

ARCONIC ARCHITECTURAL PRODUCTS FIRE TEST REPORT

SCOPE OF WORK

CAN/ULC S134, STANDARD METHOD OF FIRE TESTS OF EXTERIOR WALL ASSEMBLIES
CONTAINING ARCONIC REYNOBOND[®] RB-160-FB

REPORT NUMBER

103413434SAT-003

TEST DATE(S)

03/09/18

ISSUE DATE

03/29/18

RECORD RETENTION END DATE

03/19/28

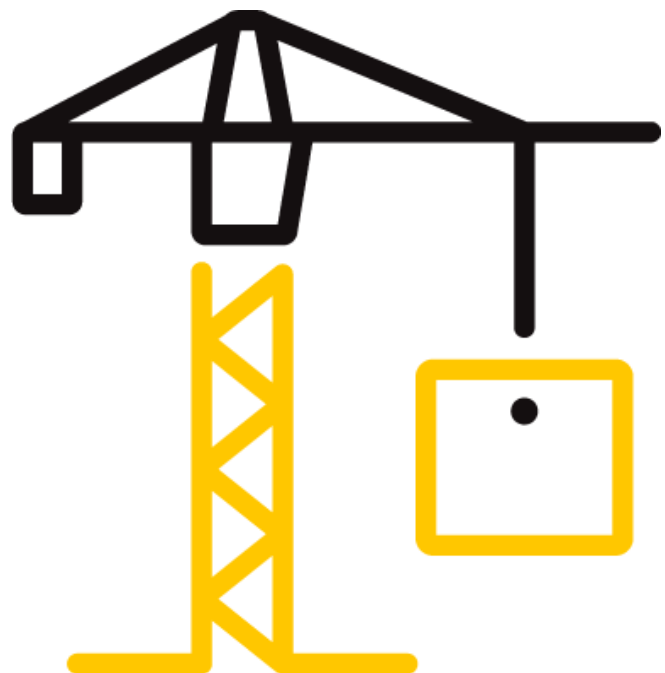
PAGES

42

DOCUMENT CONTROL NUMBER

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TEST REPORT FOR ARCONIC ARCHITECTURAL PRODUCTS

Report No.: 103413434SAT-003

Date: 03/29/18

REPORT ISSUED TO

ARCONIC ARCHITECTURAL PRODUCTS

50 Industrial Blvd

Eastman, Georgia 31023

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Arconic Architectural Products (Eastman, GA) to evaluate resistance to flame propagation in accordance with **CAN/ULC-S134, Standard Method of Fire Test of Exterior Wall Assemblies, 2nd Edition, dated August 2013**, on their REYNOBOND[®] RB 160-FR Aluminum Composite Material Panels. Testing was conducted at the Intertek B&C test facility in Elmendorf, Texas, USA. Results obtained are tested values and were secured by using the designated test method.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

SECTION 2

SUMMARY OF TEST RESULTS

Wall System: Exterior Non-load-bearing Wall Assembly

Combustible Components: Arconic Aluminum Composite Panels over Roxul Cavityrock[®] Insulation over Carlisle WIP 300HT Underlayment

CAN/ULC S134 Test Results

The assembly described and tested in this report **did not** meet the Conditions of Acceptance of **CAN/ULC-S134, Standard Method of Fire Tests of Exterior Wall Assemblies, 2nd Edition, dated August 2013**. Construction of the full assembly is summarized in Section 7 of this test report.

For INTERTEK B&C:

COMPLETED BY:	Chris Owen	REVIEWED BY:	Herbert W. Stansberry II
TITLE:	Project Engineer – Fire Resistance	TITLE:	Engineering Supervisor
SIGNATURE:		SIGNATURE:	
DATE:	03/19/18	DATE:	03/28/18

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SECTION 3

TEST METHOD(S)

The assembly was evaluated in accordance with the following:

CAN/ULC-S134, *Standard Method of Fire Test of Exterior Wall Assemblies, 2nd Edition, dated August 2013*

SECTION 4

MATERIAL SOURCE/INSTALLATION

The components of the test assembly were provided by the client except for the core wall components that were acquired and assembled by Intertek B&C personnel. Samples were submitted to Intertek directly from the client. The sampled product was selected by Intertek B&C personnel, Ryan Hedgepeth. The specimen was witnessed during production and tagged prior to shipment on 02/18/18, (Reference Intertek B&C Test Specimen Selection Report No. I1170.01-550-38, dated 02/26/18). The samples were received at the Evaluation Center on 03/07/18 in good condition and were assigned Intertek Sample ID No. SATX1803071326-001 . The subject test specimen is a traceable sample selected from the manufacturer's facility. Intertek selected the specimen and has verified the composition, manufacturing techniques and quality assurance procedures.

SECTION 5

CALIBRATED INSTRUMENTATION USED FOR TESTING

Description	Serial No.	Calibration Due Date
Stopwatch	160778695	09/21/18
DAQ Unit	HB9002195	12/26/18
Thermo/Hygrometer	170016662	01/04/19
Anemometer	17331	10/11/18
Anemometer	17332	10/11/18
Anemometer	17333	10/11/18
Anemometer	17334	10/11/18
Radiometer	189851	10/10/18
Radiometer	189853	10/10/18
Radiometer	189854	10/10/18
Gas Flow Transducer	2642089	02/09/19
E-Type TC	461564	02/12/19
Gas Pressure Transducer	1026161022	02/14/19

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SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas Rogers	Arconic Architectural Products
Chris Owen	Intertek B&C
Victor Burgos	Intertek B&C

SECTION 7

TEST PROCEDURE

Testing was performed on 03/08/2018 in accordance with the CAN/ULC S134 test method. Ambient conditions were 18°C and 35% relative humidity. Anemometers were used to verify ambient air velocity did not exceed 2 m/s as specified in the test method. Video recording, digital photographs, visual observations, and data collection were performed prior, during, and after testing was completed. The test was performed at 11:30 AM. All observations are recorded in the table located in Section 8.

In accordance with CAN/ULC S134, once ambient conditions are met, the pilot burners are lit. The test then starts with the ignition of the burners. The burners proceed, controlled as specified in the test method, with a 5 min growth period, followed by a 15 min steady state period, followed by a 5 min ramp down period to zero.

