	0.03	0.06
Design Pressure (+60.0 psf)				
Maximum Deflection	3.53	0.47	0.17	0.77
Permanent Set	0.19	0.09	0.07	0.12
50% of Test Pressure (-45.0 psf)				
Maximum Deflection	3.25	0.28	0.11	0.55
Permanent Set	0.04	0.01	<0.01	0.03
Design Pressure (-60.0 psf)				
Maximum Deflection	3.64	0.34	0.18	0.67
Permanent Set	0.04	0.02	0.02	0.03
Test Pressure (+90.0 psf)				
Maximum Deflection	4.30	0.55	0.16	1.04
Permanent Set	0.14	0.04	0.02	0.05
Test Pressure (-90.0 psf)				
Maximum Deflection	4.36	0.48	0.17	0.95
Permanent Set	0.06	0.03	0.03	0.05

Note: See ATI Sketch #1 for indicator locations.

Test Results: (Continued)

Protocol TAS 201-94, *Impact Test Procedures*

Missile Weight: 9.25 lbs

Muzzle Distance from Test Specimen: 17 ft.

Test Unit #2

Impact #1: Missile Velocity: 50.1 fps

Impact Area: Center of panel

Observations: Indented outer layer of panel, no penetration.

Maximum Deflection: 0.42"

Results: Pass

Impact #2: Missile Velocity: 49.5 fps

Impact Area: Bottom right corner

Observations: Minimal tearing at fasteners, no penetration.

Maximum Deflection: 0.13"

Results: Pass

Test Unit #3

Impact #1: Missile Velocity: 50.1 fps

Impact Area: Center of panel

Observations: Tore outer layer of panel, no penetration.

Maximum Deflection: 0.41"

Results: Pass

Impact #2: Missile Velocity: 49.0 fps

Impact Area: Top right corner

Observations: Minimal tearing at fasteners, no penetration.

Maximum Deflection: 0.14"

Results: Pass

Note: Refer to ATI Sketch #2 for impact locations.

Test Results: (Continued)

Protocol TAS 201-94, *Impact Test Procedures*

Test Unit #4

Impact #1: Missile Velocity: 50.8 fps

Impact Area: Center of panel

Observations: Tore through outer and middle layer, no penetration.

Maximum Deflection: 0.46"

Results: Pass

Impact #2: Missile Velocity: 50.1 fps

Impact Area: Bottom left corner

Observations: Indented panel, minimal tear around corner screws, no penetration.

Maximum Deflection: 0.11"

Results: Pass

Test Unit #5

Impact #1: Missile Velocity: 50.4 fps

Impact Area: Center of panel

Observations: Indentation with no tear or break, no penetration.

Maximum Deflection: Transducer wire broke during impact

Results: Pass

Impact #2: Missile Velocity: 50.5 fps

Impact Area: Lower left corner

Observations: Indentation with no tear or break, no penetration.

Maximum Deflection: 0.32"

Results: Pass

Note: Refer to ATI Sketch #2 for impact locations.

Test Results: (Continued)

Protocol TAS 203-94, Cyclic Wind Pressure Loading

Test Unit #2

Design Pressure: ±60.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	2.33	2.83	0.10	0.12	0.08
0.0 to 36.0	70	2.25	3.01	0.12	0.14	0.09
0.0 to 78.0	1	---	3.14	0.13	0.17	0.10
			Permanent Set (inch)			
			<0.01	0.01	0.01	<0.01

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	2.28	3.88	0.03	0.07	0.04
0.0 to 36.0	70	3.64	3.94	0.04	0.08	0.05
0.0 to 78.0	1	---	4.67	0.06	0.10	0.06
			Permanent Set (inch)			
			<0.01	0.01	0.03	0.01

Result: Pass

Note: Refer to ATI Sketch #1 for indicator locations. Test Unit #2 and Test Unit #3 were cycled in a common test chamber. Thus, the Average Cycle Times are identical.

