

KAWNEER COMPANY INC. FLORIDA BUILDING TEST REPORT

SCOPE OF WORK

ASTM E283, ASTM E331, ASTM E330, ASTM E 1886/1996, TAS 201, TAS 202, AND TAS 203
TESTING ON 1600 WALL SYSTEM™1 CURTAIN WALL

REPORT NUMBER

J0847.01-550-18 R0

TEST DATE(S)

01/24/19 – 01/29/19

ISSUE DATE

02/18/19

LABORATORY CERTIFICATION NO.

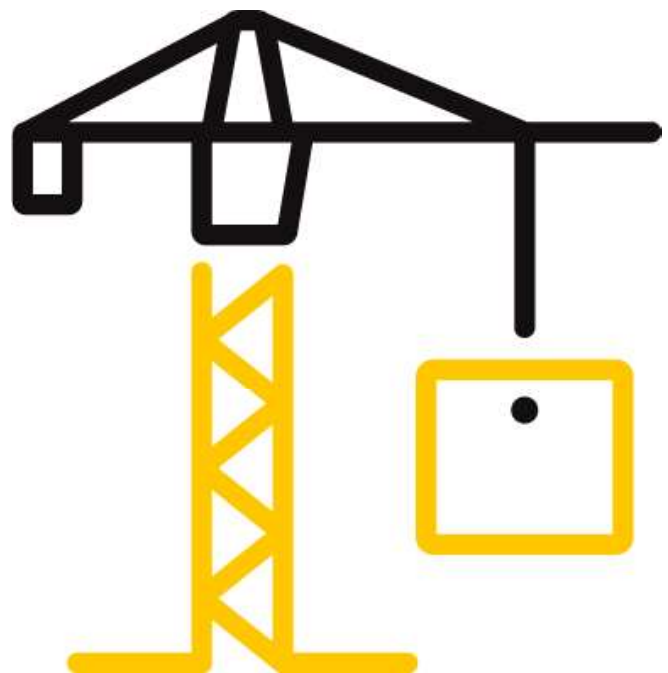
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TEST REPORT FOR KAWNEER COMPANY INC.

Report No.: J0847.01-550-18 R0

Date: 02/18/19

REPORT ISSUED TO

KAWNEER COMPANY INC

555 Guthridge Court
Norcross, GA 30092

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Kawneer Company Inc to perform ASTM E283, ASTM E331, ASTM E330, ASTM E 1886/1996, TAS 201, TAS 202, AND TAS 203 testing in accordance with Florida Building Code for High Velocity Hurricane Zone requirements on their 1600 Wall System™1 Curtain Wall. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at the Intertek B&C test facility in Lithia Springs, GA. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

SECTION 2

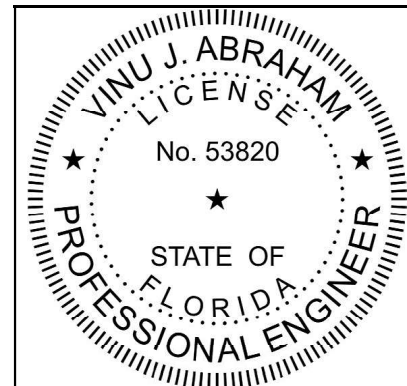
SUMMARY OF TEST RESULTS

The specimen(s) tested met the performance requirements set forth in the protocols.

