

ICC NTA TEST REPORT



**ASTM E119
CAN/ULC-S101
(Fire Resistance Performance)**

**RENDERED TO: ChamClad
10235 184 Street NW
Edmonton, Alberta T5S 2J4**

**PRODUCT: ChamClad 6-in. wide, V-groove
PVC Exterior Panel**

Report No.: CWaL032323-49
Test Date(s): 06/02/2023, 06/06/2023, and 06/16/2023
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1.0 General Information

1.1 Product

ChamClad 6-in. wide, V-groove PVC Exterior Panel

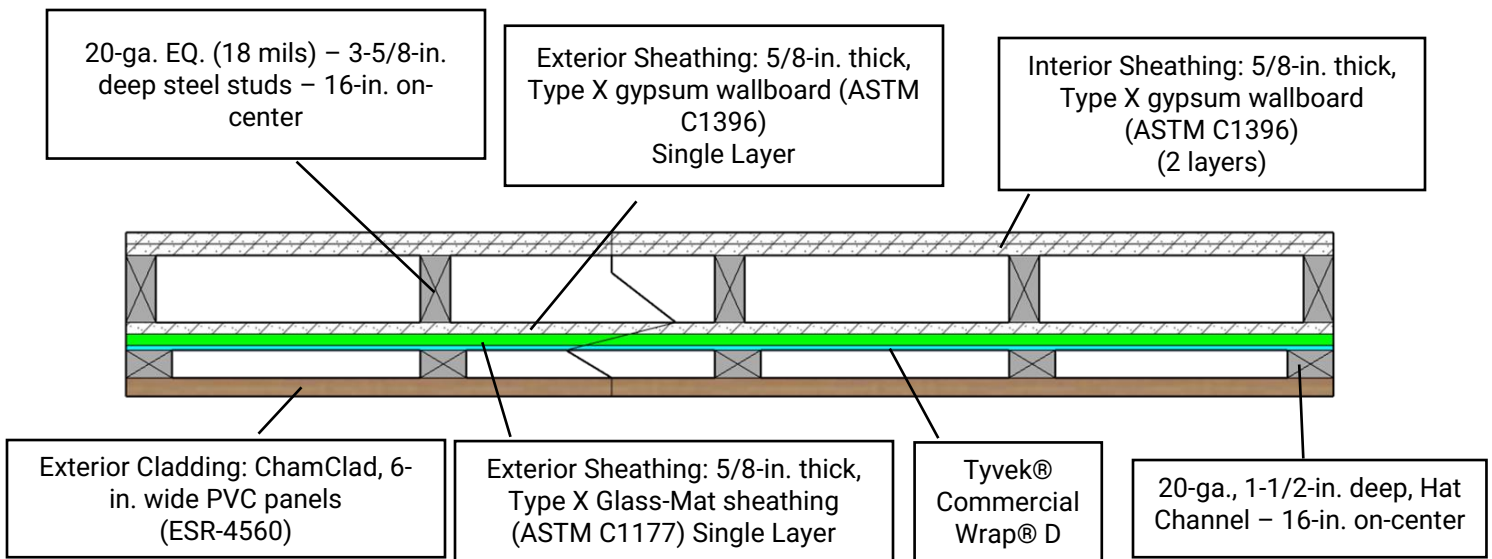
1.2 Project Summary

ICC NTA, LLC was contracted by ChamClad to evaluate ChamClad 6-in. wide, V-groove PVC Exterior Panel in accordance with ASTM E119. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at ICC NTA's facility in Bryan, Texas.

1.3 Product Description

The wall system(s) described in this report consisted of ChamClad 6-in. wide, V-groove PVC Exterior Panels installed over a base wall constructed per UL Design No. U419.

The 6-in. wide, V-groove PVC panel is an extruded poly vinyl chloride (PVC) cladding conforming to the requirements of ASTM D3676 with a PVC film laminated to the exterior surface of the panels. Panels are formed with an upper edge having nail slots and a lower edge that stacks into the upper edge of the lower course. The cladding is available in a range of colors.



1.4 Qualifications

ICC NTA in Bryan, TX has demonstrated compliance with ISO/IEC 17025 and is consequently accredited as a Testing Laboratory. ICC NTA is accredited to perform all testing reported herein.

1.5 Product Sampling

ChamClad, 6-in. wide, V-groove PVC Exterior Panels were sampled by ICC NTA, LLC personnel for the testing reported herein. The specimen(s) were randomly selected from overstock material at the manufacturing warehouse (On-Site) and tagged prior to shipment with appropriate sample marking identification, (Reference ICC NTA, LLC Information Gathering and Sample Submission Form, Project No: CWaL032323-51 dated 04/27/2023). All test specimens were supplied by ChamClad. Specimens arrived at ICC NTA, LLC facility in Bryan, Texas on 05/26/2023.

1.6 Witnessing

The following were present for testing reported herein via video conference call:

Witness	Organization
Sami Sakalla	ChamClad
Amber Gunderson	ChamClad
Tony Crimi	A.C. Consulting Solutions Inc.

1.7 Conditions of Testing

Unless otherwise indicated, all testing reported herein was conducted in ambient laboratory conditions.

2.0 Referenced Standards

ASTM E119-22, *Standard Test Methods for Fire Tests of Building Construction and Materials*

ASTM E2226-15b, *Standard Practice for Application of Hose Stream*

CAN/ULC-S101-14, *Standard Methods of Fire Endurance Tests of Building Construction and Materials*

3.0 Summary of Results

Fire Resistance Rating: 120 minutes
Hose Stream: Pass
Non-Loadbearing Assembly

4.0 ASTM E119-22 (CAN/ULC-S101-14)

4.1 General

4.1.1 Fire Endurance Test

The fire exposure is continued on the specimen with its applied load, if applicable, until failure occurs, or until the specimen has withstood the test conditions for the desired fire endurance rating.

4.1.2 Test Furnace

The test furnace is designed to allow the test specimen to uniformly be exposed to the specified time-temperature conditions. It is fitted with six (6) natural gas/air burners positioned on the left and right-side walls, designed to provide an even heat flux distribution across the face of the test specimen while inhibiting direct flame introduction. Each burner can produce a maximum of 1.5 MBtu/hr. The test engineer has overall control of the furnace in order to vary the following variables during the test: the overall energy input into the furnace, the air: gas ratio to the burners, and the input of additional air beyond that passing through the burners. The furnace opening is 14 ft. wide by 12 ft. tall by 4 ft. deep. The furnace can be equipped with a concrete adapter in order to reduce the opening for testing of a 10 feet x 10 feet wall, if desired. Furnace pressure may be maintained at a predetermined value based on the laboratory ambient pressure.

The temperature within the furnace is determined to be the mathematical average of thermocouples located symmetrically within the furnace and positioned six (6) inches away from the vertical face of the test specimen. The construction of these thermocouples is per ASTM E119. During the test, the furnace temperatures are recorded and displayed every 15 seconds to allow for the test engineer to control the energy input and follow the specified time-temperature curve. The data is saved every minute for report purposes.

