

RANGER SPECIALIZED GLASS, INC.

TEST REPORT

SCOPE OF WORK

ANSI/AMCA 540 TESTING ON 5" RAIN-RESISTANT, HORIZONTAL LOUVER

REPORT NUMBER

M5994.01-109-44

TEST DATE(S)

07/08/21 - 07/09/21

ISSUE DATE

07/28/21

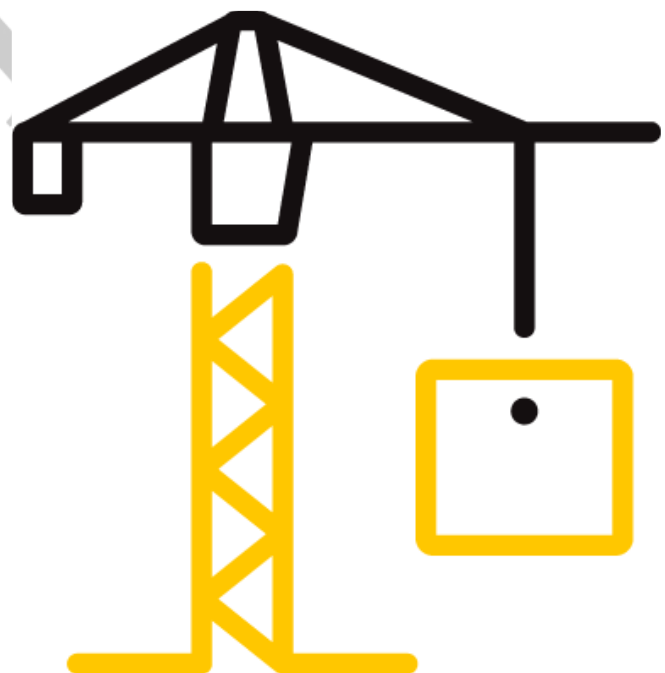
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REPORT ISSUED TO

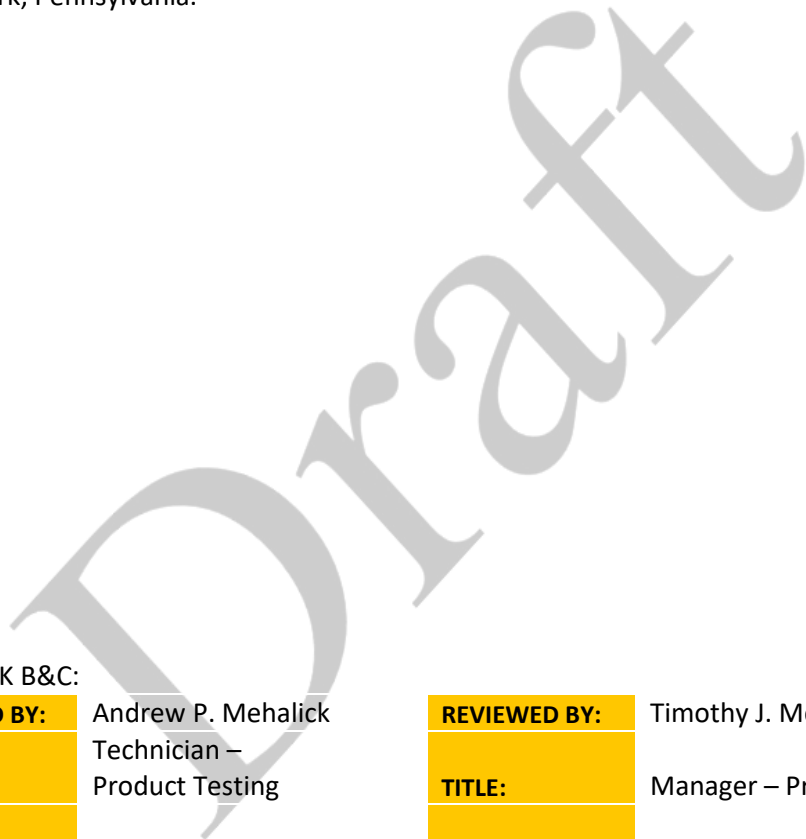
RANGER SPECIALIZED GLASS, INC.

42630 John Mosby Highway
Chantilly, Virginia 20152

SECTION 1

SCOPE

Architectural Testing, Inc. (an Intertek company), dba Intertek Building & Construction (B&C) was contracted by Ranger Specialized Glass, Inc. to perform testing in accordance with ANSI/AMCA 540 on their 5" Rain-Resistant, horizontal louver. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek B&C test facility in York, Pennsylvania.



For INTERTEK B&C:

COMPLETED BY:	Andrew P. Mehalick
TITLE:	Technician – Product Testing
SIGNATURE:	
DATE:	07/28/21

REVIEWED BY:	Timothy J. McGill
TITLE:	Manager – Product Testing
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APM:nls

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SECTION 2
TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ANSI/AMCA Standard 540-13, *Test Method for Louvers Impacted by Wind Borne Debris*

ASTM E1996-20, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

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

SECTION 3
MATERIAL SOURCE/INSTALLATION

Test specimens were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek B&C for a minimum of five years from the test completion date.