Three water cooled heat flow transducers (0-100 kW/m²) were installed through the test specimen and the front wall of the test chamber 3.5 m above the top of the window opening; one within 0.2 m ± 0.05 m horizontally of the center line of the opening and one on each side and within 0.5 ± 0.1 m horizontally from the first. The transducers were installed so that their sensing faces were flush with the outer face of the test specimen. 24 GA (0.51 mm), Type K bare beaded thermocouples were used to monitor temperature of the specimen and were located approximately 89 mm to the right of the vertical center line and above the opening at 1.5 ± 0.05 m, 2.5 ± 0.05 m, 3.5 ± 0.05 m, 4.5 ± 0.05 m, 5.2 ± 0.05 m. At each of these levels, one thermocouple was installed on the outermost ridge of the test specimen, and one on the outer face of each representative layer within the specimen.

The assembly was instrumented with fifteen (15) thermocouples, at the prescribed heights, as follows:

- TCs 1-5: Flush with exterior panels.
- TCs 6-10: Second level between the insulation and the inside of the exterior panels.
- TCs 11-15: Third level between the peel and stick underlayment and the insulation.

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The output of the transducers and thermocouples were monitored by a National Instruments CDAQ-9188 Data Acquisition Unit. The data acquisition system was programmed to scan and save data every 5 seconds. Following the test, the files were imported into MS Excel for tabular and graphical display. The graphical display data can be found in Section 13.

SECTION 8

TEST OBSERVATIONS

FIRE-RESISTANCE TEST OBSERVATIONS	
Time (Min:Sec)	Observations
Pre-test	Nothing to report.
00:00	Test Start
04:30	Flaming out window
05:00	Ramp up complete
08:00	Intermittent flaming on panels above window, panel beginning to open
11:00	Bottom panels above window flaming and opened
11:22	3 m flame height
13:00	Center cavity flaming opened, 3.5 m flame height
14:00	Heat flux exceeded left and right radiometer
14:01	Center radiometer appears to be blocked
16:00	4 m flame height
17:30	Near 5 m flame spread
20:00	Flaming subsided
23:00	Minor lingering flames
25:00	Test finished

Following the test, cone-like pattern observed from flaming on panels, with apex at just above 6 m mark. Bottom 2 panels were nearly entirely consumed, with panel consumption lessening as flame travelled up. During test, a row of ceramic blanket which connected from within the furnace to the blanket at the flashing along top edge, was sagging and fell with consumption of the first two panels above the opening at approximately 17 min.

SECTION 9

TEST SPECIMEN DESCRIPTION

Strips of Carlisle WIP 300HT self-adhering roofing underlayment membrane, 0.914 m wide, were adhered to the exterior surface of the gypsum board on the CMU base wall of the S134 test wall. Strips were cut to a nominal length of 6.3 m below the window, beginning with a row flush with the floor to the bottom of the window. Strips were then cut to approximately 1.8 m on either

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side of the window. Above the window, strips were cut to nominally 3.2 m, and adhered from edge to the center of the test wall. For each row above the window to the top, the strips overlapped 0.12 m. Additionally, each row overlapped the strip below by .10 m. Strips around the window were cut along the edge to be flush with the opening.

Closure angle pieces consisting of 16 GA stair step zee girts were installed vertically from the base of the floor to the top edge of the base wall. The girt profile consisted of a horizontal leg at 5.4 cm, a vertical leg at 7.5 cm, a second horizontal leg at 4.3 cm and a second vertical leg at 4.3 cm. The overall girt was 9.7 cm in width and 11.8 cm in height. Holes were pre-drilled in the 5.4 cm horizontal leg at 0.5 cm diameter, 40.6 cm on-center (oc) nominally, beginning at 15 cm from the edge. The closure girts were secured with 7 cm long x .65 cm diameter concrete anchor screws through the pre-drilled holes. The closure zeers were set 5 m apart, oc, and oriented so that the closure angles were wider apart as they extended from the base wall surface (see photos), or that the lip/plane furthest from the wall was closer to the vertical edge/perimeter of the base wall.

Z-girts (16 GA, galvanized steel, top and bottom flange lengths of 4.5 cm and depth of 7.6 cm) were installed horizontally to the base wall via anchor screws every 40.64 cm, oc, beginning 6 cm from the edge. Holes were predrilled as well in the same manner as the closure zeers. Full 3.048 m sections were aligned with cut pieces of 1.82 m in length so two pieces fit between the closure zeers. The girts were installed, beginning 16 cm from the bottom going up every 40.64 cm nominally, oc, with noted exceptions. The row beneath the window was located 17.1 cm beneath the bottom edge of the window. From this point going up, an extra row was placed 20.3 cm up, oc, on both sides of the window, between the nominal 40.64 cm rows. The window pieces were cut to lengths of 1.16 m. Between the top two side zeers, a piece was cut to 2.68 m and placed 6.5 cm, oc, above the top edge of the window, resulting in a row that was not continuous across. Additionally, 2 extra rows were placed to accommodate for panel attachments. The first extra row was placed 13.5 cm above the row located 4 m above the top window edge. The second extra row was placed 18 cm above the 5th zee row.

Roxul Cavityrock (2.45 x 40.64 x 121.92 cm) of 85 kg/m³ was used as insulation. 3 layers were used for the entire wall. Pieces were inserted by wedging under the lip of the top zee and pushing until flush with the system and aligned together. Pieces were cut as needed to fit the cavities between girts. Additionally, the insulation was extended past the edges of the horizontal zee girts until flush with the closure zeers on each edge. Flashing (8 x 5 cm, 16 GA, galvanized steel) was installed and fastened to the girts around the top, left, and right edges of the window.