The furnace interior temperature during a test is controlled such that the corresponding area under the time-temperature curve is within 10% of the corresponding area under the standard time-temperature curve for one (1) hour or less tests, 7.5% for tests longer than 1 hour, but less than two (2) hours, and 5% for tests longer than two (2) hours.

The fire exposure is controlled in order to follow the standard time-temperature curve, see Figure No. 1 in Appendix B - Data.

4.1.3 Temperatures of Unexposed Surfaces

Temperatures of the unexposed face are monitored using 18-gauge or lighter gauge, Type K thermocouples placed under 6-inch x 6-inch x 0.4-inch-thick, dry felted pads as described in the standard. Temperature readings are taken at not less than nine points on the surface, at intervals not exceeding one minute. The temperature on the unexposed surface is to be taken as the average value of all thermocouples, unless noted otherwise. Transmission of heat through the test assembly during the fire-resistance period shall not raise the temperature on the unexposed face more than 250° F above its initial average temperature at the start of the test or 325°F above its initial temperature at any single point. One thermocouple is located approximately at the center of the wall and four others are placed approximately in the center of each quarter of the wall. The remaining four are symmetrically located on the unexposed face to record the representative temperatures of the unexposed face. Thermocouples were located no closer than 3 in. to a panel joint or fastener head. For thermocouple locations on the unexposed face, see Appendix D – Drawings and graphical representation within Appendix B – Data.

4.1.4 Hose Stream Test

If required, this practice is intended to standardize the apparatus and method used to represent a standard hose stream to building elements as part of the assessment and fire resistance of building products. This practice specifies the water pressure and duration of application of the hose stream to the test assembly. This practice is to be used only after a test assembly has completed a prescribed standard fire-resistance test. The practice exposes a test assembly to a standard hose stream under controlled laboratory conditions. The apparatus used to apply the hose stream is built per ASTM E2226 with a 2-1/2 in. diameter hose to a playpipe with a 1-1/8 in. discharge tip that delivers a solid stream of water. Hose stream application time and water pressure varies based on the intended fire resistance period and is noted within ASTM E2226. The nozzle tip is located 20 feet away from the test assembly and verified prior to applying the hose stream to the test assembly. The hose stream starts at one corner of the test assembly and the stream is directed to the entire face of the test assembly. The hose stream follows the pattern provided in the standard. A fully developed hose stream shall not pass through the unexposed face of the test assembly. Alternatively, a duplicate wall assembly shall be exposed to a standard time-temperature curve for one-half the duration of the initial fire-resistance test prior to be subjected to the rapid cooling and erosional effects of the standard hose stream application.

4.1.5 Furnace Pressure

In accordance with CAN/ULC-S101, the pressure differential between the exposed and unexposed surfaces of the test assembly shall be measured. The pressure shall be measured by a minimum of two pipe probes constructed per the standard. Control of the furnace pressure shall be established no later than 10 minutes after the start of the test and shall be maintained for the remainder of the fire resistance duration. The two probes are separated by a vertical distance of at least 6-ft. The location of the neutral pressure plane shall be calculated based on the vertical separation of the two pressure sensing probes. All pressure measurements are taken at intervals not exceeding one minute. Furnace Pressure was not monitored during testing. No requirement for location of neutral pressure plane is specified within CAN/ULC-S101.

4.1.6 Correction Factor

When the indicated resistance period is 1/2 h or over, and the wall assembly exceeds acceptance criteria limitations, determined by the average or maximum temperature rise on the unexposed surface or within the test specimen, or by failure under load, a correction shall be applied for variation of the furnace exposure from that prescribed, where it will affect the classification.

The correction factor can be expressed as follows:

$$C = \frac{2I(A - A_S)}{3(A_S + L)}$$

Where:

C = time correction in the same units as I

I = indicated fire resistance in minutes

A = area under the curve of indicated average furnace temperature for the first three fourths of the indicated period

A_S = area under the standard furnace temperature curve for the same part of the indicated period, and
L = lag correction in the same units as A and A_S (54°F·h or 30°C·h (3240°F·min or 1800°C·min)).

5.0 Test Specimens

A representative test specimen was constructed and built under representative conditions of those applied in the field during construction in order to assess the materials, workmanship, and details such as dimensions of parts and all components in the assembly. ICC NTA, LLC lab personnel constructed the 10 ft. × 10 ft. wall assembly.

5.1 Framing

The framing of the wall assembly consisted of 3-5/8-in. deep, 20-gauge equivalent (20-ga. EQ.) steel studs, Clark Dietrich product: 362PDS125-18. The 20-ga. EQ. studs were spaced 16-in. on-center with 12-in. edge-to-center spacing on each end of the wall assembly. The studs were fastened to the top and bottom tracks, Clark Dietrich product: 362PDT125-18, 20-gauge equivalent C-shaped track, using #8 – 1/2 in. long, wafer head, self-drilling framing screws.

5.2 Interior Sheathing

The interior side of the wall assembly was sheathed using a double layer of 5/8-in. thick, Type X gypsum wallboard (GWB) conforming to ASTM C1396 directly attached to the steel studs. The base layer gypsum wallboard was secured to the studs using #6 – 1-in. long self-drilling, bugle head drywall screws. The fasteners were spaced 8 in. on-center around the perimeter and 12 in. on-center in the field of the panel. Fasteners around the perimeter of the GWB were spaced 3/8 in. from the edge of the panel. The 10 ft. long edge of the panels were oriented vertically. All seams were left exposed. The face layer of GWB was secured to the steel studs through the base layer GWB using #6 – 1-5/8-in. long self-drilling, bugle head drywall screws. Face layer GWB fasteners were offset a maximum of 4-in. to avoid aligning with base layer fasteners. The long dimension of the face layer GWB was oriented vertically and staggered a minimum of one stud cavity from the underlying vertical seams of the base layer GWB. The face layer GWB vertical seams were treated with a Level 2 finish consisting of nominal 2-in. wide paper seam tape embedded in joint compound and wiped with a joint knife leaving a thin layer of joint compound over the tape. All fasteners were covered with one coat of joint compound.

5.3 Exterior Sheathing

The exterior side of the wall assembly sheathing consisted of two layers of 5/8-in. thick, Type X GWB. The base layer consisted of 4x10-ft. panels of Type X, paper-faced GWB conforming to ASTM C1396. The base layer GWB was secured to the steel studs using #6 – 1-in. long self-drilling, bugle head drywall screws. The fasteners were spaced 8 in. on-center around the perimeter and 12 in. on-center in the field of the panel. Fasteners around the perimeter of the GWB were spaced 3/8 in. from the edge of the panel. The 10 ft. long edge of the panels were oriented vertically. The vertical, tapered edge seams were staggered a minimum of one stud cavity so to avoid aligning with vertical seams of base layer on exposed face of wall assembly. The face layer of Type X GWB consisted of USG™ SECUROCK® Brand Glass-Mat Sheathing conforming to ASTM C1177. The 4x8-ft. sheets of SECUROCK® were installed with the long dimension vertically oriented. The horizontal butt joints were staggered a minimum of 6-ft. on-center. The vertical tapered seams were staggered a minimum of one stud cavity from the underlying tapered seams of the base layer. No joint compound or seam tape was used on the exterior glass-mat sheathing.