Product Type: Curtain Wall

Series/Model: 1600 Wall System™1

SPEC.	TEST PROTOCOL	DESIGN PRESSURE
1	ASTM E283, E330, E331, & E1886/E1996 TAS 201-202-203 (Large Missile)	+50 / -50 psf
2	ASTM E330 TAS 202 (Static only)	+50 / -50 psf
2	ASTM E1886/E1996 TAS 201/203 (Large Missile)	+50 / -50 psf



For INTERTEK B&C:

COMPLETED BY: Ryan K. Hedgepeth, E.I.T.
TITLE: Project Engineer
SIGNATURE: 
Digitally Signed by: Ryan K. Hedgepeth
DATE: 02/18/19

REVIEWED BY: Vinu J. Abraham, P.E.
TITLE: Vice President
SIGNATURE: 
Digitally Signed by: Vinu Abraham
DATE: 02/18/19

rkx:cns

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SECTION 3

TEST METHOD(S)

The specimens were evaluated in with the following:

ASTM E283-04(2012), *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*

ASTM E330-14, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

ASTM E331-00(2016), *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

ASTM E1886-13a, *Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials*

ASTM E1996-17, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

TAS 201-94, *Impact Test Procedures*

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

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

SECTION 4

MATERIAL SOURCE/INSTALLATION

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

Then specimen was installed into a 2x8 double wood buck with a C8 Steel C-Channel buck for buck reinforcement. The rough opening allowed for a 1/2" shim space. The exterior perimeter was sealed with sealant. Installation of the tested product was performed by the client.

Test Specimen #1 and 2:

LOCATION	ANCHOR DESCRIPTION	ANCHOR LOCATION
Head/Sill	Four (4) 5/16" x 2-1/2" Ultracon Anchors into "F" Anchors (Part# 162311)	At each Jamb Mullion (See drawings)
Head/Sill	Four (4) 5/16" x 2-1/2" Ultracon Anchors into "T" Anchors (Part# 162312)	At each Intermediate Mullion (See drawings)

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EQUIPMENT**Cannon:** 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**Deflection Measuring Device:** Linear transducers,**SECTION 6**
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Philip Busenlehner	Kawneer Company Inc.
Ryan Hedgepeth	Intertek B&C
Guillermo Silva	Intertek B&C
Raul Nieves	Intertek B&C

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SECTION 7

TEST SPECIMEN DESCRIPTION

Product Type: Curtain Wall

Series/Model: 1600 Wall System™ 1

Product Size(s):
Test Specimen #1 & 2:

OVERALL AREA:	WIDTH		HEIGHT	
14.9 m ² (161 ft ²)	millimeters	inches	millimeters	inches
Overall Size	5194	204-1/2	2851	112-1/4

The following applies to all specimens:

Frame Construction:

FRAME MEMBER	MATERIAL	DESCRIPTION
Head/Sill	Aluminum	6063-T6 (Part# 162095)
Jambs/Mullion	Aluminum	6063-T6 (Part# 162003)
Vertical Divider	Aluminum	6063-T6 (Part# 162004)
	JOINERY TYPE	DETAIL
Head/Sill	Mechanical	Shear block (Part# 162332) with two (2) #12 x 1-7/8" Type B pan head threaded fasteners.
Mullions	Mechanical	Shear block (Part# 162378) with two (2) #12 x 1-7/8" Type B pan head threaded fasteners.

Reinforcement:

PART #	LOCATION	MATERIAL	DESCRIPTION
162300	Mullion	Grade 50 Steel	Located 26-1/8" from bottom of unit, 60" span, hi-span steel reinforcing (1.750" x 4.560" x 0.164") fastened with 1/4"-20 x 2" FHTCMS "D/F" screws spaced 48" max. o.c.

Weatherstripping: No weatherstripping was utilized.

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Glazing: *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made.*

CLIENT DESIGNATION	OVERALL THICKNESS	GLASS MAKEUP	GLAZING METHOD
1	1-5/16"	1/4" fully tempered glass 1/2" air space 1/4" heat-strengthened glass 0.090" Kuraray SG interlayer 1/4" heat-strengthened glass	Exterior: EPDM Gasket (Part# 027850) Interior: EPDM Gasket (Part# 127196)
LOCATION	QUANTITY	DAYLIGHT OPENING millimeters	GLASS BITE
Top Lites	2	2502 x 1791	98-1/2 x 70-1/2
Bottom Lites	2	2502 x 870	98-1/2 x 34-1/4