Sampled 4 mm Arconic Reynobond panels were then installed. Panels were received with Al (aluminum alloy 6063 T5 temper mill finish) extrusions already attached to the panels via galvanized steel screws. Double "h" Al (aluminum alloy 6063 T5 temper mill finish) clips with dimensions of 366 cm in length, 6.9 cm in width, 0.3 cm thickness, and h-channel cavity of 0.3 cm wide and 1.2 cm in depth were used to secure the panels to the zee girts. Please note, single side/channel clips were missing for the vertical edges of the wall, thus pieces of the double channel were cut down the middle and cut again into 61 cm, nominal, length pieces. These pieces were centered for each panel, and placed on panel by panel. This same setup was used for vertical double channel clips as well for the rest of the vertical joints at 61 cm nominal. The very bottom,

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horizontal clip was a full-length piece. Horizontal clips on the sides of the window were cut to 61 cm and set centered to the space between the window and edge. All horizontal clips above the window opening were full length and centered with the wall, with 67 cm pieces cut and aligned on the sides to form a continuous horizontal clip. All clips were installed using 5 cm x 0.5 cm galvanized steel screws through the clip into the zee, every 40.64 cm oc, nominally, except for the shorter clips which were every 20 cm oc, nominally.

After the clips were installed for a given section, panels were then slid into place. Two panels (1.4 x 2.5 x .035 m) were installed below the window. One panel (1.41 x 1.22 x 0.035 m) was installed on each side of the window. Two rows of four panels (1.22 x 1.22 x 0.035 m) were placed above the window, and 3 rows of two panels (1.52 x 2.5 x .035 m) were placed above those. All rows had a vertical joint centered with test wall. After the panels were placed, cover slips were slid between the panels and over the clips to cover the joints. After the panels were placed, the cover wrap was removed from the exterior surface.

Please note, the zee girt row located 4m above the window opening was not aligned per the drawing. The clip was instead fastened to the vertical clips and through the insulation.

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**SECTION 10
TEST RESULTS**

Time (min)	Left Radiometer (1 min. Avg.)	Right Radiometer (1 min. Avg.)	Center Radiometer (1 min. Avg.)	Visual Flame Height (in meters)
0:00	-0.43743	-0.43978	-0.30736	0
1:00	-0.36138	-0.48683	-0.64457	0
2:00	-0.22684	-0.28099	0.01842	0
3:00	0.129998	0.248319	-0.02159	0
4:00	0.99576	1.112849	0.527091	0
5:00	2.3529	1.97738	1.190078	0
6:00	3.669092	3.006583	2.121689	0
7:00	4.692797	3.871113	2.064535	0
8:00	6.45942	4.529803	2.298867	0
9:00	10.3612	5.506076	3.024724	0.5
10:00	12.08102	5.406096	3.430517	1
11:00	12.78884	6.400012	5.047978	2
12:00	20.6743	13.428	5.64238	3
13:00	23.27743	25.27265	6.539699	3.5
14:00	37.06528	34.38845	8.911592	3.5
15:00	61.09602	66.38784	5.882427	4
16:00	39.64501	72.94533	4.396421	4
17:00	39.28233	74.23918	6.111043	4.5
18:00	46.7466	48.63262	12.25511	5
19:00	19.20016	23.90822	24.9033	2
20:00	13.8301	15.43935	20.14808	2
21:00	9.296545	13.2398	18.34201	0
22:00	7.664467	11.47545	15.11852	0
23:00	6.178632	9.746392	14.68415	0
24:00	4.920937	8.599566	10.68337	0
25:00	3.850434	7.682105	5.77955	0

**SECTION 11
CONCLUSION**

The Arconic REYNOBOND® RB 160-FR Aluminum Composite Material Panels did not meet the conditions of acceptance outlined in **CAN/ULC-S134, Standard Method of Fire Test of Exterior Wall Assemblies, 2nd Edition, dated August 2013.**

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SECTION 12 PHOTOGRAPHS

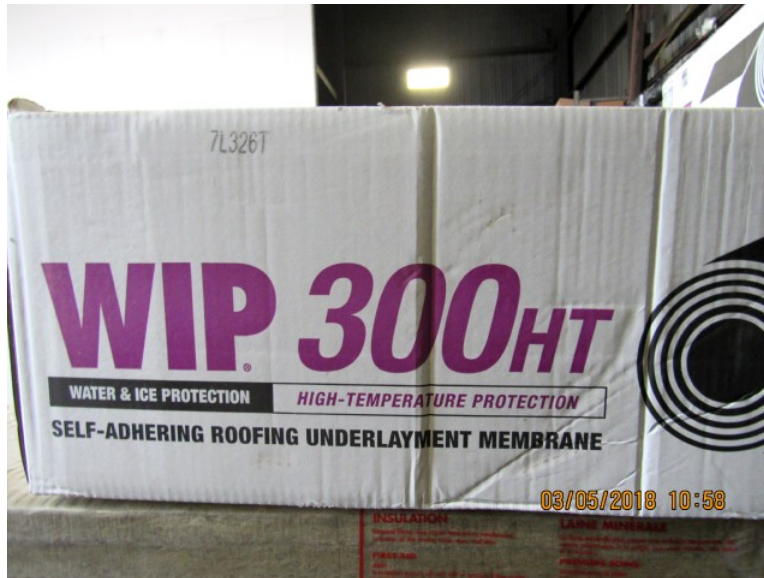


Photo No. 1
Weather Barrier



Photo No. 2
Insulation

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Photo No. 3
Installing Weather Barrier

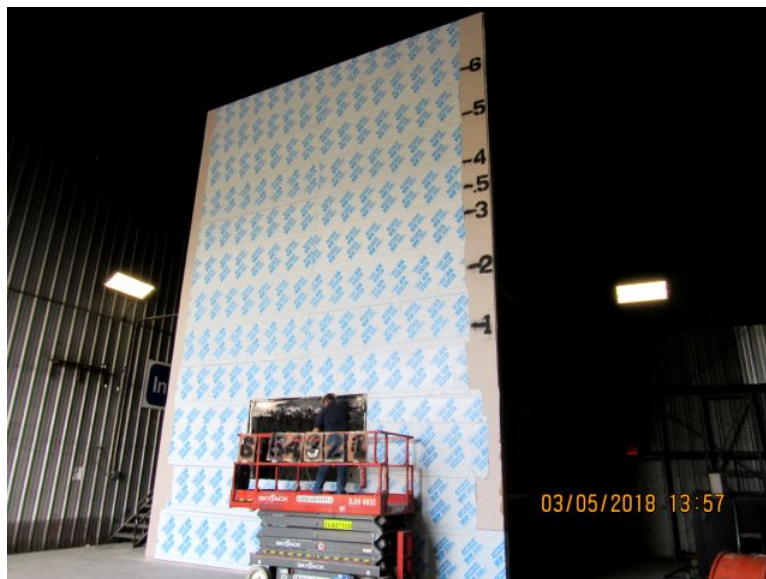


Photo No. 4
Finished Layer

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Photo No. 5

Collection of All Girts, Closure Angles, and Flashing



Photo No. 6

Drilling Through Girts

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Photo No. 7
Vertical Closure