5.4 Water Resistive Barrier

A water resistive barrier (WRB) consisting of DuPont™ Tyvek® CommercialWrap® D (ESR-2375) was installed over the exterior glass-mat sheathing on the exterior face of the wall assembly. The WRB was temporarily secured to the sheathing using T50, ½-in. crown staples. The WRB was installed per the manufacturer’s specifications. Seams were overlapped a minimum of 6-in.

5.5 Exterior Furring Channels

Hat-shaped framing members used to “furr” out the ChamClad V-groove exterior panels were installed on the exterior face of the wall assembly over the WRB. The Clark Dietrich furring channels, product: 150F125-30, a 20-ga. (30-mils thick) were secured to the steel studs through both layers of Type X GWB using #6 – 1-5/8-in. long, self-drilling screws with bugle head. The hat channels were spaced 16-in. on-center with only one leg secured to the studs. The fasteners were spaced 12-in. on-center vertically.

5.6 Exterior Cladding

The exterior cladding consisted of ChamClad 6-in. wide, V-groove PVC Exterior Panels (ESR-4560). The V-groove siding panels were secured to the hat channels using #8 – ¾-in. long, self-drilling screws with pan head spaced 16-in. on-center. Care was taken to ensure the V-groove siding panels locked into the previous course before securing in place with fasteners positioned in the center of the fastening slots located along the attachment flange of the panels.

6.0 Test Setup and Procedure (Interior Face Exposure)

The product(s) were setup and evaluated in accordance with the 2022 version of ASTM E119 (2014 version of CAN/ULC-S101). The non-loadbearing, non-symmetrical wall assembly was placed in front of the vertical furnace at ICC NTA, Inc.'s Fire Testing Laboratory with the GWB, interior sheathed face towards the furnace opening on 06/02/2023. The thermocouple leads were connected to the data acquisition system in the control room and the connection was verified prior to ignition. The ambient air temperature within the lab was 87°F, with a relative humidity of 53%.

Deviations from the standard include: No furnace pressure measurements were collected per CAN/ULC-S101.

6.1 Test Observations

At 12:16 PM on June 2nd, 2023, the burners were ignited, and the furnace temperature was controlled following the standard time-temperature curve for a target period of 120 minutes.

Time (hr:min:sec)	Observation
0:00	Burners Lit, Test Started
10:26	Paper facing of exposed face GWB calcifying
15:00	No change to unexposed face
19:42	Discoloration of fastener heads showing through joint compound on exposed face
26:33	Vertical cracks developing in face layer GWB on exposed face; parallel to tapered edge seams
27:30	Joint compound and paper seam tape beginning to delaminate on exposed face
30:00	No change to unexposed face
37:00	Joint compound and paper seam tape continuing to delaminate on exposed face
44:30	Both vertical tapered edge seams fully exposed; seams open approx. ¼-in. on exposed face
45:00	No change to unexposed face
1:00:00	Face layer GWB showing signs of buckling/ warping on exposed face of wall assembly
1:00:30	Top coarse of PVC siding panel warping at top right corner of assembly, venting steam
1:10:00	Vertical crack on exposed face increasing in length and opening slightly
1:15:00	Vertical tapered edge seams open approx. 3/4-in.
1:15:30	No change to unexposed face

Time (hr:min:sec)	Observation
1:30:00	No change to unexposed face or exposed face of wall assembly
1:37:30	Face layer GWB beginning to separate from base wall assembly on exposed face
1:45:00	No change to unexposed face
1:48:00	Increase separation of face layer GWB on exposed face; still intact
1:50:00	Face layer GWB on exposed face beginning to sag at top of wall assembly
1:56:00	Moisture beginning to weep at seams of PVC siding panels
1:57:33	Piece of face layer GWB fell from top of wall assembly on south side of wall assembly on exposed face
2:00:00	Fire-Resistance portion concluded. No temperature thresholds exceeded. No gaps or openings present through wall assembly

Hose Stream Application Observations

Time (hr:min:sec)	Observation
2:03:22	Wall assembly in position for hose stream application (30 psi for 150 seconds)
2:03:59	Hose stream application started
2:06:32 (153 secs.)	Hose stream application concluded. No projection of water observed beyond the unexposed surface of the wall assembly.

Post-Mortem Observations

Component	Observation
Interior Sheathing (Exposed Face)	Approx. 90% of face layer GWB remained intact through duration of fire resistance portion of test with full deterioration of both layers during hose stream application.
Exterior GWB (Unexposed Face)	Remained intact through full duration of fire resistance portion of test. Base layer deteriorated during hose stream test. Face layer, glass-mat sheathing remained mostly intact throughout duration of all testing, small blowout through sheathing during hose stream test
WRB	Slight discoloration and charring at top of wall assembly and at horizontal butt joints of glass mat sheathing
ChamClad, 6-in. wide V-groove PVC exterior panels	Remained intact throughout the full duration of all testing. Minimal wetting of unexposed face during hose stream portion due to some seeping at seams.

7.0 Test Setup and Procedure (Exterior Face Exposure)

The product(s) were setup and evaluated in accordance with the 2022 version of ASTM E119 (2014 version of CAN/ULC-S101). The non-loadbearing, non-symmetrical wall assembly was placed in front of the vertical furnace at ICC NTA, Inc.’s Fire Testing Laboratory with the ChamClad 6-in. wide, V-groove PVC Exterior Panels towards the furnace opening on 06/06/2023. The thermocouple leads were connected to the data acquisition system in the control room and the connection was verified prior to ignition. The ambient air temperature within the lab was 83°F, with a relative humidity of 62%.

Deviations from the standard include: No furnace pressure measurements were collected per CAN/ULC-S101.

7.1 Test Observations

At 1:36 PM on June 6th, 2023, the burners were ignited, and the furnace temperature was controlled following the standard time-temperature curve for a target period of 120 minutes.

