HURRICANE ENGINEERING & TESTING INC.

Computer Controlled Product Testing & Design,
.....Wind Load Analysis

Large Missile Impact & Cyclic Wind Pressure Tests

(ASTM E 1886-02/ASTM E 1996-03, Level C, 4.5 lbs 2x4*)

June 14, 2007

REPORT NUMBER: **HETI-07-4183B**
MANUFACTURER: 3M
3M Center, Building 207-1W-08, St. Paul, MN 55144-1000.

TEST LOCATION: Hurricane Engineering & Testing Inc.
6120 NW 97th AVE, Miami, FL 33178

LAB. CERTIFICATION No.: 07-0213.01 (MIAMI-DADE COUNTY, FLORIDA)
FBC ORGANIZATION No: TST1691
FBPE Certificate of Authorization Number: 6905

PRODUCT: Film Application to Aluminum Sliding Glass Door Panel.

MODEL: Window Film Type: **SH14CLARL.**

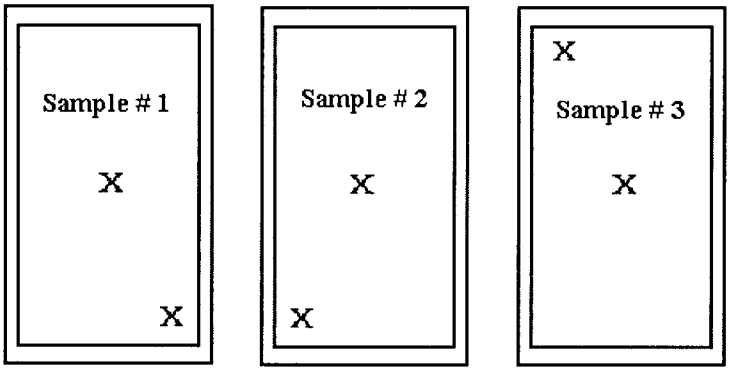
SAMPLE ID.: Sample 1: DC1-1 (Ref. Test No. 07-4183).
Sample 2: DC1-2 (Ref. Test No. 07-4184).
Sample 3: DC1-1 (Ref. Test No. 07-4183B).

PRODUCT SIZE: 36 1/4"w x 79 1/8"h overall

DESIGN LOADS (psf): **+50, -75**

TEST WITNESSED BY: Syed Waqar Ali, Ph. D. (HETI)
Dr. Nasreen K. Ali, E.I. (HETI)
Mr. Candido F. Font, P.E. (HETI)

SPECIAL NOTE: The Window Film was tested using Pino Window Corp Aluminum Sliding Glass Door Panel.



X Impact Locations

Construction Details

PRODUCT Film Application to Aluminum Sliding Glass Door Panel.

DESCRIPTION OF UNIT

FILM TYPE:	**SH14CLARL**
Opening Size:	36 ¾" x 80" h
Overall Size	36 ¾" w x 80"h overall
Configuration	X
No.& size of vents	(1) Fixed 36 ¼ " w x 79 1/8" h

MATERIAL CHARACTERISTICS

Frame Components (aluminum material, unless specified otherwise)

Component	Overall Dimension (Inches)	Wall Thickness (Inches)	Material
Frame Head	4.000 x 0.937	0.062	6063-T5
Frame Sill	4.654 x 2.000	0.062	6063-T5
Frame Jamb	1.50 x 1.50	-	SYP 2x2

Frame Assembly

The Head and sill were attached to the wood frame, and were not connected to the wood strips used as jamb guide. The Jamb consisted of 2x2 SYP wood in front and rear of the Door Panel.

Sash Components (aluminum material, unless specified otherwise)

Component	Overall Dimension (Inches)	Wall Thickness (Inches)	Material
Panel Top Rail	2.000 x 0.875	0.062	6063-T5
Panel Bottom Rail	2.000 x 0.875	0.062	6063-T5
Lock Stile	1.850 x 1.014	0.062	6063-T5
Interlock	1.502 x 1.781	0.078	6063-T5
Glazing Gasket	0.66 x 0.32	0.069	Vinyl

Sash Construction

- **Corner Construction**

  Each corner was but joined using (1) #10 x ¾" Sheet Metal Screw.

- **Glazing Material**

  3/16" (0.182") Clear tempered glass with one layer of SH14CLARL 14 mil multi-layer PET polyester film on the interior side.