Photo No. 8
Installing Zee Girts

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Photo No. 9
Anchor Screws

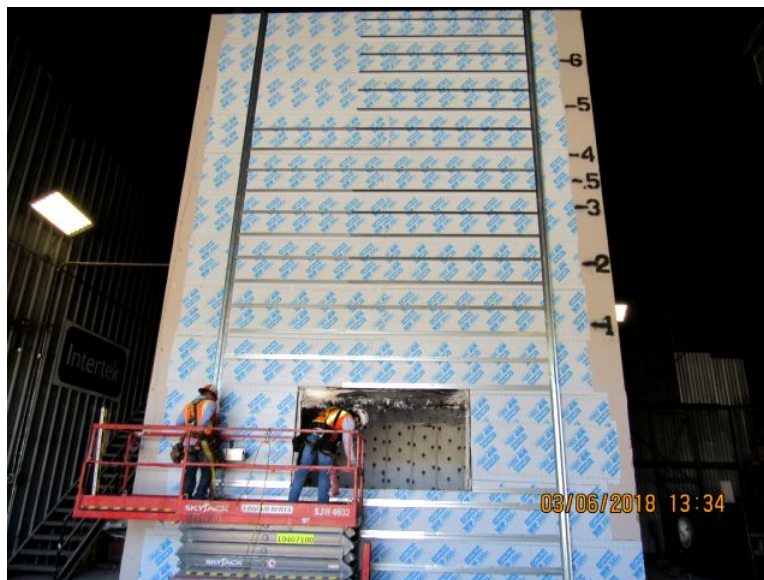


Photo No. 10
Installation of Girts Above Window

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Photo No. 11
Installation of Extra Rows



Photo No. 12
Installation of Insulation

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Photo No. 13
Completed Insulation

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Photo No. 14
Opening of Crate of Panels



Photo No. 15
Clips and Cover Plates

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Photo No. 16
Clips Used

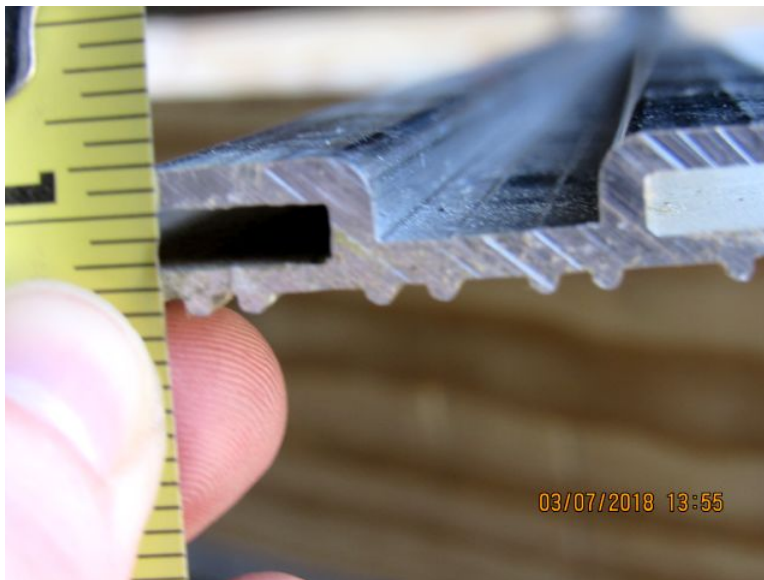


Photo No. 17
Clip with 3.175 mm Channel

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Photo No. 18
Marked Panels



Photo No. 19
Marked Smaller Panels

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Photo No. 20
Underside Marking for Placement



Photo No. 21
Cutting Down Middle of Clips for Vertical Edge

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Photo No. 22
Installation of Clips



Photo No. 23
Installation of Panels

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Photo No. 24
Installation of Smaller Vertical Clips

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Photo No. 25
Installation of Flashing