The specimens were installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the louver was not sealed.

LOCATION	ANCHOR DESCRIPTION	ANCHOR LOCATION
Head, sill, and jambs	8" wide by 3" deep by 1-1/2" high by 3/16" thick aluminum clips with three 1/4" x 2" self-tapping hex head screws through the clips and into the louver. Three #10 x 1-1/2" pan head screws were through the clips and into the wood buck.	Located 3" from each corner of the louver

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.

SECTION 4
EQUIPMENT

Cannon: A1207, 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

Tape Measure Verification: 63788

Weather Station: 63316

Control Panel: 003921

Linear Transducers: 62182, 003625, 003420, 64460, 64368, Y003056, 003439, 62187, 62185

SECTION 5
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Robert J. Beatty	Intertek B&C
John A. Shanabrook	Intertek B&C
Timothy J. McGill	Intertek B&C
Andrew P. Mehalick	Intertek B&C

SECTION 6
TEST SPECIMEN DESCRIPTION

Product Type: Horizontal Louver

Series/Model: 5" Rain-Resistant

Product Size(s):

Test Specimens #1 - #3:

OVERALL AREA:	WIDTH		HEIGHT		DEPTH	
	millimeters	inches	millimeters	inches	millimeters	inches
1.5 m ² (16.0 ft ²)						
Overall size	1219	48	1219	48	127	5
Louver core size	1105	43-1/2	1092	43	127	5

The following descriptions apply to all specimens.

Louver Construction:

LOUVER MEMBER	MATERIAL	DESCRIPTION
Head	Aluminum	Extruded, 0.075" thick, secured to the jambs using two #10 x 1-1/2" pan head screws at each end, through the jambs and into the screw bosses
Sill	Aluminum	Extruded, 0.075" thick, sloped to the exterior, secured to the jambs using two #10 x 1-1/2" pan head screws at each end, through the jambs and into the screw bosses
Jambs	Aluminum	Extruded, 0.075" thick
Head, sill, and jamb covers	Aluminum	Extruded, 0.075" thick, clipped upon one side to the head, sill, and jambs and secured to the other with silicone sealant
Louver core	Aluminum	Extruded, 0.075" thick, set into the jambs without securing
Blades	Aluminum	Extruded, 0.075" thick, spaced at 5/8" and secured to the louver core, with two #8 x 3/4" pan head screws per member end, into the screw bosses

SECTION 7

TEST RESULTS

The temperature range during testing was 26°C - 27°C (79°F - 81°F). The results are tabulated as follows:

ASTM E1996, LARGE MISSILE IMPACT

Conditioning Temperature: 26°C - 27°C (79°F - 81°F)

Missile Weight: 4191 g (9.24 lbs)

Missile Length: 2.5 m (8' 4")

Muzzle Distance from Test Specimen: 5.2 m (17' 0")

Test Specimen #1: Orientation within ±5° of horizontal

IMPACT	#1	#2	#3
MISSILE VELOCITY	15.3 m/s (50.3 fps)	15.3 m/s (50.3 fps)	15.2 m/s (49.9 fps)
IMPACT AREA	Top right corner of louver	Center of louver	Lower left corner of louver
OBSERVATIONS	Missile hit target area, dented blades, no breakage, missile was rejected	Missile hit target area, dented blades, no breakage, missile was rejected	Missile hit target area, dented blades, no breakage, missile was rejected
RESULTS	Pass	Pass	Pass

Note: See Intertek B&C Sketch #1 for impact locations.

Test Specimen #2: Orientation within ±5° of horizontal

IMPACT	#1	#2	#3
MISSILE VELOCITY	15.2 m/s (49.8 fps)	15.2 m/s (49.9 fps)	15.4 m/s (50.4 fps)
IMPACT AREA	Lower left corner of louver	Center of louver	Top right corner of louver
OBSERVATIONS	Missile hit target area, missile was rejected, bent blades, no further damage observed	Missile hit target area, missile was rejected, bent blades, no further damage observed	Missile hit target area, missile was rejected, bent blades, no further damage observed
RESULTS	Pass	Pass	Pass

Note: See Intertek B&C Sketch #2 for impact locations.

Test Specimen #3: Orientation within $\pm 5^\circ$ of horizontal

IMPACT	#1	#2	#3
MISSILE VELOCITY	15.2 m/s (49.7 fps)	15.3 m/s (50.3 fps)	15.2 m/s (49.8 fps)
IMPACT AREA	Lower right corner of louver	Center of louver	Top left corner of louver
OBSERVATIONS	Missile hit target area, missile was rejected, dented blades, no further damage observed	Missile hit target area, missile was rejected, dented blades, no further damage observed	Missile hit target area, missile was rejected, dented blades, no further damage observed
RESULTS	Pass	Pass	Pass

Note: See Intertek B&C Sketch #3 for impact locations.