Test Results: (Continued)

Protocol TAS 203-94, Cyclic Wind Pressure Loading

Test Unit #3

Design Pressure: ±60.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	2.33	2.94	0.14	0.10	0.09
0.0 to 36.0	70	2.25	3.13	0.15	0.12	0.11
0.0 to 78.0	1	---	3.28	0.16	0.14	0.12
			Permanent Set (inch)			
			<0.01	0.01	0.02	0.01

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	2.28	3.55	0.06	0.09	0.05
0.0 to 36.0	70	3.64	3.71	0.07	0.10	0.07
0.0 to 78.0	1	---	4.17	0.09	0.13	0.10
			Permanent Set (inch)			
			<0.01	0.02	0.01	0.01

Result: Pass

Note: Refer to ATI Sketch #1 for indicator locations. Test Unit #2 and Test Unit #3 were cycled in a common test chamber. Thus, the Average Cycle Times are identical.

Test Results: (Continued)

Protocol TAS 203-94, *Cyclic Wind Pressure Loading*

Test Unit #4

Design Pressure: ± 60.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	3.66	1.23	0.18	0.20	0.33
0.0 to 36.0	70	3.63	1.36	0.23	0.26	0.42
0.0 to 78.0	1	---	2.99	0.51	0.57	0.92
			Permanent Set (inch)			
			0.01	0.01	<0.01	0.01

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	3.77	1.46	0.35	0.54	0.81
0.0 to 36.0	70	3.91	1.68	0.39	0.57	0.84
0.0 to 78.0	1	---	2.30	0.51	0.76	1.15
			Permanent Set (inch)			
			0.07	0.06	0.05	0.10

Result: Pass

Note: Refer to ATI Sketch #1 for indicator locations.

Test Results: (Continued)

Protocol TAS 203-94, *Cyclic Wind Pressure Loading*

Test Unit #5

Design Pressure: ± 60.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	2.85	0.09	0.09	0.16	4.01
0.0 to 36.0	70	3.84	0.09	0.09	0.16	4.53
0.0 to 78.0	1	---	0.12	0.13	0.17	6.63
			Permanent Set (inch)			
			<0.01	0.06	0.01	0.11

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (sec.)	Maximum Deflection at Indicator (inch)			
			#1	#2	#3	#4
0.0 to 30.0	600	3.85	0.11	0.14	0.07	6.04
0.0 to 36.0	70	4.77	0.13	0.15	0.07	6.35
0.0 to 78.0	1	---	0.19	0.28	0.12	9.12
			Permanent Set (inch)			
			0.04	0.02	0.06	0.19

Result: Pass

Note: Refer to ATI Sketch #1 for indicator locations.

Test Equipment:

Cannon: Steel pipe barrel 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: Linear transducers and 1" dial indicators

Laboratory Compliance Statements: The following are provided as required by the protocols for the testing reported herein.

Upon completion of testing, specimens tested for TAS 201-94 met the requirements of Section 1626 of the Florida Building Code, Building (2004).

Upon completion of testing, specimens tested for TAS 202-94 met the requirements of Section 1620 of the Florida Building Code, Building (2004).

Upon completion of testing, specimens tested for TAS 203-94 met the requirements of Section 1609 of the Florida Building Code, Building (2004).

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.

List of Official Observers:

<u>Name</u>	<u>Company</u>
Mike Howser	Palram Americas, Inc.
Michael D. Stremmel, P.E.	Architectural Testing, Inc.
Stephen D. Shank	Architectural Testing, Inc.

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 specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Stephen D. Shank
Senior Technician

Michael D. Stremmel, P.E.
Senior Project Engineer

SDS:vlm

Attachments (pages):

- Appendix-A: Sketches (2)
- Appendix-B: Drawings (4)