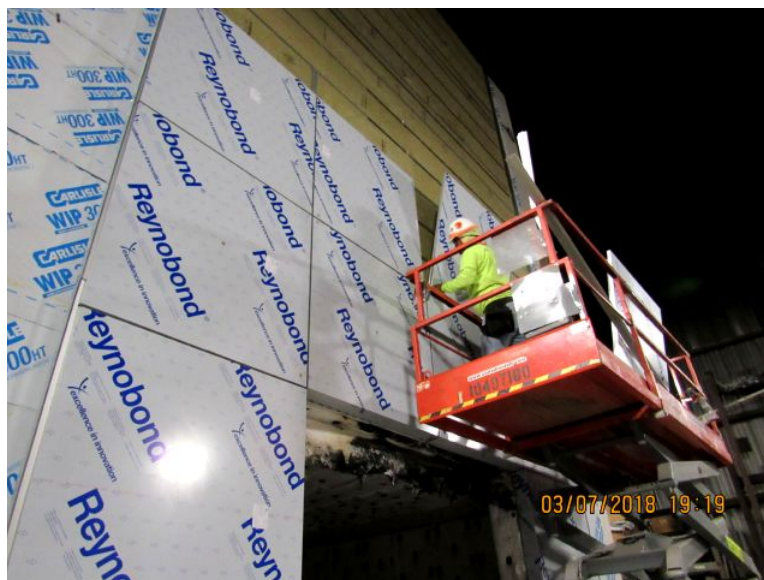


Photo No. 26
Installation of Panels Above Windows

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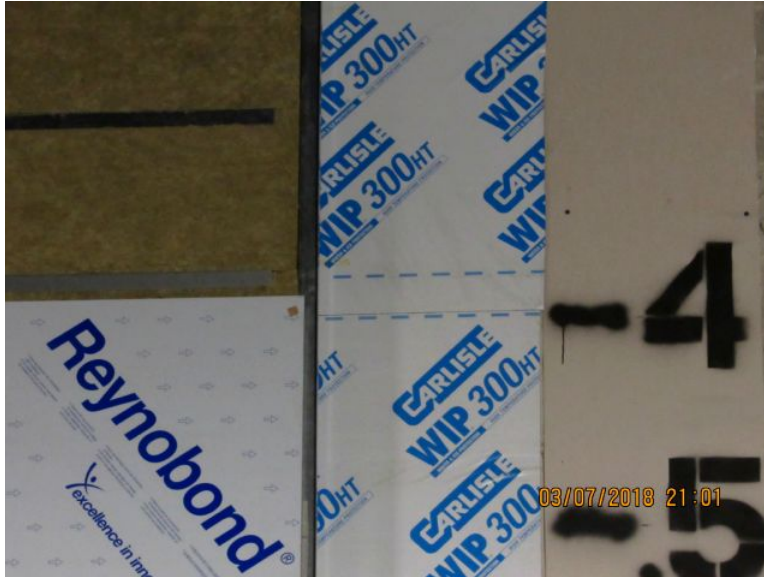


Photo No. 27

Panels Installed on Clip Not Fastened to Respective Girt



Photo No. 28

Closer View of Abnormal Clip Install

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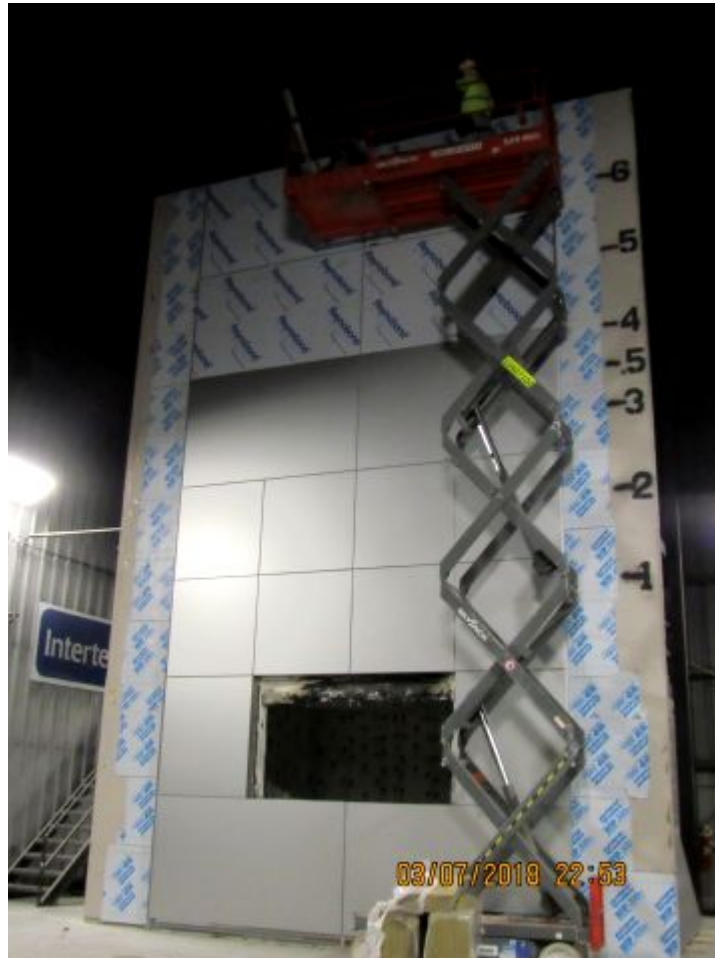


Photo No. 29
Removing Protective Film

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Photo No. 30
Completed Wall - Pretest

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Photo No. 31
Approximately 5 min into Test



Photo No. 32
Side View at Approximately 8 min into Test

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Photo No. 33
Panels Burning 1 m Above Opening



Photo No. 34
Panels Burning 2 m Above Opening

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Photo No. 35
Panels Burning 4 m Above Opening



Photo No. 36
Side View of Panel Consumption

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Photo No. 37
Clearer View of Fallen Debris from System



Photo No. 38
Photo of System Approximately 7 min After Furnace Off

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Photo No. 39
Closer View of System Posttest

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Photo No. 40
Panels Removed

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Photo No. 41
Insulation Removed Above Opening



Photo No. 42
Insulation Removed

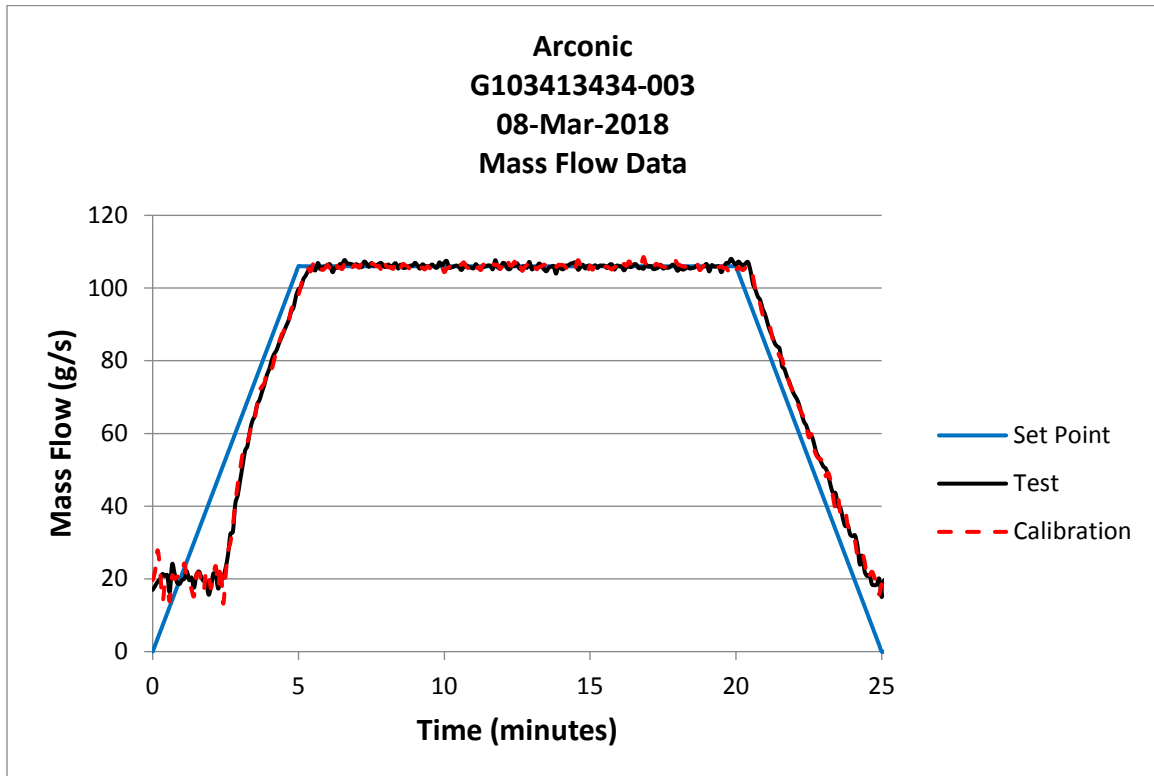
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SECTION 13