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TAS 203, Cyclic Wind Pressure Loading

Test Specimen #1:

Test Specimen #1: Cyclic Test Spectrum and Average Cycle Time per TAS 203

DESIGN PRESSURE	STAGE		
	1	2	3
±60.0 psf			
POSITIVE PRESSURE RANGE (psf)	0 – 30.0	0 – 36.0	0 – 78.0
AVERAGE CYCLE TIME (sec.)	2.77	2.89	N/A
NUMBER OF CYCLES	600	70	1
	4	5	6
NEGATIVE PRESSURE RANGE (psf)	0 – 30.0	0 – 36.0	0 – 78.0
AVERAGE CYCLE TIME (sec.)	2.25	2.74	N/A
NUMBER OF CYCLES	600	70	1

Test Specimen #1: Positive Cyclic Load per TAS 203

INDICATOR LOCATION	MAXIMUM DEFLECTION (in.)	PERMANENT SET (in.)
1	0.08	0.01
2	0.15	0.01
3	0.04	<0.01

Test Specimen #1: Negative Cyclic Load per TAS 203

INDICATOR LOCATION	MAXIMUM DEFLECTION (in.)	PERMANENT SET (in.)
1	0.21	0.02
2	0.15	0.01
3	0.05	0.01

Result: Pass

Note: See Intertek B&C Sketch #4 for indicator locations.

TAS 203, Cyclic Wind Pressure Loading

Test Specimen #2:

Test Specimen #2: Cyclic Test Spectrum and Average Cycle Time per TAS 203

DESIGN PRESSURE	STAGE		
	1	2	3
±60.0 psf			
POSITIVE PRESSURE RANGE (psf)	0 – 30.0	0 – 36.0	0 – 78.0
AVERAGE CYCLE TIME (sec.)	2.77	2.89	N/A
NUMBER OF CYCLES	600	70	1
	4	5	6
NEGATIVE PRESSURE RANGE (psf)	0 – 30.0	0 – 36.0	0 – 78.0
AVERAGE CYCLE TIME (sec.)	2.25	2.74	N/A
NUMBER OF CYCLES	600	70	1

Test Specimen #2: Positive Cyclic Load per TAS 203

INDICATOR LOCATION	MAXIMUM DEFLECTION (in.)	PERMANENT SET (in.)
1	0.02	<0.01
2	0.09	0.01
3	0.01	<0.01

Test Specimen #2: Negative Cyclic Load per TAS 203

INDICATOR LOCATION	MAXIMUM DEFLECTION (in.)	PERMANENT SET (in.)
1	0.09	0.03
2	0.19	0.02
3	0.09	0.02

Result: Pass

Note: See Intertek B&C Sketch #4 for indicator locations.

TAS 203, Cyclic Wind Pressure Loading

Test Specimen #3:

Test Specimen #3: Cyclic Test Spectrum and Average Cycle Time per TAS 203

DESIGN PRESSURE	STAGE		
	1	2	3
±60.0 psf			
POSITIVE PRESSURE RANGE (psf)	0 – 30.0	0 – 36.0	0 – 78.0
AVERAGE CYCLE TIME (sec.)	2.77	2.89	N/A
NUMBER OF CYCLES	600	70	1
	4	5	6
NEGATIVE PRESSURE RANGE (psf)	0 – 30.0	0 – 36.0	0 – 78.0
AVERAGE CYCLE TIME (sec.)	2.25	2.74	N/A
NUMBER OF CYCLES	600	70	1

Test Specimen #3: Positive Cyclic Load per TAS 203

INDICATOR LOCATION	MAXIMUM DEFLECTION (in.)	PERMANENT SET (in.)
1	0.06	<0.01
2	0.14	0.01
3	0.05	<0.01

Test Specimen #3: Negative Cyclic Load per TAS 203

INDICATOR LOCATION	MAXIMUM DEFLECTION (in.)	PERMANENT SET (in.)
1	0.07	0.01
2	0.17	0.01
3	0.07	0.02

Result: Pass

Note: See Intertek B&C Sketch #4 for indicator locations.

SECTION 8
CONCLUSION

The specimen(s) tested met the performance requirements set forth in the referenced test procedures for a ± 60.0 psf Design Pressure with missile impacts corresponding to Missile Level D.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends five years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens (where required by Certification or Accreditation bodies), or other pertinent project documentation, will be retained for the entire test record retention period.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

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SECTION 9
SKETCHES

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SECTION 10
PHOTOGRAPH



Photo No. 1
5" Rain-Resistant, Horizontal Louver Prior to Testing

SECTION 11
DRAWINGS

The test specimen drawings have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.

PDF with blank page for each drawing which will be inserted into the report to ensure final pagination of report matches number of pages of final PDF once drawings are inserted in place of blank pages.

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SECTION 12
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	07/28/21	N/A	Original Report Issue

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