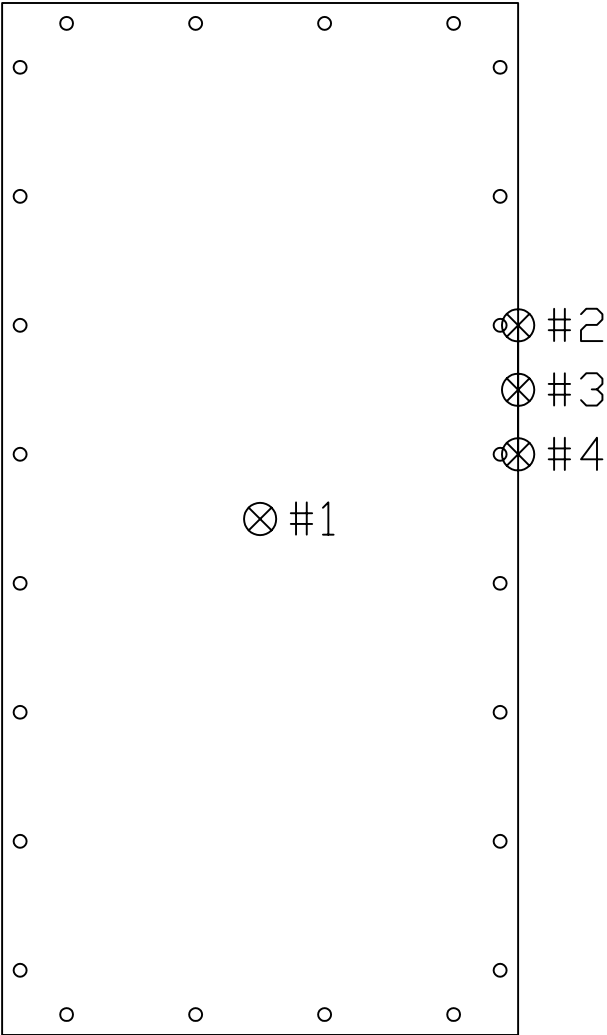
Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	02/26/07	N/A	Original report issue

Appendix A

Sketches

REV	DATE	DESCRIPTION	BY



PROJECT NO.
68911.01
109-18

PROJECT NAME: SunLite XL
CLIENT: Palram Americas Inc.