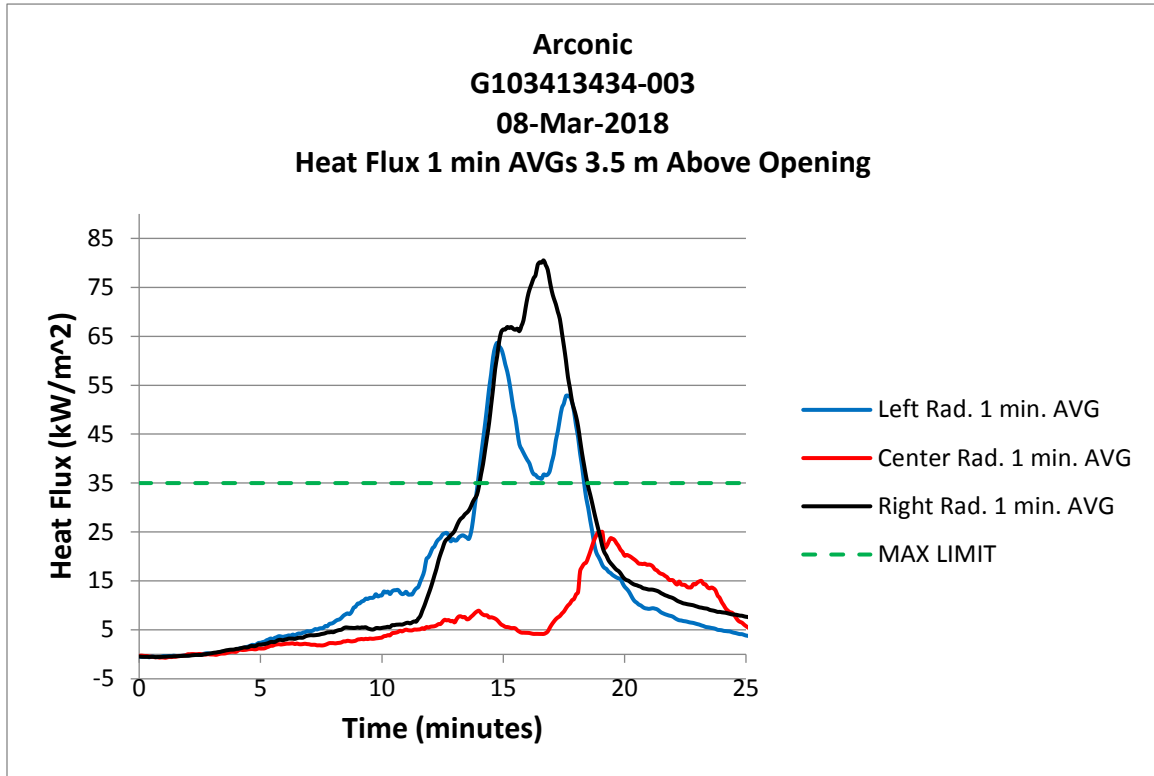
GRAPHS



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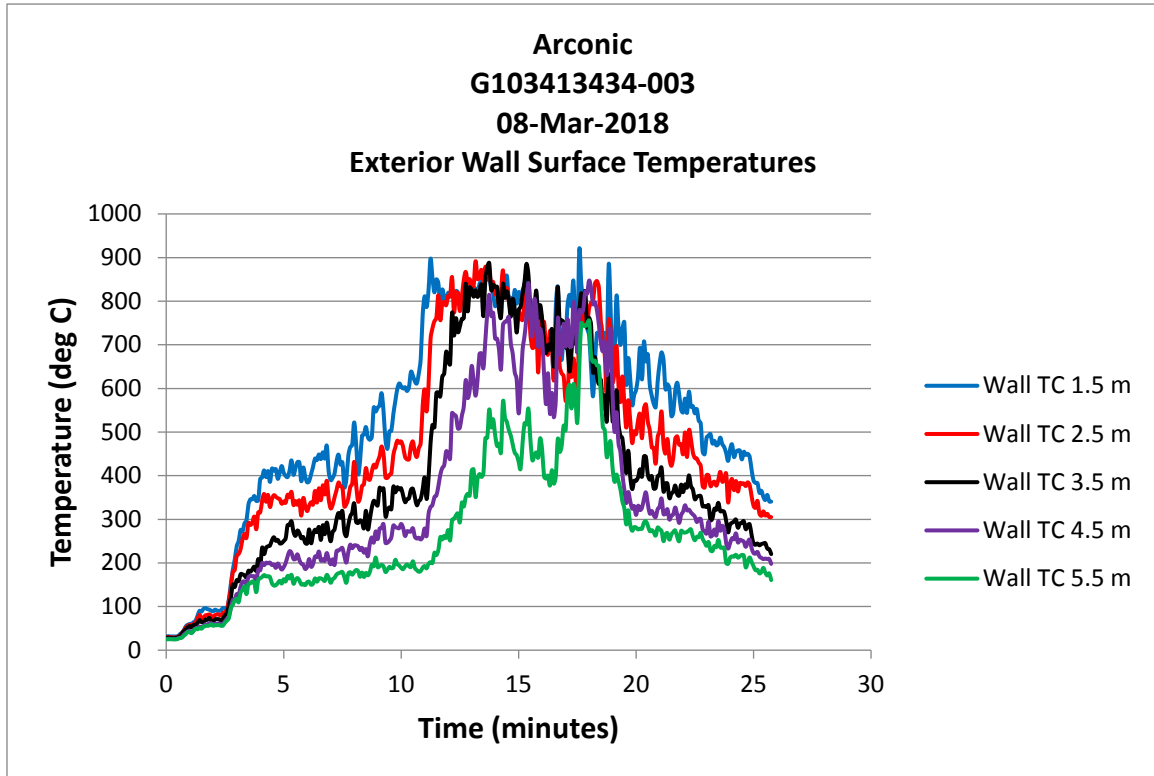
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