Time (hr:min:sec)	Observation
0:00	Burners Lit, Test Started
1:00	Significant smoke escaping around perimeter of assembly and around moveable test frame on unexposed side
2:20	Smoke escaping around wall assembly on unexposed side fully dissipated
15:00	Limited visibility into furnace due to smoke and flaming on exposed face
15:00	No change to unexposed face of wall assembly
30:00	No change to exposed face; no visibility into furnace
30:00	No change to unexposed face
45:00	No change to unexposed face
45:30	Continued limited visibility into furnace
1:00:00	No change to unexposed face
1:10:30	Exterior PVC paneling completely burned/melted away from assembly on exposed face. Hat channel showing signs of warping/buckling
1:15:00	No change to unexposed face
1:20:40	Glass-mat sheathing seams beginning to open
1:30:00	No change to unexposed face
1:30:30	Little to no change to exposed face
1:40:10	Portion of glass-mat sheathing fell from between hat channels at center of assembly

Time (hr:min:sec)	Observation
1:45:00	No change to unexposed face. Wall assembly showing signs of slight deflection towards furnace
1:45:10	Vertical cracking developing in remaining glass-mat sheathing on exposed face
1:57:05	Increased separation of glass-mat sheathing on exposed face
2:00:00	Fire-Resistance portion concluded. No temperature thresholds exceeded. No gaps or openings present through wall assembly

Hose Stream Application Observations

Time (hr:min:sec)	Observation
2:02:38	Wall assembly in position for hose stream application (30 psi for 150 seconds)
2:03:00	Hose stream application started
2:04:07 (66 secs.)	Blowout of unexposed face, bottom left corner of assembly. Continued hose stream application
2:04:16 (76 secs.)	Hose stream application terminated

Post-Mortem Observations

Component	Observation
Exposed GWB	Approx. 90% of face layer GWB remained intact through duration of fire resistance portion of test with full deterioration of both layers during hose stream application.
Unexposed GWB	Remained intact through full duration of fire resistance portion of test. Base layer mostly deteriorated during hose stream test. Face layer, glass-mat sheathing remained mostly intact throughout duration of fire resistance portion of testing, blowout through sheathing during hose stream test
WRB	Fully burned away during fire resistance portion of testing.
ChamClad, 6-in. wide V-groove PVC exterior panels	Fully deteriorated during fire resistance portion of testing.

8.0 Hose Stream Retest Setup and Procedure (Exterior Face Exposure)

A duplicate wall assembly was constructed in order to assess the erosional and rapid cooling effects of a standard hose stream application to the wall assembly following a fire resistance period equal to half the duration of the initial fire resistance test. All components of the duplicate assembly matched that of the initial wall assembly. The non-loadbearing, asymmetrical wall assembly was placed in front of the vertical furnace at ICC NTA, Inc.’s Fire Testing Laboratory with the face of the wall assembly clad with ChamClad 6-in. wide V-groove PVC Exterior Panels exposed to the furnace environment. The thermocouple leads were connected to the data acquisition system in the control room and the connection was verified prior to ignition. The ambient air temperature within the lab was 88°F, with a relative humidity of 70%.

At 1:28 PM on June 16, 2023, the burners were ignited, and the furnace temperature was controlled following the standard time-temperature curve for a target period of 60 minutes.

Time (hr:min:sec)	Observation
0:00	Burners Lit, Test Started
1:04	Significant smoke escaping perimeter of wall assembly and moveable test frame on unexposed side of specimen
1:49	Smoke dissipating
5:35	Cladding beginning to fall from assembly on exposed face
15:00	No change to unexposed face
20:44	Furnace filled with significant smoke and flames limiting visibility
26:05	All cladding has fallen from assembly on exposed face; exterior GWB fully exposed
30:00	No change to unexposed face
34:00	Horizontal butt joints of exterior GWB beginning to open. Approx. ½-in.
40:00	Limited visibility into furnace – no conclusive observations
45:00	No change to unexposed face
47:00	Little to no change to exposed face
1:00:00	Fire resistance portion concluded. Burners extinguished

Hose Stream Application Observations

Time (hr:min:sec)	Observation
1:02:15	Wall assembly in position for hose stream
1:02:50	Hose stream application started (30 psi for 150 seconds)
1:05:21 (151 secs.)	Hose stream application concluded. No projection of water beyond unexposed surface of wall assembly observed.

9.0 Summary and Conclusions

The asymmetrical, non-loadbearing wall assembly described in this report did meet the Conditions of Acceptance of ASTM E119 (CAN/ULC-S101) when both faces of the wall assembly were exposed to the standard time-temperature curve for a period 120 minutes across two tests. The unexposed temperatures of the wall assembly detailed within this report did not exceed the maximum temperature thresholds for the duration of each fire resistance period of 120 minutes. When exposed from the interior face of the wall assembly, a hose stream application in accordance with ASTM E2226 was performed on the assembly immediately following the furnace exposure per ASTM E119. No projection of water was observed beyond the unexposed surface of the wall assembly. When exposed from the exterior face of the wall assembly, a hose stream application in accordance with ASTM E2226 was performed on a duplicate assembly immediately following a furnace exposure equal to half the duration of the initial fire resistance period per ASTM E119. No projection of water was observed beyond the unexposed surface of the wall assembly. The wall assembly detailed within this report obtained a Fire Resistance Rating of 120 minutes from both the interior and exterior surface of the wall assembly clad with ChamClad's 6-in. wide, V-groove PVC Exterior Panels installed on the exterior face of the assembly.

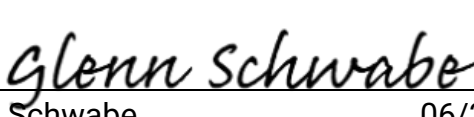
10.0 Closing Statement

This report contains only findings and results arrived at after employing the specific test procedures listed herein. It does not constitute a recommendation for, endorsement of, or certification of the product or material tested. Unless differently required, ICC NTA, LLC reports apply the "Simple Acceptance" rule, also called "Shared Risk approach", of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity. ICC NTA makes no warranty, expressed or implied, except that the test has been performed, and a report prepared, based upon the specimen specified by the client. Extrapolation of data, from the test data provided herein, to the batch or lot from which the specimens were obtained may not correlate and should be interpreted with extreme caution. ICC NTA assumes no responsibility for variations in quality, composition, appearance, performance, or other features of similar materials produced by the client, other persons, or under conditions over which ICC NTA has no control. ICC NTA has issued this report for the exclusive use of the client to whom it is addressed. Any use or duplication of this report shall not be made without their consent. This report shall only be reproduced in its entirety.

For ICC NTA, LLC:



Joseph Briski
Project Engineer
06/23/2023



Glenn Schwabe
Operations Manager
06/23/2023

Appendix A - Photographs



Photo No. 1

**Completed framing of base wall assembly. 20-ga. EQ., 3-5/8-in. steel studs spaced 16-in. on-center
Interior Exposure**



Photo No. 2

**Completed base layer of GWB on exposed face
Interior Exposure**



Photo No. 3
Completed face layer of GWB on exposed face
Interior Exposure



Photo No. 4
Completed base layer of GWB on unexposed face
Interior Exposure



Photo No. 5
Completed face layer of Exterior GWB on unexposed face
Interior Exposure