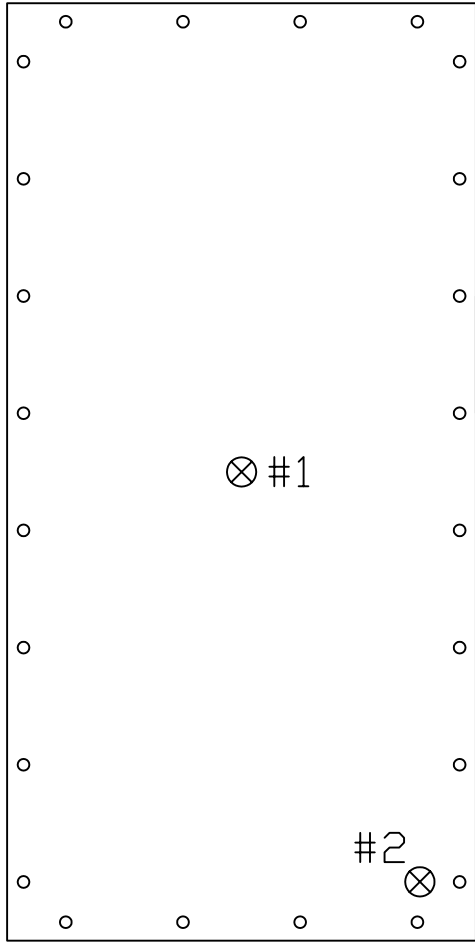


DRAWING
Sketch #1 - Indicator Locations

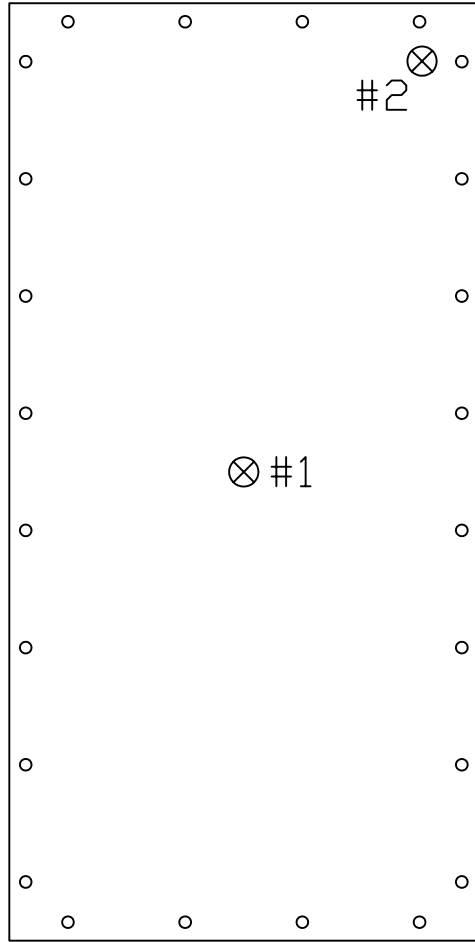
DWG. BY:
MDS
DATE:
12/29/06

SHEET
1
OF
1

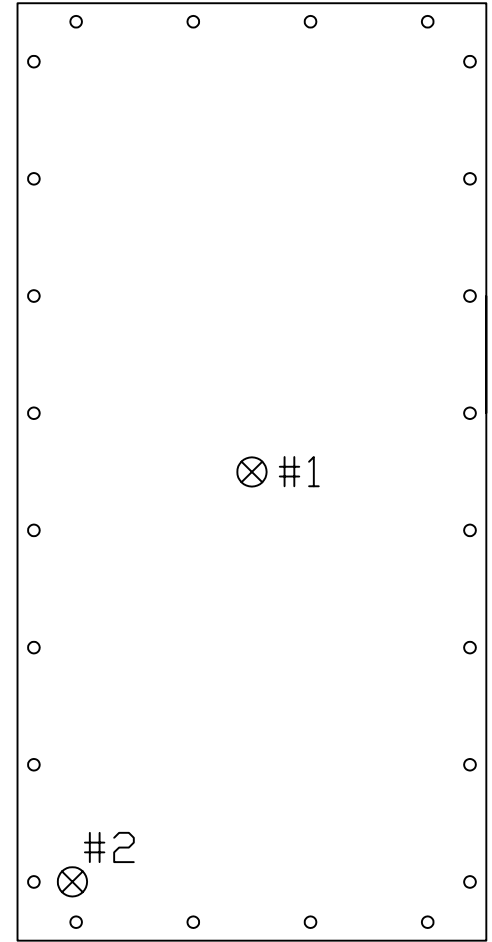
REV	DATE	DESCRIPTION	BY



Test Specimen #2



Test Specimen #3

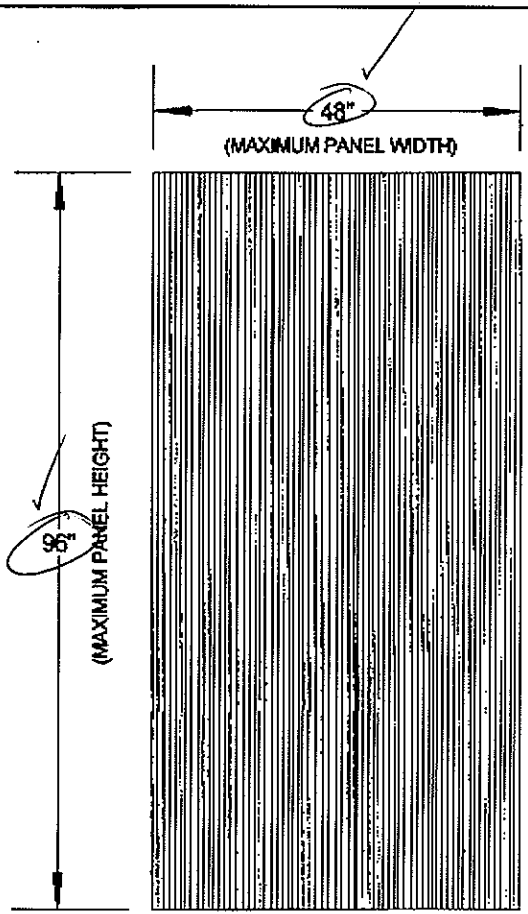


Test Specimen #4
Test Specimen #5

⊗ - Denotes Impact Location

Appendix B

Drawings



EXTERIOR ELEVATION
16mm X-LITE



Test sample complies with these details.
Deviations are noted.

