



BLACKWATER TESTING INC.

9040 Belvedere Road, West Palm Beach, Fl. 33411

Phone: 954-648-0955 E-mail: Engdep@blackwatertesting.com

MIAMI-DADE CERTIFICATION #12-0703.01

REPORT NO: BT-FWG-14-001

Test Dates: Start: 12/11/2014 End:12/11/2014



01/06/2015

TESTING OF LARGE MISSILE IMPACTS, AND POSITIVE AND NEGATIVE CYCLIC LOADS

Client:

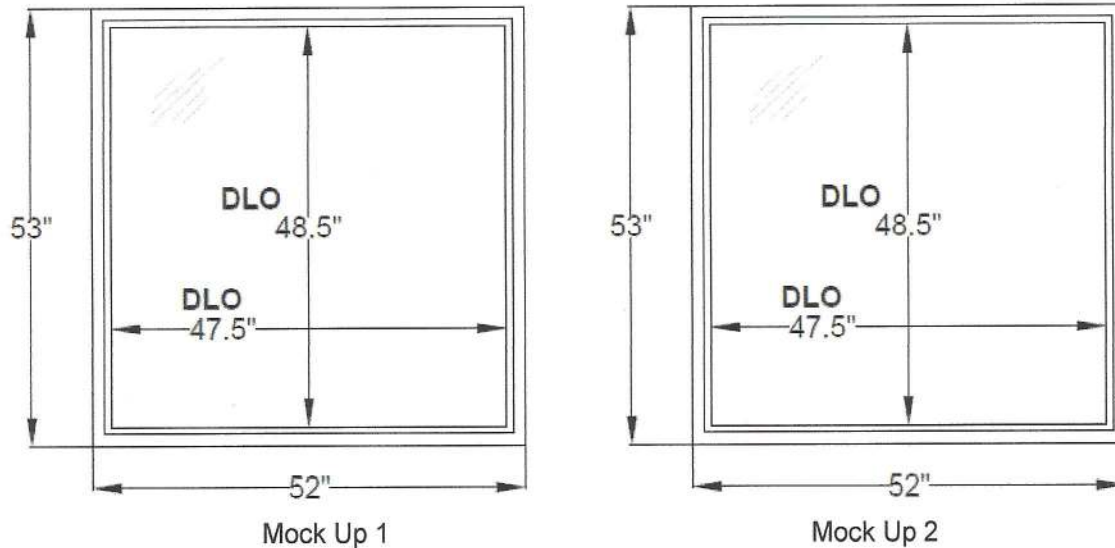
Folienwerk Wolfen GmbH

GuardianstraBe4

06766 Bitterfeld-Wolfen

Germany

Phone: +49 3494-69790



Product Description of Units	Fixed Windows
Overall Sizes	52" w x 53" h
Configurations	O
Test Protocols	TAS201 and TAS203 @+90psf/-90psf

Disclaimer Statement:

This is a general statement and does not supersede the specific product descriptions in this report. The specimens were provided by the manufacturer as built. Blackwater Testing Inc. does not take responsibility for performance and whose only purpose is to gather pertinent data for client in Test Report Format.

Witness To Testing:

Dennis Duffy, BT CEO
Erik Coppola, BT Lab Technician
Yamil G. Kuri, P.E. Test Engineer



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Window Frame Construction

Mock Up 1 and Mock Up 2

Fixed Window was assembled and delivered by others attached to wooden buck for testing.

Glazing Detail

Mock Up 1 and Mock Up 2

3/16"(5mm) ANNEALED glass /// EV-76 0.03" (0.76mm) /// **MPE-80 0.03" (0.80mm)** /// EV-76 0.03" (0.76mm) /// **3/16"(5mm) ANNEALED glass**

**interlayer by evguard® an EVA film manufactured in Germany by Folienwerk Wolfen GmbH

** The inter plastic layer was only one called: MPE - Modified Polyester

Glass Pane Dimensions

Mock Up 1 and Mock Up 2

50"x50" laminated annealed glass

DLO

Mock Up 1 and Mock Up 2

The daylight openings for both window lites were 47-1/2" w x 48-1/2" h

Hardness

Mock Up 1 and Mock Up 2

A "Webster" gauge: Model B was used to determine the hardness of all the aluminum components. Readings indicated for aluminum components tested were in the allowable hardness range of 6063-T6.