Drainage:
Test Specimen #1:

DRAINAGE METHOD	SIZE	QUANTITY	LOCATION
Weeps	5/16"	8	2" from edges at bottom sill only

Test Specimen #2:

DRAINAGE METHOD	SIZE	QUANTITY	LOCATION
Weeps	5/16"	8	2" from edges

Hardware: *No hardware was utilized.*

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SECTION 8
TEST RESULTS
Protocol ASTM E283, ASTM E330, ASTM E331, and TAS 202-94, Static Air Pressure
Test Date(s): 01/22/19 – 01/29/19

The temperature during testing was 21°C (69°F) to 22°C (71°F). The results are tabulated as follows:

Test Specimen #1

TITLE OF TEST	RESULTS	ALLOWED	NOTE
Air Leakage, Infiltration per ASTM E283 & TAS 202 at 1.57 psf (25 mph)	<0.05 L/s/m ² (<0.01 cfm/ft ²)	0.3 L/s/m ² (0.06 cfm/ft ²) max.	1
Air Leakage, Infiltration per ASTM E283 & TAS 202 at 6.24 psf (50 mph)	<0.05 L/s/m ² (<0.01 cfm/ft ²)	0.3 L/s/m ² (0.06 cfm/ft ²) max.	1
Water Penetration, per ASTM E331 & TAS 202 15% of Positive Design Pressure at 958 Pa (20.00 psf)	Pass	No leakage	

Note 1: Test Date 01/22/19 (Air Note only)

Test Specimen #1: Preload and Design Load per ASTM E330 & TAS 202

LOAD (psf)	INDICATOR LOCATION	DEFLECTION (in.)		PERMANENT SET (in.)	
		MEASURED	ALLOWED	MEASURED	ALLOWED
+37.50 50% of Test Pressure	A	0.118	N/A	0.008	N/A
	B	0.267	N/A	0.020	N/A
	C	0.161	N/A	0.006	N/A
+50.00 Design Pressure	A	0.168	0.544	0.010	0.196
	B	0.372	0.622	0.031	0.224
	C	0.220	0.544	0.003	0.196
-37.50 50% of Test Pressure	A	0.133	N/A	0.023	N/A
	B	0.289	N/A	0.040	N/A
	C	0.200	N/A	0.036	N/A
-50.00 Design Pressure	A	0.185	0.544	0.024	0.196
	B	0.417	0.622	0.048	0.224
	C	0.300	0.544	0.059	0.196

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Test Specimen #1: Structural Overload Load per ASTM E330 & TAS 202

LOAD (psf)	INDICATOR LOCATION	DEFLECTION (in.)		PERMANENT SET (in.)	
		MEASURED	ALLOWED	MEASURED	ALLOWED
+75.00 Test Pressure	A	0.273	N/A	0.009	0.196
	B	0.575	N/A	0.029	0.224
	C	0.350	N/A	0.023	0.196
-75.00 Test Pressure	A	0.260	N/A	0.001	0.196
	B	0.610	N/A	0.020	0.224
	C	0.403	N/A	0.013	0.196

Test Specimen #2: Preload, Design, and Overload per ASTM E330 & TAS 202

LOAD (psf)	INDICATOR LOCATION	DEFLECTION (in.)		PERMANENT SET (in.)	
		MEASURED	ALLOWED	MEASURED	ALLOWED
+37.50 50% of Test Pressure	A	0.139	N/A	0.001	N/A
	B	0.283	N/A	0.001	N/A
	C	0.178	N/A	0.001	N/A
+50.00 Design Pressure	A	0.195	0.544	0.003	0.196
	B	0.405	0.622	0.019	0.224
	C	0.252	0.544	0.014	0.196
-37.50 50% of Test Pressure	A	0.150	N/A	0.026	N/A
	B	0.298	N/A	0.041	N/A
	C	0.139	N/A	0.053	N/A
-50.00 Design Pressure	A	0.197	0.544	0.032	0.196
	B	0.402	0.622	0.057	0.224
	C	0.332	0.544	0.073	0.196
+75.00 Test Pressure	A	0.279	N/A	0.008	0.196
	B	0.569	N/A	0.031	0.224
	C	0.360	N/A	0.031	0.196
-75.00 Test Pressure	A	0.227	N/A	0.006	0.196
	B	0.561	N/A	0.038	0.224
	C	0.376	N/A	0.010	0.196