Report# 68911.01
Date 12/29/06 Tech SDS

NOTES:

1. THE PRODUCT SHOWN IS DESIGNED TO COMPLY WITH THE 2004 FLORIDA BUILDING CODE, MIAMI DADE COUNTY REQUIREMENTS, AND THE INTERNATIONAL BUILDING CODE.
2. THE PANELS SHOWN IS 16mm THICK WITH AN "X BRACED" PROFILE. IT IS INTENDED FOR DIRECT INSTALLATION AS SHOWN HEREIN.
3. THE DIMENSIONS SHOWN ON THIS SHEET REPRESENT THE MAXIMUM ALLOWABLE HEIGHT AND WIDTH OF THE PANELS AS INSTALLED.
4. THIS SYSTEM IS NOT INTENDED FOR OPENINGS LARGER THAN 42" x 90". SECURED SHEETS MUST OVERLAP SUCH OPENINGS A MINIMUM OF 3" ALONG ALL FOUR EDGES.
5. PANELS MUST BE INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS (AS PRESENTED IN THIS DOCUMENT. FAILURE TO DO SO MAY RESULT IN PRODUCT FAILURE AND ADDITIONAL PROPERTY DAMAGE.
6. NOTE THAT ONLY THE LABELED SIDE OF THE PANEL IS UV PROTECTED AND THAT THIS SIDE SHOULD FACE OUTWARDS. MAKE NOTE OF THIS SIDE WHEN REMOVING THE PROTECTIVE FILM.

TABLE OF CONTENTS	
SHEET	DESCRIPTION
1	GENERAL NOTES AND DIMENSIONS
2	FASTENER PLACEMENT DETAILS
3	HARDWARE DETAILS
4	WINDOW INSTALLATION DETAILS

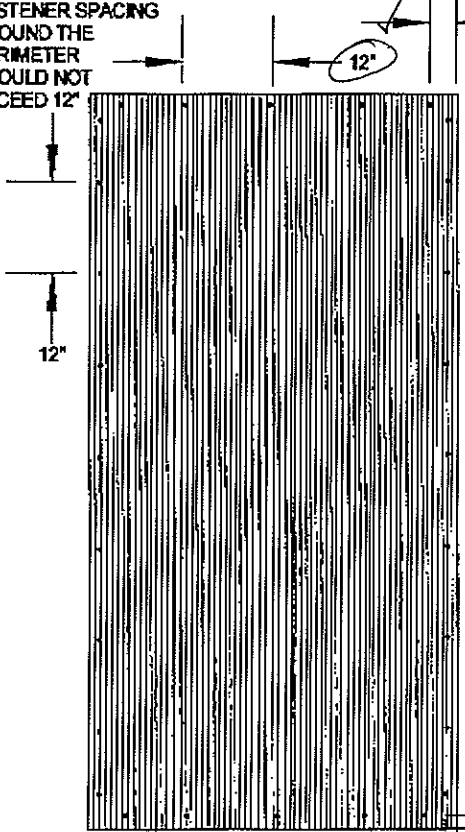
REV.	DATE	BY
1	10/24/06	DHO

PALRAM AMERICAS INC.
 ARCADIA WEST INDUSTRIAL PARK
 8735 COMMERCE CIRCLE
 KUTZTOWN, PA. 19630
 PHONE: 610-285-9918
 FAX: 610-285-2859



TITLE 16mm SUNLITE X-LITE HURRICANE PANEL INSTALLATION DETAILS AND NOTES	
DRAWING NUMBER:	SCALE:
DRAWN BY:	SHEET: 1 OF 4

FASTENER SPACING
AROUND THE
PERIMETER
SHOULD NOT
EXCEED 12"



FASTENERS ARE INSTALLED
6" MAX FROM CORNER

6" MAX

12"

6" MAX

12"

FASTENERS ARE TO BE INSTALLED
A MINIMUM OF 2" FROM THE EDGE
OF THE PANEL

2" MIN

2" MIN

NOTES:

1. FASTENERS SHOULD BE PLACED 6" MAXIMUM FROM EACH CORNER AND 2" MINIMUM ALONG PANEL EDGES.
2. FASTENERS ARE TO BE SPACED 12" MAXIMUM ALONG THE VERTICAL AND HORIZONTAL EDGES OF THE INSTALLATION.
3. ONLY RECOMMENDED FASTENERS AND ASSOCIATED HARDWARE ARE PERMISSIBLE FOR USE ON THIS INSTALLATION.



Test sample complies with these details.
Deviations are noted.