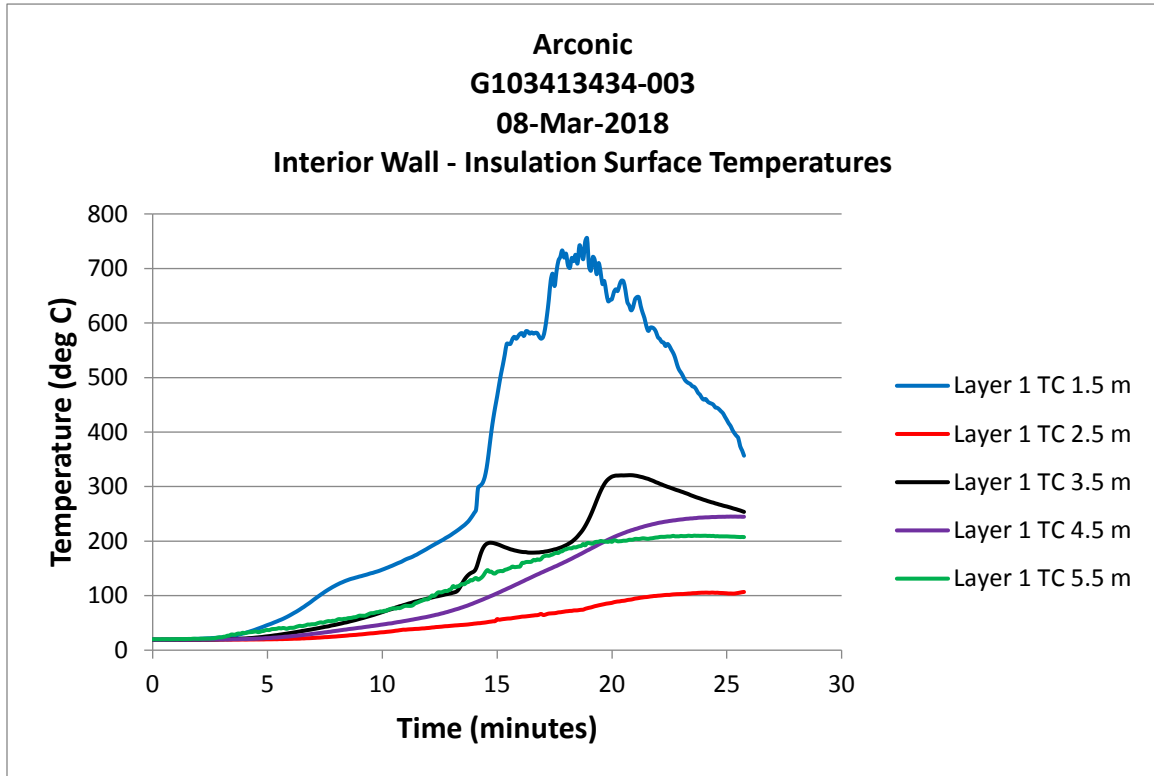
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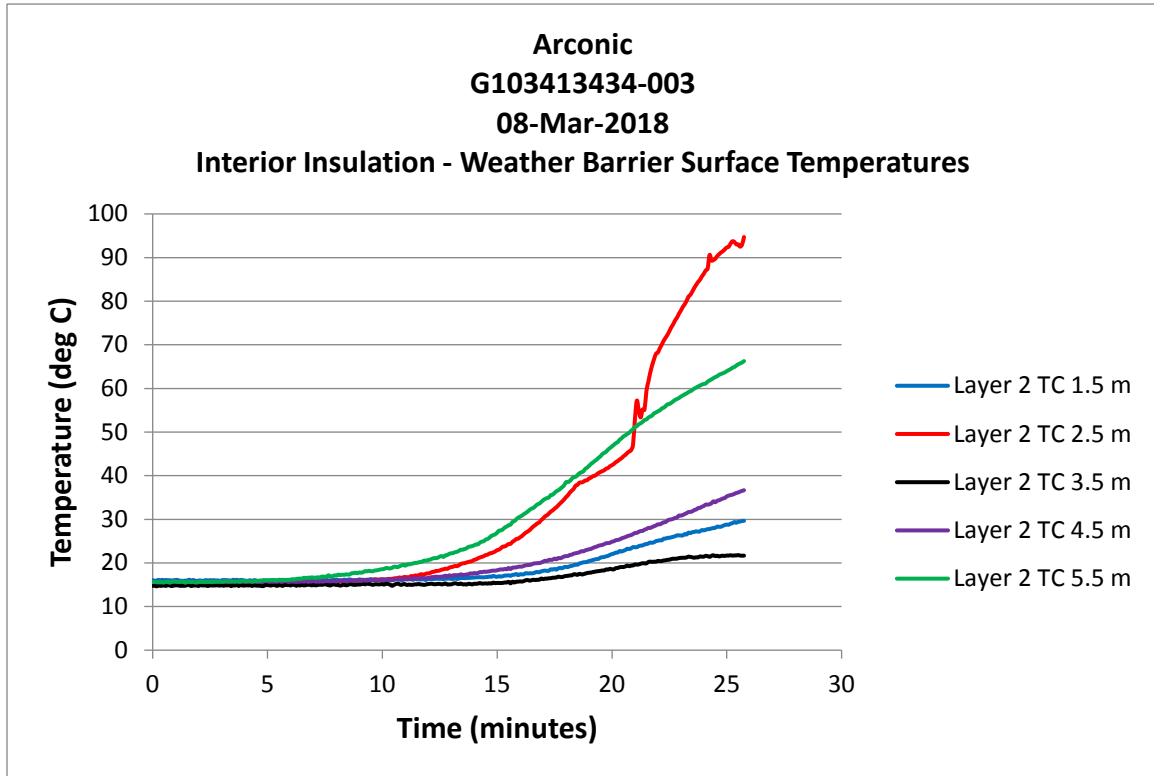
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Total Quality. Assured.