Photo No. 6
Completed installation of WRB on unexposed face
Interior Exposure

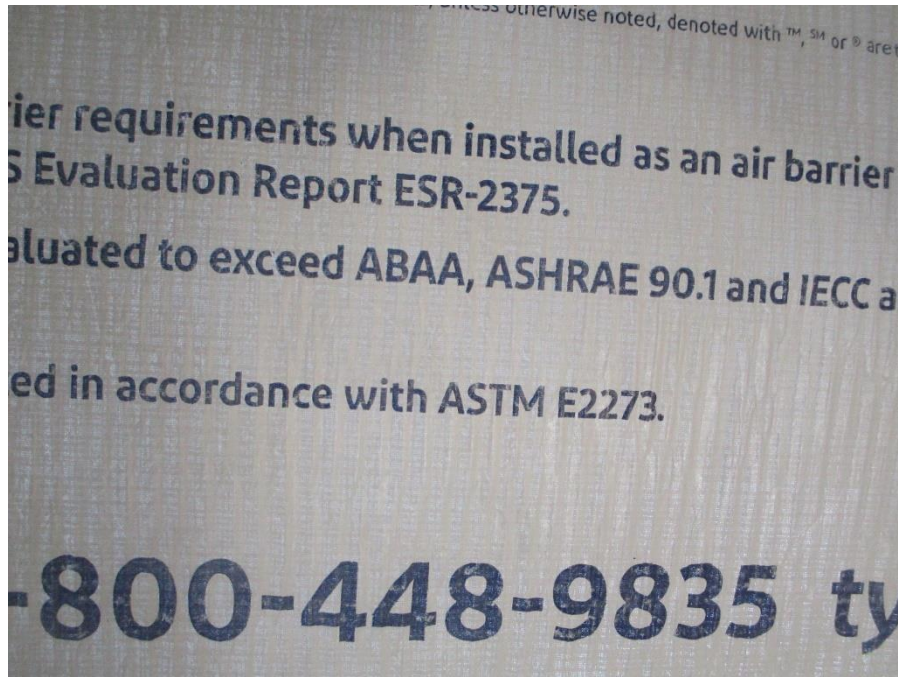


Photo No. 7
ESR identification of CommercialWrap® D WRB



Photo No. 8
Completed installation of 1-1/2-in. deep hat channels spaced 16-in. on-center
Interior Exposure



Photo No. 9
Air Gap dimensional detail between WRB and backside of exterior cladding
Interior Exposure

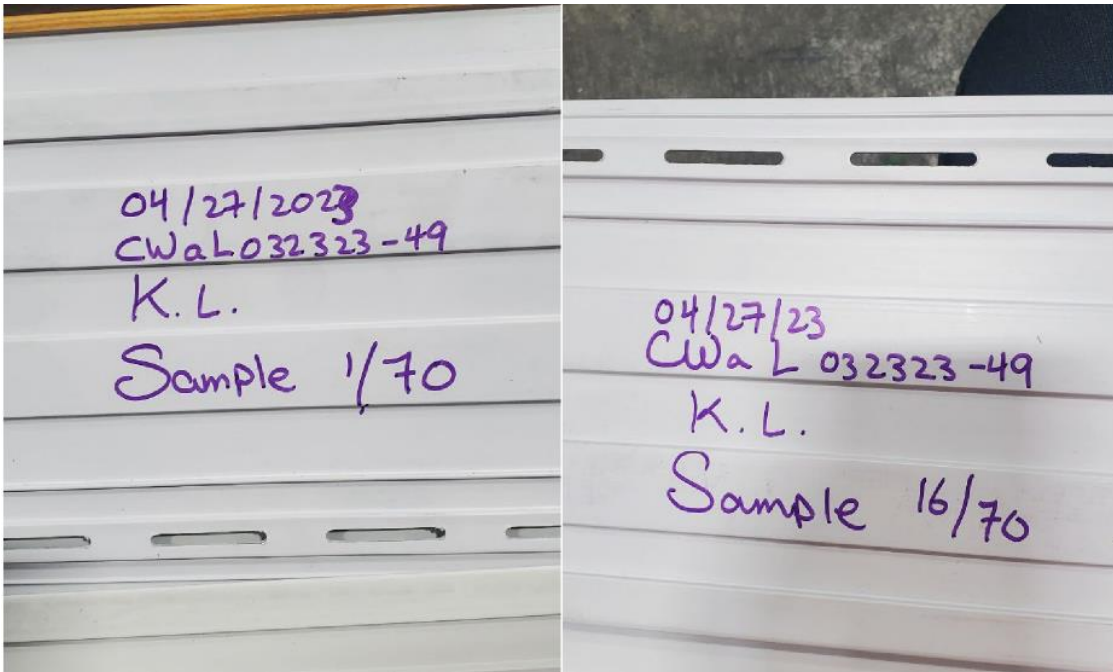


Photo No. 10
Inspection Auditor sample identification markings; backside of ChamClad Siding panels
Interior Exposure

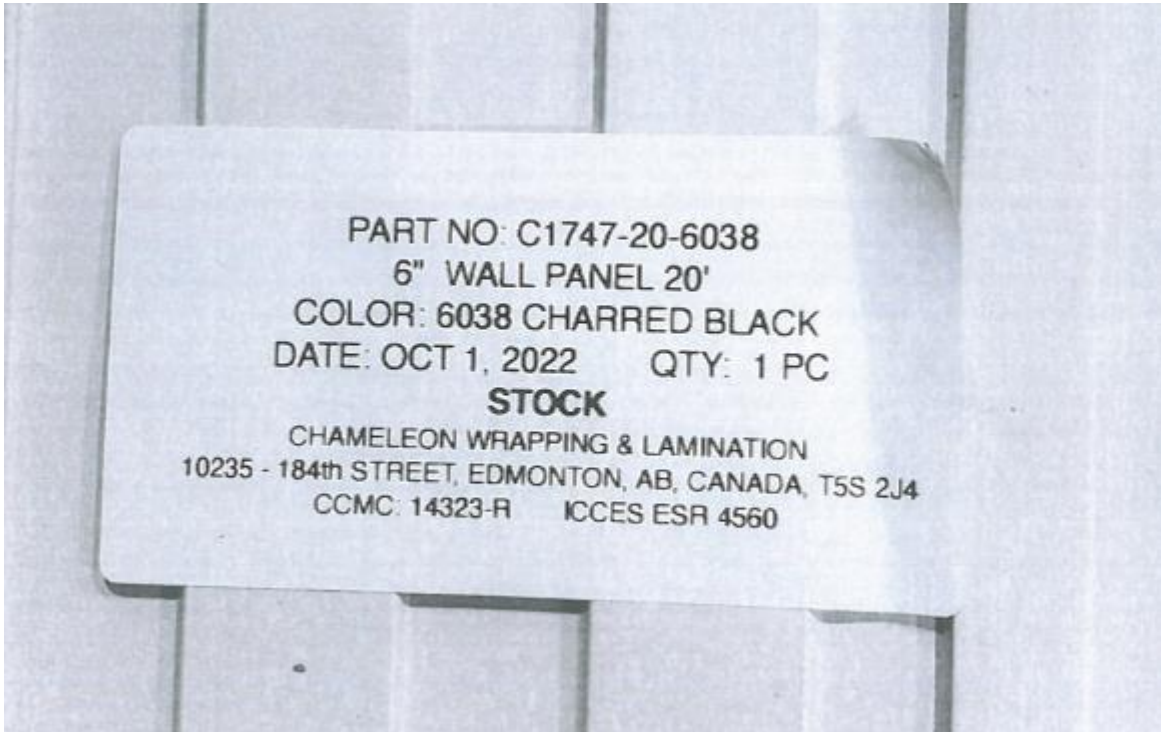


Photo No. 11
ESR-4560 sticker on backside of ChamClad PVC siding panels



Photo No. 12
Completed installation of ChamClad 6-in. wide, V-groove PVC exterior panels (Unexposed Face)
Interior Exposure