Report# 68911.01

Date 12/29/06 Tech SDS

0	10/24/06	DHO
REV.	DATE	BY

PALRAM AMERICAS INC.

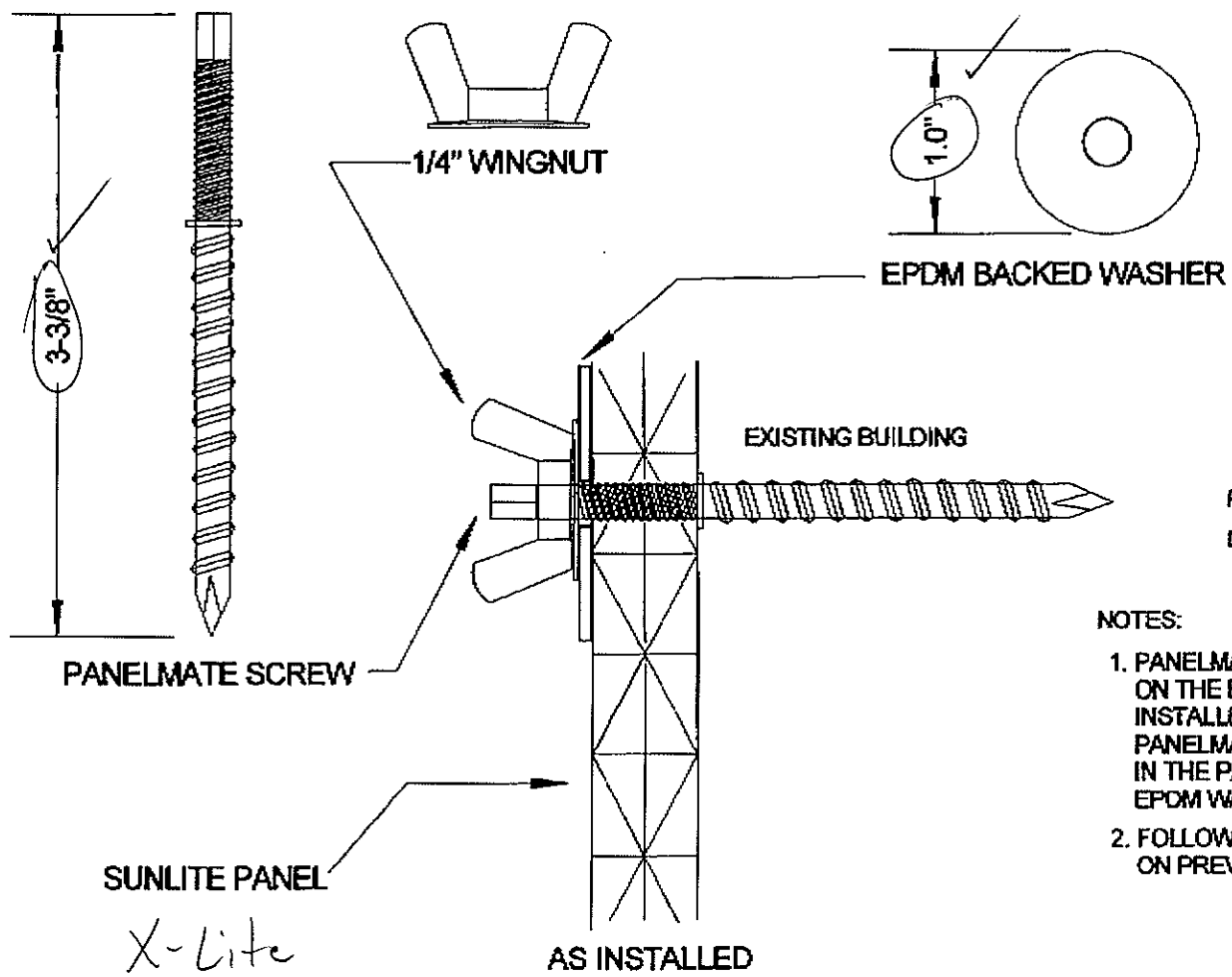


ARCADIA WEST INDUSTRIAL PARK
9735 COMMERCE CIRCLE
KUTZTOWN, PA 18530

PHONE: 610-285-9918
FAX: 610-285-2850

TITLE: 16mm SUNLITE X-LITE
HURRICANE PANEL
INSTALLATION DETAILS AND NOTES

DRAWING NUMBER:	SCALE:
DRAWN BY:	SHEET: 2 OF 4




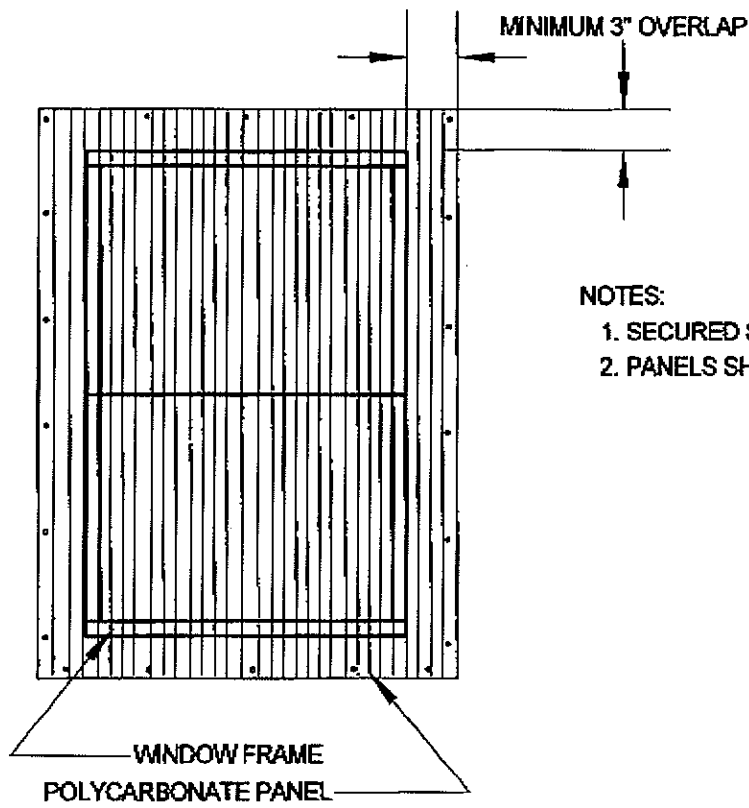
Architectural Testing
 Test sample complies with these details.
 Deviations are noted.
 Report# 68911.01
 Date 12/29/06 Tech SDS

NOTES:

1. PANELMATE SCREWS ARE PERMANENT INSTALLED ON THE EXISTING STRUCTURE. PANELS ARE INSTALLED BY PLACING THE SHEET ONTO THE PANELMATE SCREWS THROUGH PREDRILLED HOLES IN THE PANEL. THE PANEL IS SECURED WITH AN EPDM WASHER AND 1/4" WINGNUT AS SHOWN.