Note 2: Positive and negative uniform static load test loads were held for 30 seconds.

Note 3: 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.

Note 4: See Sketch #1 for indicator locations. Deflection/permanent set reported is the overall deflection between three points (longest unsupported span) which accounts for support movement.

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Protocol ASTM E1886, ASTM E1996, & TAS 201-94, *Large Missile Impact Procedures*

Test Date(s): 01/24/19 and 01/29/19

The temperature during testing was 21°C (70°F) and 22°C (71°F), respectively. The results are tabulated as follows:

Test Specimen #1: Impact Data

IMPACT #	MISSILE WEIGHT (lbs.)	MISSILE LENGTH (in.)	MISSILE VELOCITY (ft./sec.)
1	9.3	100	49.89
2	9.3	100	49.98
3	9.3	100	49.47
4	9.3	100	49.64

Test Specimen #2: Impact Data

IMPACT #	MISSILE WEIGHT (lbs.)	MISSILE LENGTH (in.)	MISSILE VELOCITY (ft./sec.)
1	9.0	100	50.50
2	9.0	100	49.40
3	9.0	100	50.26
4	9.0	100	49.30

Note 5: See Sketch #2 & 3 for impact locations.

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Protocol ASTM E1886, ASTM E1996, & TAS 203-94, *Cyclic Wind Pressure Loading*
Test Date(s): 01/24/19 through 01/29/19

The temperature during testing was 21°C (70°F). The results are tabulated as follows:

Test Specimen #1: Cyclic Test Spectrum and Average Cycle Time per ASTM E1886, ASTM E1996, & TAS 203

DESIGN PRESSURE	STAGE			
+50.0 / -50.0 psf	1	2	3	4
POSITIVE PRESSURE RANGE (psf)	10.0 – 25.0	0 – 30.0	25.0 – 40.0	15.0 – 50.0
AVERAGE CYCLE TIME (sec.)	2.3	2.4	2.9	2.7
NUMBER OF CYCLES	3500	300	600	100
	5	6	7	8
NEGATIVE PRESSURE RANGE (psf)	15.0 – 50.0	25.0 – 40.0	0 – 30.0	10.0 – 25.0
AVERAGE CYCLE TIME (sec.)	2.6	2.3	2.1	2.1
NUMBER OF CYCLES	50	1050	50	3350

Test Specimen #2: Cyclic Test Spectrum and Average Cycle Time per ASTM E1886, ASTM E1996, & TAS 203

DESIGN PRESSURE	STAGE			
+50.0 / -50.0 psf	1	2	3	4
POSITIVE PRESSURE RANGE (psf)	10.0 – 25.0	0 – 30.0	25.0 – 40.0	15.0 – 50.0
AVERAGE CYCLE TIME (sec.)	2.3	2.5	1.8	1.6
NUMBER OF CYCLES	3500	300	600	100
	5	6	7	8
NEGATIVE PRESSURE RANGE (psf)	15.0 – 50.0	25.0 – 40.0	0 – 30.0	10.0 – 25.0
AVERAGE CYCLE TIME (sec.)	2.9	2.7	2.1	2.3
NUMBER OF CYCLES	50	1050	50	3350

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SECTION 9**CONCLUSIONS**

The large missiles impacted each intended target. Each impact location was carefully inspected. No signs of penetration, rupture, or opening after the large missile impact test were observed; as such, each test specimen satisfies the large missile requirements of ASTM E1996 & TAS 201. Upon completion of testing, specimens tested for ASTM E1996 & TAS 201 met the requirements of Section 1626 of the Florida Building Code, Building.