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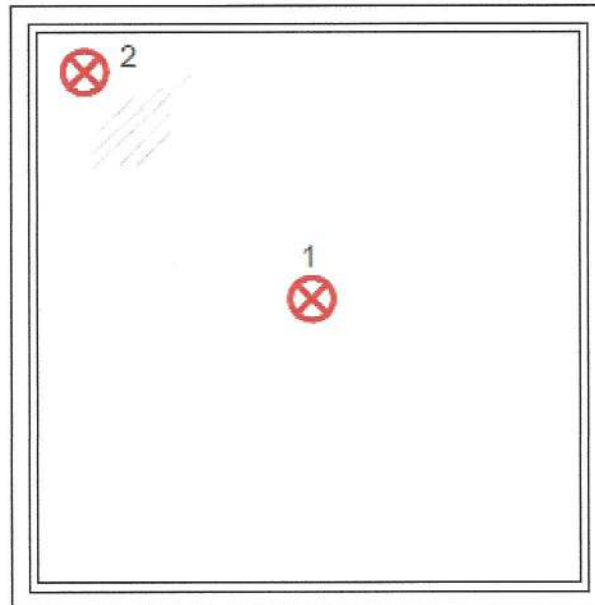
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Test Results



Large Missile Impacts

Mock Up 1

LARGE MISSILE IMPACT						T=84F
		Location			Velocity	
Sample	Shot	Area	X (in.)	Y (in.)	Keyence	Results
Fixed Window	1	Center Window	27	25	50	PASS
Fixed Window	2	Top Corner Window	6	45	50.1	PASS

Notes:

1. Impacted with a 9.05 lb., 96 "long, S4S, 2x4, of No. 2 Southern Pine lumber.
2. Impact location is given on Cartesian Grid, right (x) and up (y) from lower left hand corner.
3. The location description is relative to the product assembly i.e. Corner, Center, and Left Center.
4. Impact velocity measured with a Keyence KV-16DR, verified by the video method.



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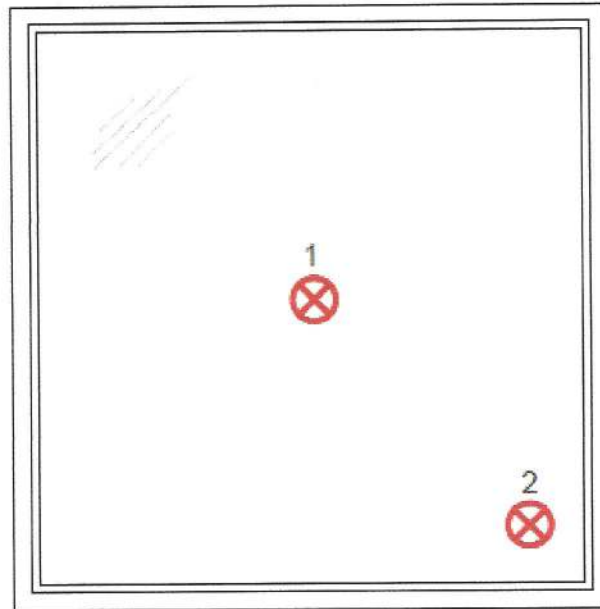
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Large Missile Impacts

Mock Up 2

LARGE MISSILE IMPACT						T=84F
Sample	Shot	Location			Velocity	
		Area	X (in.)	Y (in.)	Keyence	Results
Fixed Window	1	Center Window	26	26	50.1	PASS
Fixed Window	2	Top Corner Window	7	44	49.9	PASS

Notes:

1. Impacted with a 9.05 lb., 96 "long, S4S, 2x4, of No. 2 Southern Pine lumber.
2. Impact location is given on Cartesian Grid, right (x) and up (y) from lower left hand corner.
3. The location description is relative to the product assembly i.e. Corner, Center, and Left Center.
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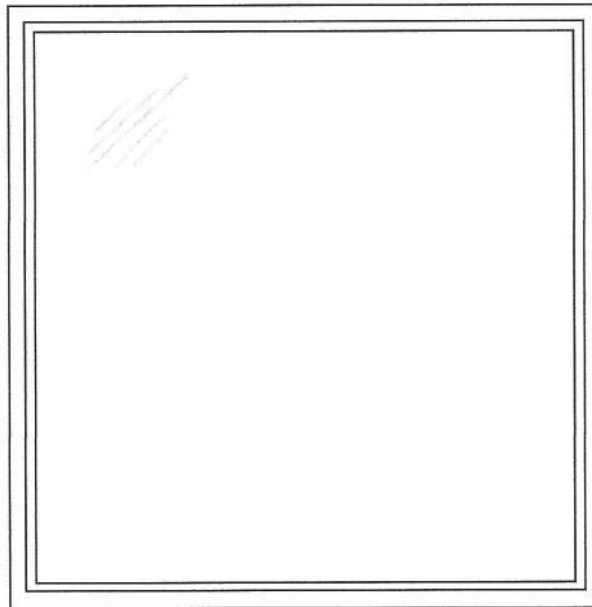
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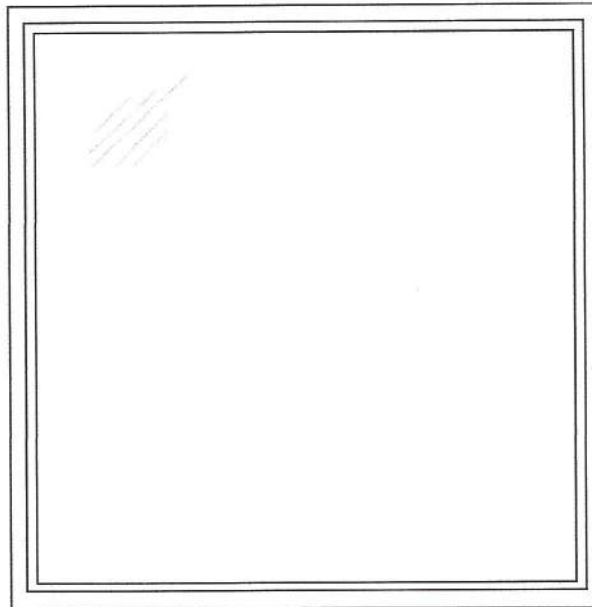
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Mock Up 1