2. FOLLOW THE FASTENING PATTERN AS SHOWN ON PREVIOUS DETAILS.

REV.	DATE	BY
1	11/28/06	DHO
0	10/24/06	DHO

PALRAM AMERICAS INC.  ARCADIA WEST INDUSTRIAL PARK 5735 COMMERCE CIRCLE KUTZTOWN, PA 19530 PHONE: 610-285-8918 FAX: 610-285-2859	TITLE: 16mm SUNLITE X-LITE HURRICANE PANEL INSTALLATION DETAILS AND NOTES	
	DRAWING NUMBER:	SCALE:
DRAWN BY:	SHEET: 3 OF 4	



NOTES:

- 1. SECURED SHEETS MUST OVERLAP WINDOW FRAME BY AT LEAST 3"
- 2. PANELS SHOULD EXTEND AT LEAST 1" BEYOND THE WINDOW PANE.

0	10/25/08	DHO
REV.	DATE	BY

PALRAM AMERICAS INC.
 ARCADIA WEST INDUSTRIAL PARK
 9735 COMMERCE CIRCLE
 KUTZTOWN, PA 19530
 PHONE: 610-285-9918
 FAX: 610-285-2859



TITLE: 16mm SUNLITE X-LITE HURRICANE PANEL INSTALLATION DETAILS AND NOTES	
DRAWING NUMBER:	SCALE:
DRAWN BY:	SHEET: 4 OF 4