No signs of failure were observed in any area of the test specimen during the TAS 202 testing; as such, the test specimen satisfies the requirements of ASTM E283, ASTM E330, ASTM E331, & TAS 202. Upon completion of testing, specimens tested for ASTM E283, ASTM E330, ASTM E331, & TAS 202 met the requirements of Section 1620 of the Florida Building Code, Building.

No signs of failure were observed in any area of the test specimens during the cyclic load test; as such, the test specimens satisfy the cyclic load requirements of ASTM E1886 & TAS 203. Upon completion of testing, specimens tested for ASTM E1886 & TAS 203 met the requirements of Section 1626 of the Florida Building Code, Building.

SECTION 10**Documentation Statement**

Intertek-ATI will service this report until 01/29/29. Test records that are retained such as detailed drawings, data sheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI until this date.

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 Intertek-ATI.

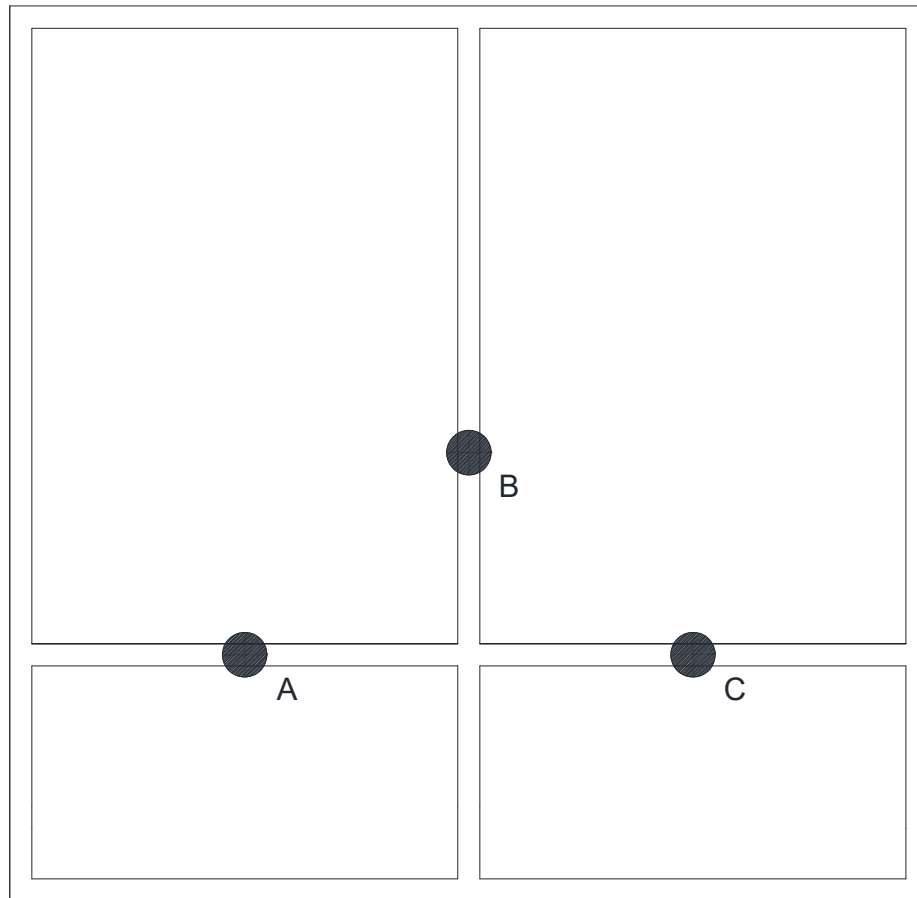
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SECTION 11