- **Glazing Method**

  The glass was dry glazed using vinyl glazing gasket.

- **Film Attachment**

  The Glazing Gasket was trimmed on the interior side leaving unequal leg u-shaped gasket with dimensions 0.66" exterior leg, and 0.500" interior leg. The film was applied to the interior side of the glass and attached to the frame using a continuous triangular bead of Dow Corning 995 Structural Silicone. The size of the bead was 0.55" along the film edge and 0.25" along Lock Stile, Top Rail, and Bottom Rail, and 0.44" along the Interlock.

- **Glass bite** 7/16"
- **Reinforcements** None.
- **Day Light Opening:** 33" w x 75" h

Weatherstripping

Location	Type	Quantity
Top Rail	Wool Pile with Fin by ULTRAFAB	2
Bottom Rail	Flap Weatherstripping	2

HARDWARE

Plugs None

Weepholes None

Lock None

INSTALLATION

Perimeter Caulking: none

Substrata 2 x 12 SYP wood

Shimming none ¼" Maximum

Location	Anchor Type	Size	Spacing	Quantity
Sill	Wood Screws	#12 x 1 ½"	6" from end and 12" on center in two rows	6
Head	Wood Screws	#12 x 1 ½"	6" from end and 12" on center in two rows	6
Jamb	Wood Screws	#12 x 3"	10" from end and 12" o.c. (each strip)	6

Test Results

Large Missile Impact Test

Impact Location	*Speed (fps)*	*Observations (in)*	*Description of Result*
Sample 1			
1) center	40	---	No Penetration or Failure
2) corner	40	---	No Penetration or Failure
Sample 2			
1) center	40	---	No Penetration or Failure
2) corner	40	---	No Penetration or Failure
Sample 3			
1) center	40	---	No Penetration or Failure
2) corner	40	---	No Penetration or Failure

The samples were impacted with a #2 Southern Yellow Pine S4S, 2x4 missile, 4.5 lbs 51 1/2" long.

Cyclic Wind Pressure Test Results

Sample 1:

Cycles	Pressure (psf)	Deflection (in)	Set (in)	Recovery (%)	Duration (sec)
Positive Pressure Cycles					
3500	**+25**	----	----	----	1
300	**+30**	----	----	----	1
600	**+40**	----	----	----	1
100	**+50**	----	----	----	1
Negative Pressure Cycles					
50	**-75**	----	----	----	1
1050	**-60**	----	----	----	1
50	**-45**	----	----	----	1
3350	**-38**	----	----	----	1

Sample 2:

Cycles	Pressure (psf)	Deflection (in)	Set (in)	Recovery (%)	Duration (sec)
Positive Pressure Cycles					
3500	**+25**	----	----	----	1
300	**+30**	----	----	----	1
600	**+40**	----	----	----	1
100	**+50**	----	----	----	1
Negative Pressure Cycles					
50	**-75**	----	----	----	1
1050	**-60**	----	----	----	1
50	**-45**	----	----	----	1
3350	**-38**	----	----	----	1

Sample 3:

Cycles	Pressure (psf)	Deflection (in)	Set (in)	Recovery (%)	Duration (sec)
Positive Pressure Cycles					
3500	**+25**	----	----	----	1
300	**+30**	----	----	----	1
600	**+40**	----	----	----	1
100	**+50**	----	----	----	1
Negative Pressure Cycles					
50	**-75**	----	----	----	1
1050	**-60**	----	----	----	1
50	**-45**	----	----	----	1
3350	**-38**	----	----	----	1

Conclusion

The samples were tested in accordance with ASTM E 1886-02/ASTM E 1996-03 **Level C, 4.5 lbs 2x4.** The samples were intact and all parts were securely in place at the conclusion of each test.

NOTE: The above results were obtained using the designated test methods, which indicates compliance with the performance requirements of the referenced specifications. This report does not constitute certification of the specimen tested.

STATEMENT OF INDEPENDENCE

The Hurricane Engineering & Testing, Inc., does not have, nor does it intend to acquire or will acquire, a financial interest in any company manufacturing or distributing products tested or labeled by the Hurricane Engineering & Testing, Inc. Hurricane Engineering & Testing, Inc., is not owned, operated or controlled by any company manufacturing or distributing products it test or labels.

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