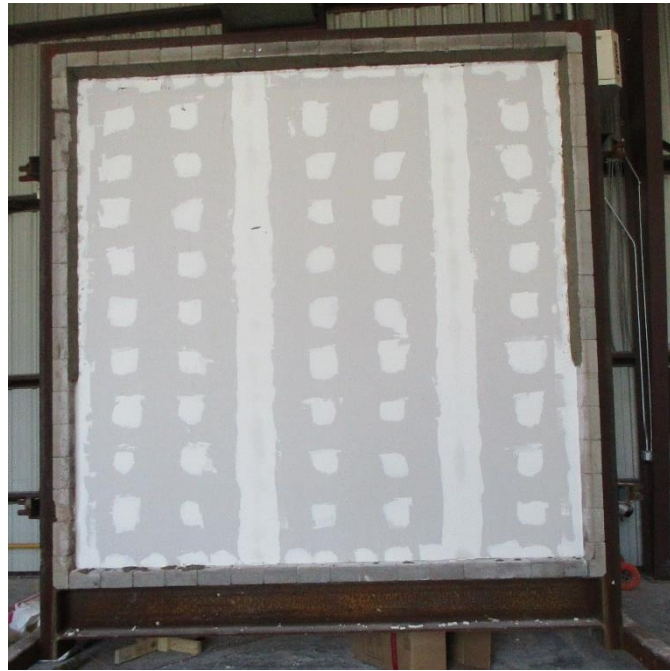


Photo No. 13
Completed Exposed Face – (Interior Exposure Pre-Test)



Photo No. 14
Completed Test Set-Up – (Interior Exposure Pre-Test)

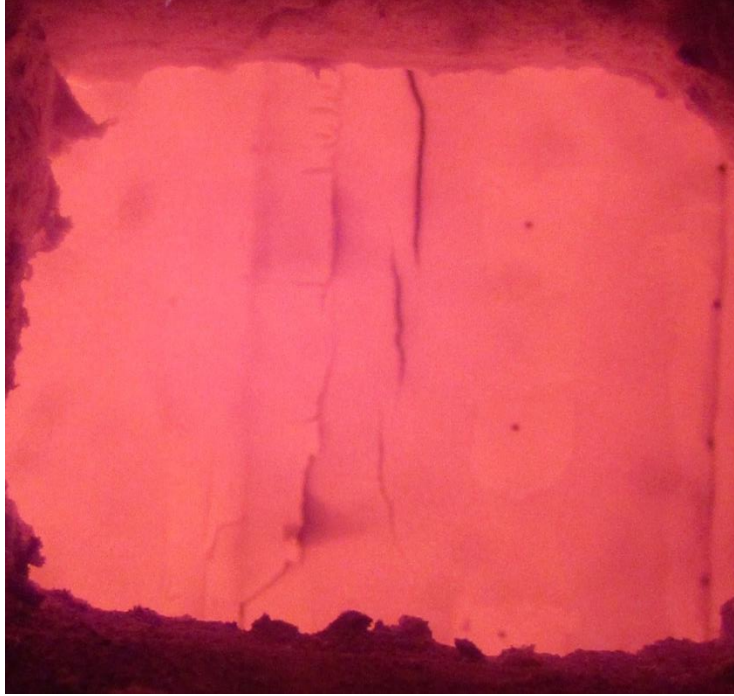


Photo No. 15

Interior Exposure - Vertical cracking developing on exposed face parallel to vertical seams of face layer – (26:33 minutes into test)



Photo No. 16

Interior Exposure - Face layer gypsum wallboard on exposed face showing signs of buckling – (1:00:00)



Photo No. 17

Interior Exposure - Warping present in top coarse of exterior cladding; venting of steam on unexposed face – (1:00:00)

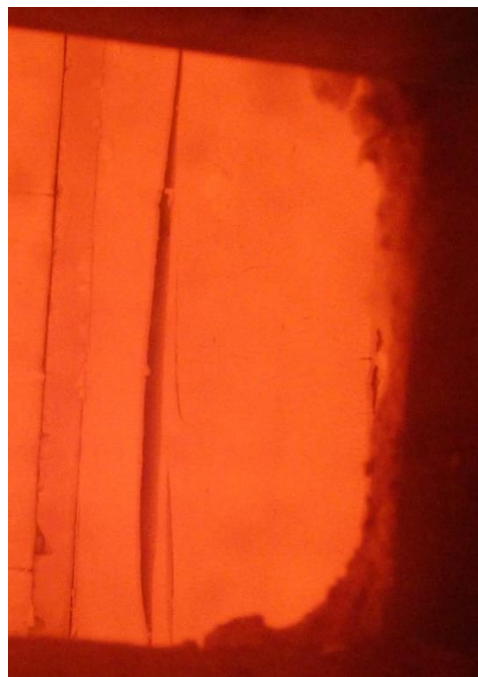


Photo No. 18

Interior Exposure - Exposed Face layer GWB separating from base wall assembly – (1:37:30)

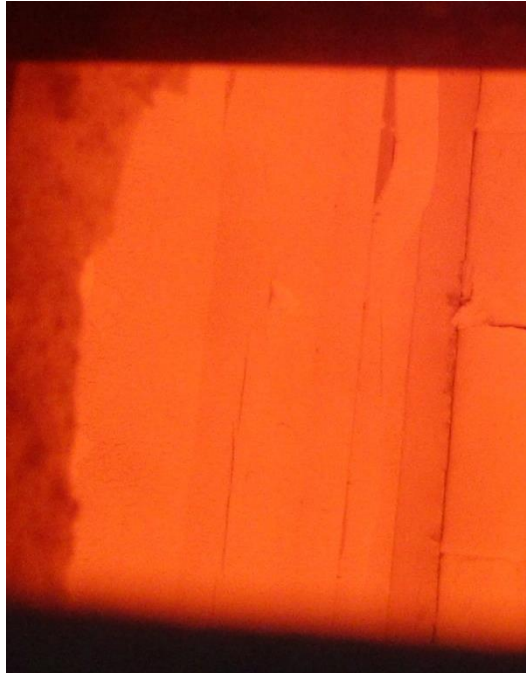


Photo No. 19

Interior Exposure - Face layer GWB sagging at top corner of exposed face – (1:50:00)



Photo No. 20

Interior Exposure - Unexposed face – (Post-Fire Resistance Period)



Photo No. 21
Interior Exposure - Exposed face – (Post-Fire Resistance Period)