CYCLIC LOAD DATA SHEET				Pd psf	
				High	Low
				90	-90
Positive Pressure					
No. of cycles	Range	Load (psf)	Load (H ₂ O)	T=85F	
				PASS/FAIL	
3500	20% to 50%	45	8.65	PASS	
300	0% to 60%	54	10.38		
600	50% to 80%	72	13.85		
100	30% to 100%	90	17.31		
Negative Pressure					
No. of cycles	Range	Load (psf)	Load (H ₂ O)	T=85F	
				PASS/FAIL	
50	30% to 100%	-90	17.31	PASS	
1050	50% to 80%	-72	13.85		
50	0% to 60%	-54	10.38		
3550	20% to 50%	-45	8.65		

****Note: Specimens were successfully cycled at higher pressures for R&D up to +/-120 PSF ****



Mock Up 2

CYCLIC LOAD DATA SHEET				Pd psf	
				High	Low
				90	-90
Positive Pressure					
No. of cycles	Range	Load (psf)	Load (H ₂ O)	T=85F	
				PASS/FAIL	
3500	20% to 50%	45	8.65	PASS	
300	0% to 60%	54	10.38		
600	50% to 80%	72	13.85		
100	30% to 100%	90	17.31		
Negative Pressure					
No. of cycles	Range	Load (psf)	Load (H ₂ O)	T=85F	
				PASS/FAIL	
50	30% to 100%	-90	17.31	PASS	
1050	50% to 80%	-72	13.85		
50	0% to 60%	-54	10.38		
3550	20% to 50%	-45	8.65		

**Note: Specimens were successfully cycled at higher pressures for R&D up to +/-120 PSF **



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SUMMARY OF TESTING

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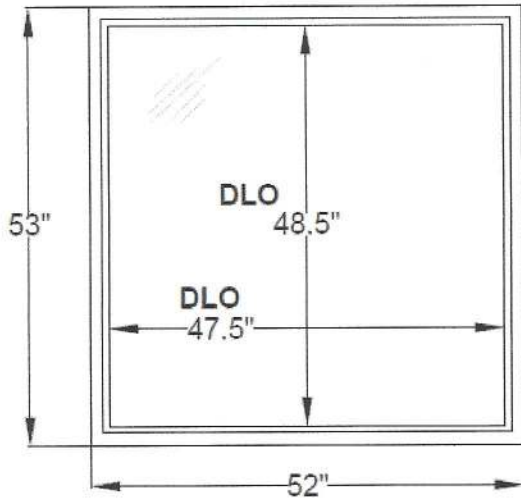
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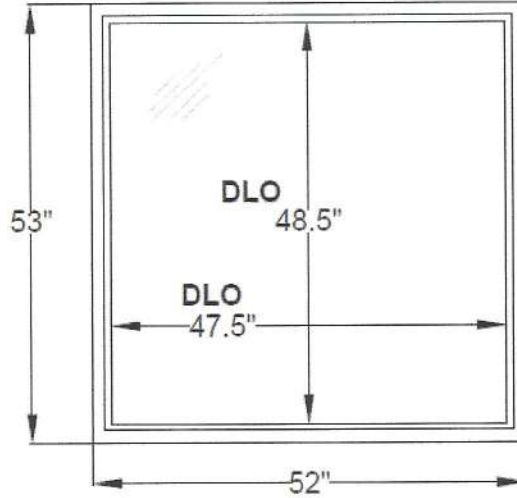
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Mock Up 1



Mock Up 2

IMPACTS: The samples were impacted in accordance with **TAS 201-94** and **FBC 2010**. The samples did not fail as a result of large impact missiles.

CYCLIC WIND LOADS: The samples were subjected to cyclic wind loads in accordance with **TAS 203-94** and **FBC 2010**. The samples successfully completed the cyclic wind loads to verify a **Design Load of +90.00 PSF / -90.00 PSF** and for **R&D purposes they were cycled successfully at +/-120 PSF** were no tearing of interlayer was viewed or any frame pull outs were observed.

CONCLUSION: Following testing the samples were disassembled. No failures were observed in the window frame, fastenings, or anchorages. **The "Fixed Window" product was tested in accordance with and meets the requirements to comply with Florida Building Code 2010.**

Respectfully submitted,

BLACKWATER TESTING INC.

(Miami-Dade Certification #12-0703.01)

Dennis Duffy, CEO