

# RANGER ARCHITECTURAL PRODUCTS, INC. TEST REPORT

**SCOPE OF WORK**

ANSI/AMCA 540 TESTING ON 4" RAIN-RESISTANT, HORIZONTAL LOUVER

**REPORT NUMBER**

M5994.01-109-44

**TEST DATE(S)**

07/08/21 - 07/09/21

**ISSUE DATE**

02/07/22

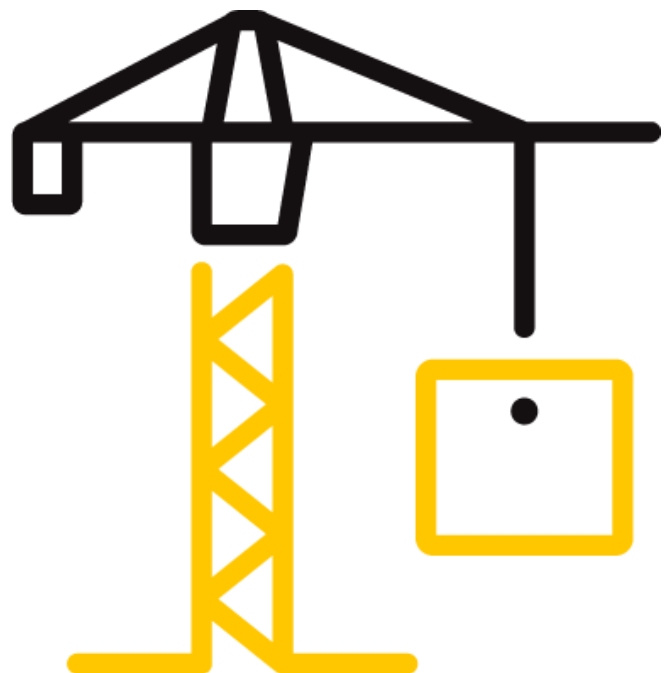
**PAGES**

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**DOCUMENT CONTROL NUMBER**

RT-R-AMER-Test-2806 (06/15/21)

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**TEST REPORT FOR RANGER ARCHITECTURAL PRODUCTS, INC.**

Report No.: M5994.01-109-44

Date: 02/07/22

**REPORT ISSUED TO**

**RANGER ARCHITECTURAL PRODUCTS, INC.**

19031 Aldine Westfield Road

Houston, Texas 77073

**SECTION 1**

**SCOPE**

Architectural Testing, Inc. (an Intertek company), dba Intertek Building & Construction (B&C) was contracted by Ranger Architectural Products, Inc. to perform testing in accordance with ANSI/AMCA 540 on their 4" 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:

<b>COMPLETED BY:</b>	Vicki L. McElwain
<b>TITLE:</b>	Manager – Product Testing
<b>SIGNATURE:</b>	
<b>DATE:</b>	02/07/22

<b>REVIEWED BY:</b>	Timothy J. McGill
<b>TITLE:</b>	Senior Project Engineer – Product Testing
<b>SIGNATURE:</b>	
<b>DATE:</b>	02/07/22

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.

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### SECTION 4 EQUIPMENT

**Canon:** Constructed from steel piping utilizing compressed air to propel the missile, A1207

**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:** 4" Rain-Resistant

**Product Size(s):**

**Test Specimens #1 - #3:**

OVERALL AREA:	WIDTH		HEIGHT		DEPTH	
	millimeters	inches	millimeters	inches	millimeters	inches
1.5 m <sup>2</sup> (16.0 ft <sup>2</sup> )						
Overall size	1219	48	1219	48	102	4
Louver core size	1105	43-1/2	1092	43	102	4

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*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 1" and secured to the louver core, with two #8 x 3/4" pan head screws per member end, into the screw bosses

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### 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 #1 for impact locations.

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### 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 #1 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			
<b>POSITIVE PRESSURE RANGE (psf)</b>	0 – 30.0	0 – 36.0	0 – 78.0
<b>AVERAGE CYCLE TIME (sec.)</b>	2.77	2.89	N/A
<b>NUMBER OF CYCLES</b>	600	70	1
	4	5	6
<b>NEGATIVE PRESSURE RANGE (psf)</b>	0 – 30.0	0 – 36.0	0 – 78.0
<b>AVERAGE CYCLE TIME (sec.)</b>	2.25	2.74	N/A
<b>NUMBER OF CYCLES</b>	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 #2 for indicator locations.



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**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			
<b>POSITIVE PRESSURE RANGE (psf)</b>	0 – 30.0	0 – 36.0	0 – 78.0
<b>AVERAGE CYCLE TIME (sec.)</b>	2.77	2.89	N/A
<b>NUMBER OF CYCLES</b>	600	70	1
	4	5	6
<b>NEGATIVE PRESSURE RANGE (psf)</b>	0 – 30.0	0 – 36.0	0 – 78.0
<b>AVERAGE CYCLE TIME (sec.)</b>	2.25	2.74	N/A
<b>NUMBER OF CYCLES</b>	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 #2 for indicator locations.

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**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			
<b>POSITIVE PRESSURE RANGE (psf)</b>	0 – 30.0	0 – 36.0	0 – 78.0
<b>AVERAGE CYCLE TIME (sec.)</b>	2.77	2.89	N/A
<b>NUMBER OF CYCLES</b>	600	70	1
	4	5	6
<b>NEGATIVE PRESSURE RANGE (psf)</b>	0 – 30.0	0 – 36.0	0 – 78.0
<b>AVERAGE CYCLE TIME (sec.)</b>	2.25	2.74	N/A
<b>NUMBER OF CYCLES</b>	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 #2 for indicator locations.