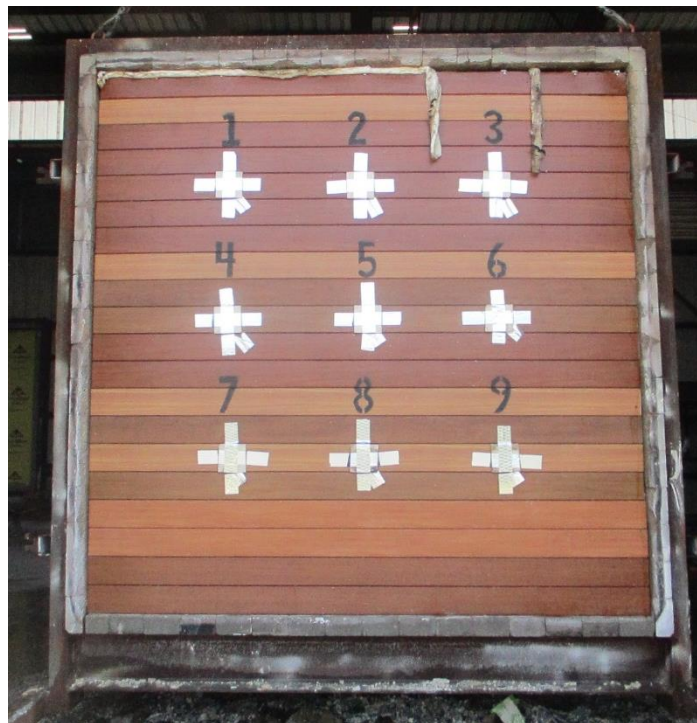


Photo No. 22
Interior Exposure - Unexposed face – (Post-Hose Stream Application)



Photo No. 23
Interior Exposure - Exposed face – (Post-Hose Stream Application)



Photo No. 24
Interior Exposure - Char Extent of WRB – (Post-Mortem Observations)



Photo No. 25

Interior Exposure - Charring of WRB at top of wall assembly and at horizontal butt joints of exterior GWB – (Post-Mortem Observations)



Photo No. 26

Interior Exposure - Exterior GWB blowout during hose stream application – (Post-Mortem Observations)



Photo No. 27
Completed framing of base wall assembly. 20-ga. EQ., 3-5/8-in. steel studs spaced 16-in. on-center
Exterior Exposure



Photo No. 38
Completed base layer of GWB on unexposed face
Exterior Exposure



Photo No. 29
Completed face layer of GWB on unexposed face
Exterior Exposure



Photo No. 30
Completed base layer of GWB on exposed face
Exterior Exposure



Photo No. 31
Completed face layer of Exterior GWB on exposed face
Exterior Exposure



Photo No. 32
Completed installation of WRB on exposed face
Exterior Exposure



Photo No. 33
Completed installation of 1-1/2-in. deep hat channels spaced 16-in. on-center
Exterior Exposure

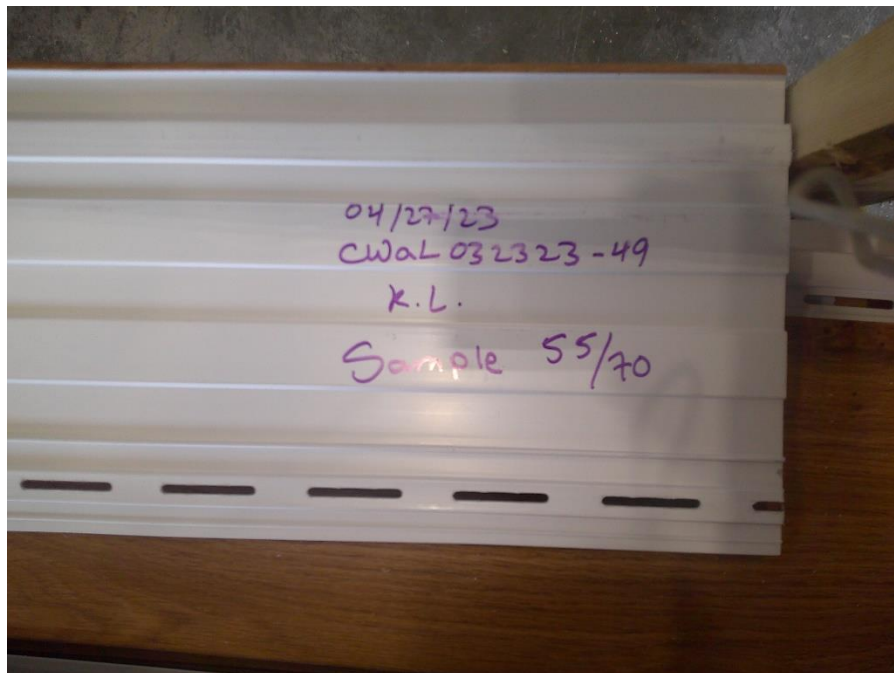


Photo No. 34
Inspection Auditor sample identification markings; backside of ChamClad Siding panels
Exterior Exposure



Photo No. 35

**Completed installation of ChamClad 6-in. wide, V-groove PVC exterior panels (Exposed Face)
Exterior Exposure**



Photo No. 36

Exterior Exposure - Completed Test Set-Up – (Pre-Test)

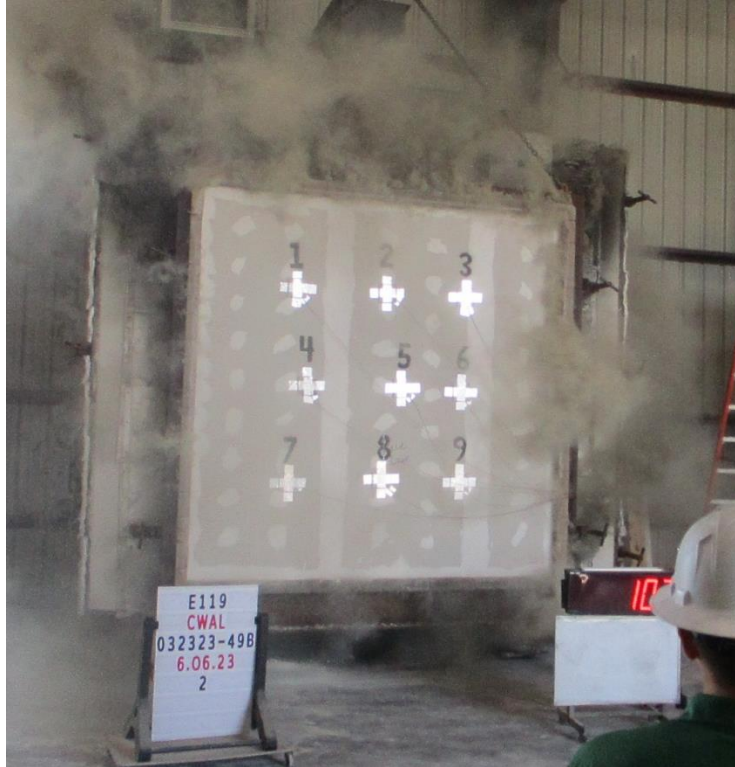


Photo No. 37

Exterior Exposure - Significant smoke escaping perimeter of wall assembly and moveable test frame – (1:07 minutes into test)