SKETCH(ES)

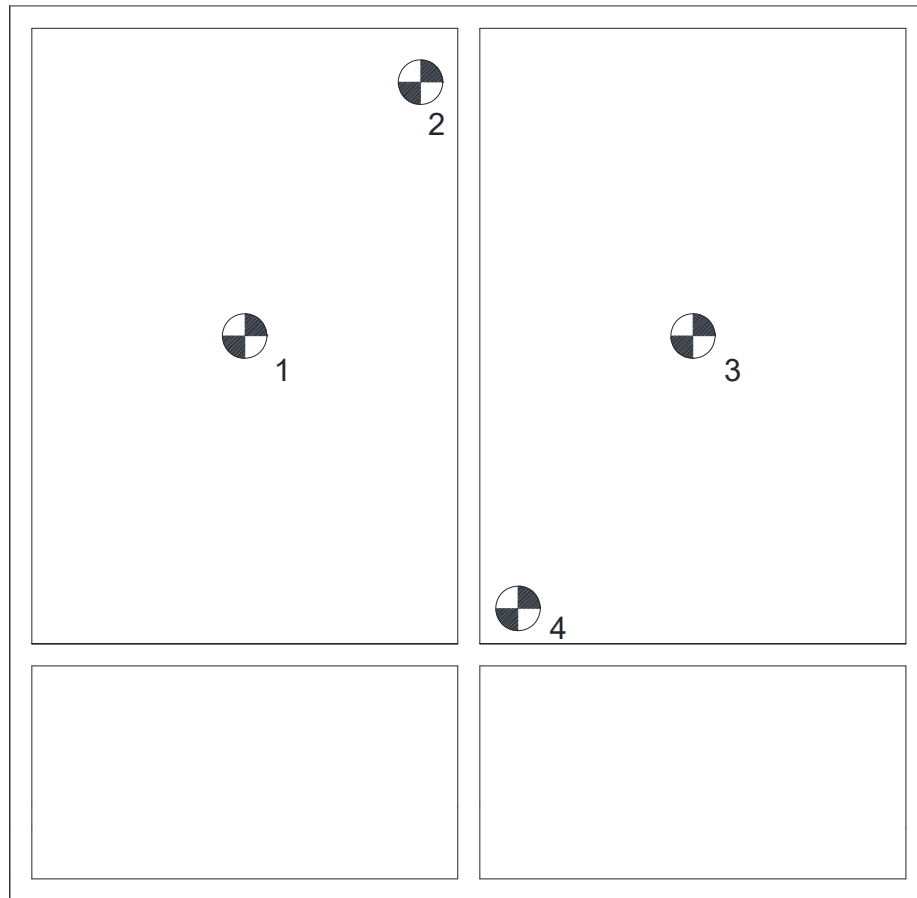


Sketch No. 1
Deflection gage Locations

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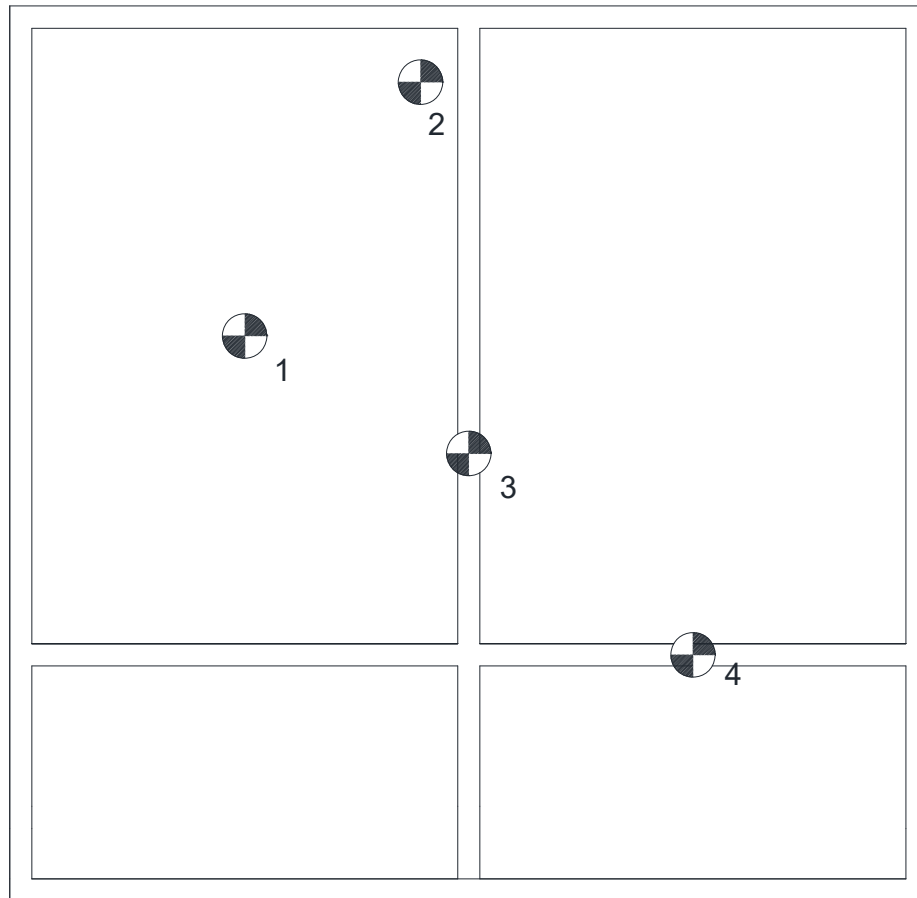


Sketch No. 2
Impact Locations (Specimen #2)

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Sketch No. 3
Impact Locations (Specimen #2)

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SECTION 12

PHOTOGRAPHS



Photo No. 1
Test Specimen #1 during air infiltration

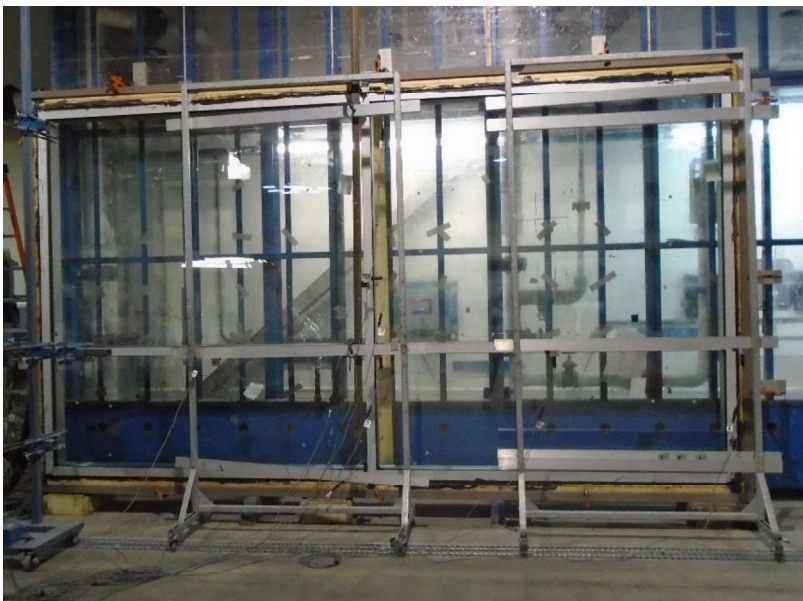


Photo No. 2
Test Specimen #1 during uniform static load

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Photo No. 3
Test Specimen #1 during water penetration



Photo No. 4
Test Specimen #1 during cyclic loading

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Photo No. 5
Test Specimen #2 during cyclic loading



Total Quality. Assured.

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SECTION 13

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 14

REVISION LOG

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