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### SECTION 8

#### CONCLUSION

The specimen(s) tested met the performance requirements set forth in the referenced test procedures for a  $\pm 60.0$  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.

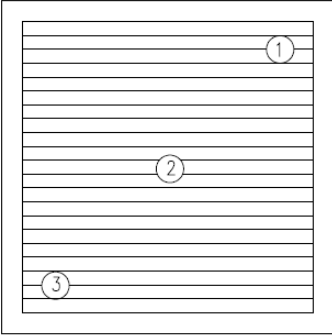
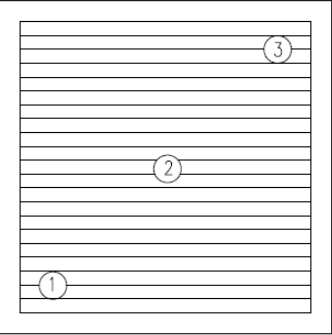
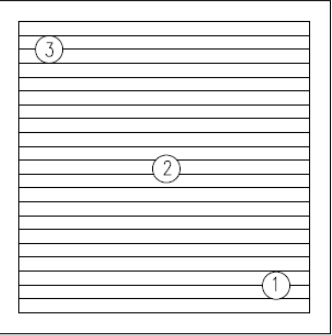

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

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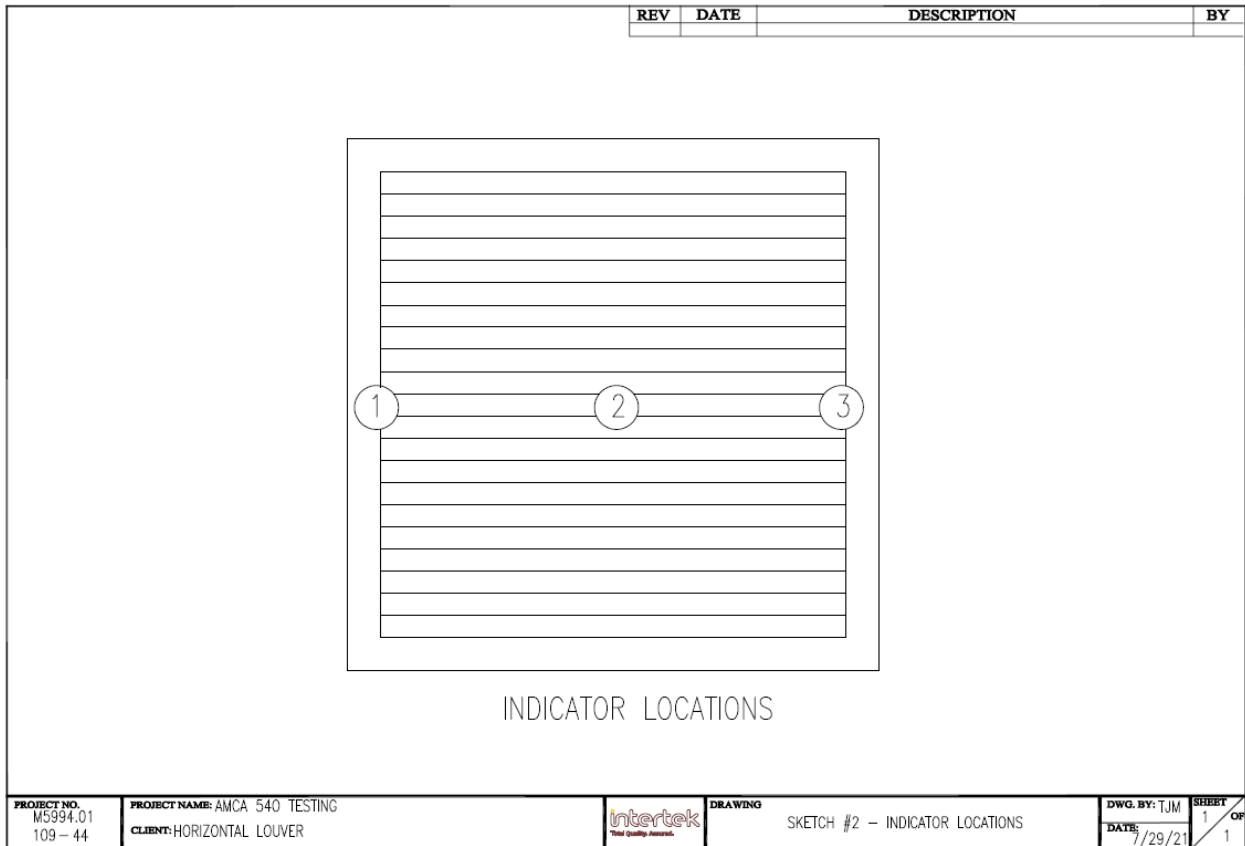
### SECTION 9 SKETCHES

	REV	DATE	DESCRIPTION	BY	
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>SPECIMEN 1</p>  </div> <div style="text-align: center;"> <p>SPECIMEN 2</p>  </div> <div style="text-align: center;"> <p>SPECIMEN 3</p>  </div> </div> <p style="text-align: center; margin-top: 10px;">IMPACT LOCATIONS</p>					
PROJECT NO. M5994.01 109 - 44	PROJECT NAME: AMCA 540 TESTING CLIENT: HORIZONTAL LOUVER			DRAWING SKETCH #1 - IMPACT LOCATIONS	DWG. BY: TJM DATE: 7/29/21 SHEET 1 OF 1

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### SECTION 10 PHOTOGRAPH



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



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**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.

















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**SECTION 12**

**REVISION LOG**

REVISION #	DATE	PAGES	REVISION
0	02/07/22	N/A	Original Report Issue