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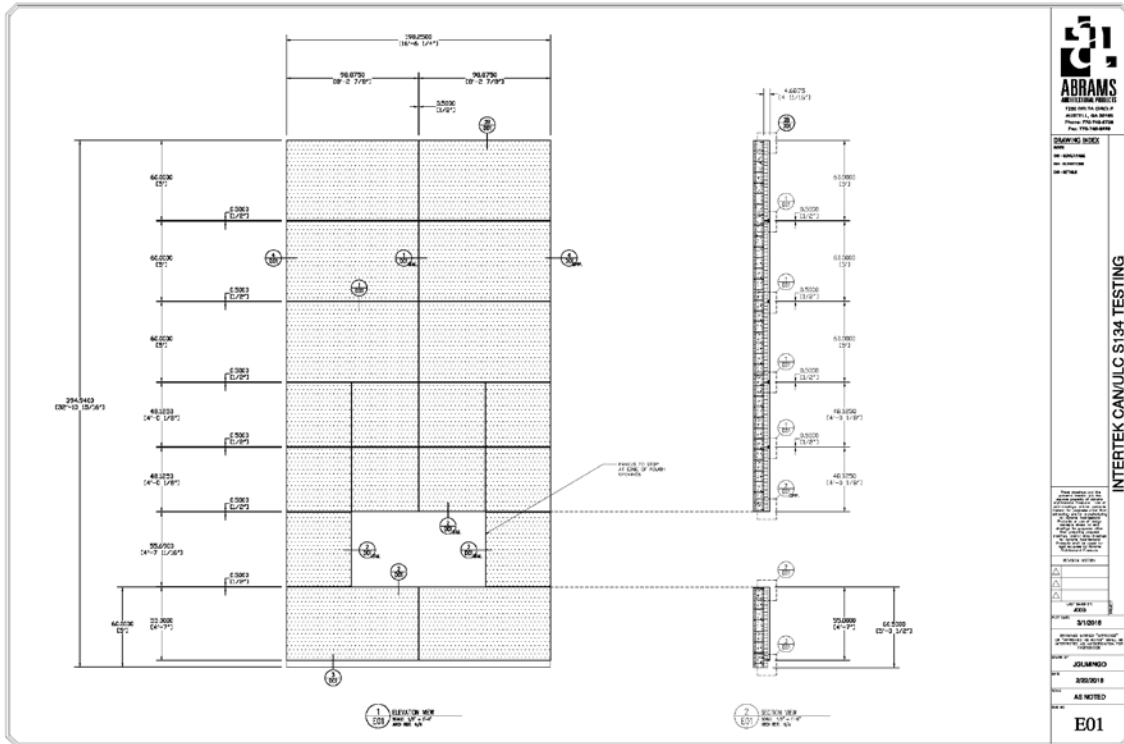
SECTION 14 DRAWINGS

The "As-Built" drawings which follow have been reviewed by Intertek B&C and are representative of the project reported herein. Project 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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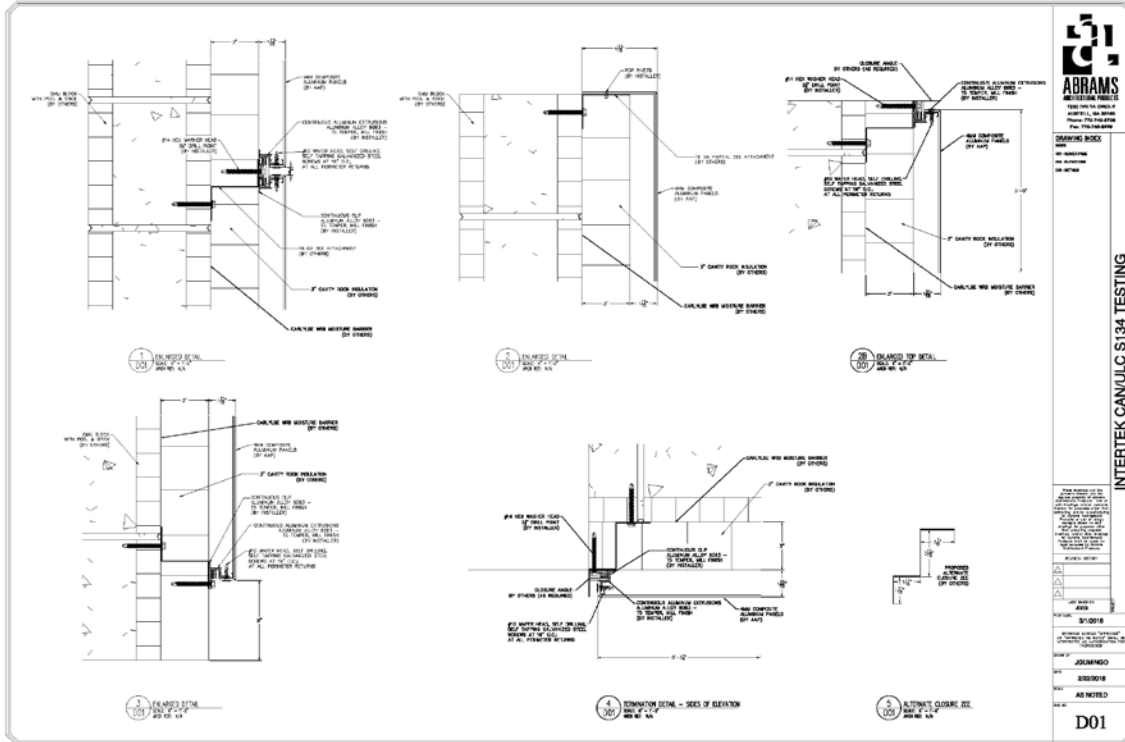
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SECTION 15 REVISION LOG



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