Photo No. 38

Exterior Exposure - Visibility into furnace restored. All ChamClad exterior panels burned away/fell from assembly – (1:10:30)

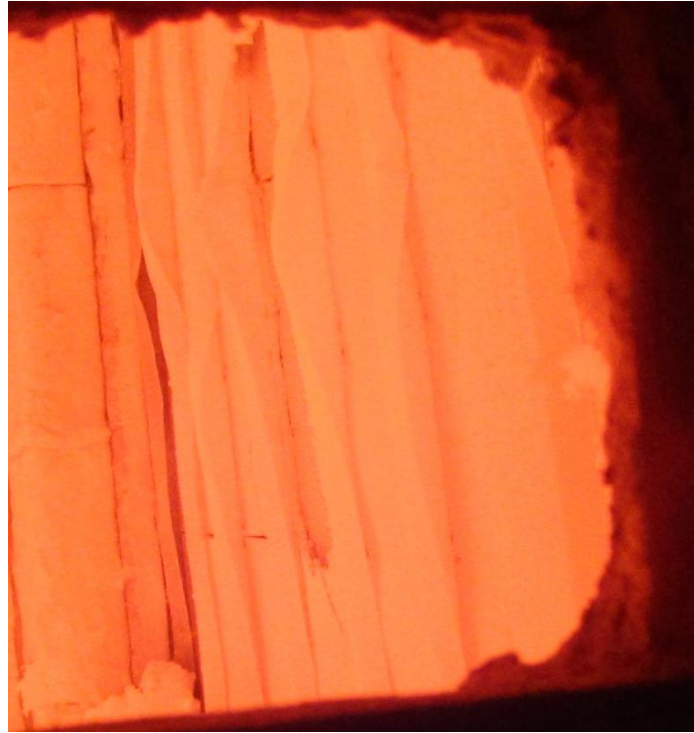


Photo No. 39

Exterior Exposure - Significant warping of hat channels. Glass-mat sheathing beginning to fall from assembly – (1:40:10)



Photo No. 40

Exterior Exposure - Unexposed face – (Post-Fire Resistance Period)



Photo No. 41
Exterior Exposure - Exposed face – (Post-Fire Resistance Period)

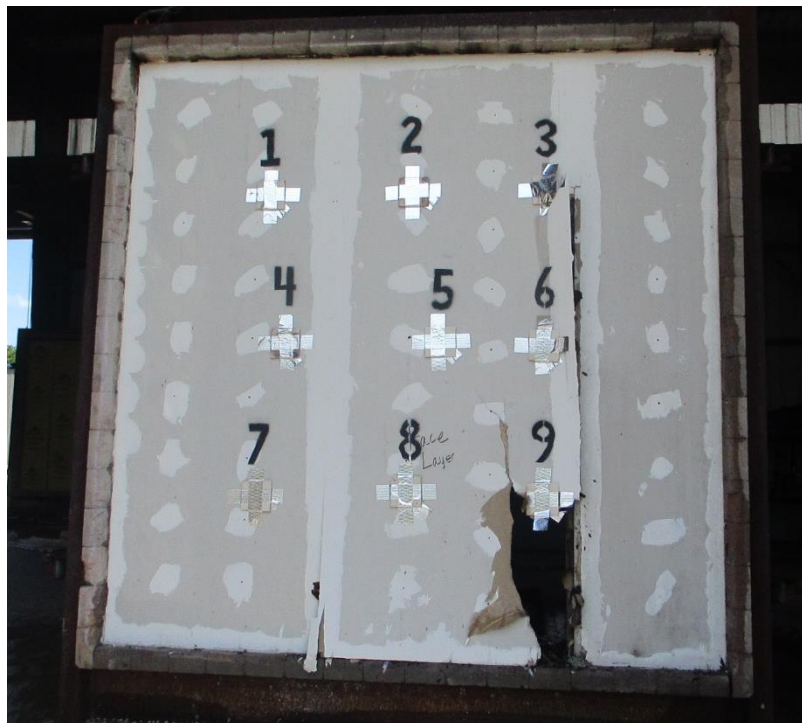


Photo No. 42
Exterior Exposure - Unexposed face – (Post-Hose Stream Application)



Photo No. 43
Exterior Exposure - Unexposed face - (Post-Hose Stream Application)



Photo No. 44
Completed Unexposed face - (Hose Stream Retest Assembly)
Exterior Exposure



Photo No. 45

**Completed installation of exterior GWB, beginning install of WRB on exposed face -
(Hose Stream Retest Assembly)
Exterior Exposure**



Photo No. 46

**Completed installation of WRB and 1-1/2-in. deep hat channel – (Hose Stream Retest Assembly)
Exterior Exposure**



Photo No. 47
Completed Exposed Face – (Hose Stream Retest Assembly)
Exterior Exposure

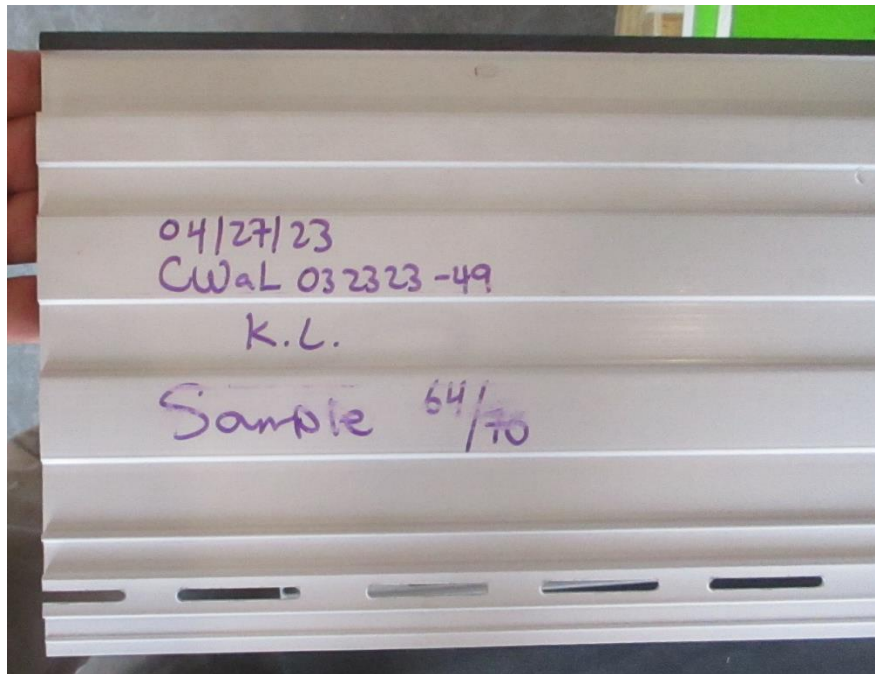


Photo No. 48
Inspections Auditor markings and identification on ChamClad panels
Exterior Exposure



Photo No. 49
Exterior Exposure - Completed Hose Stream Retest Set-up

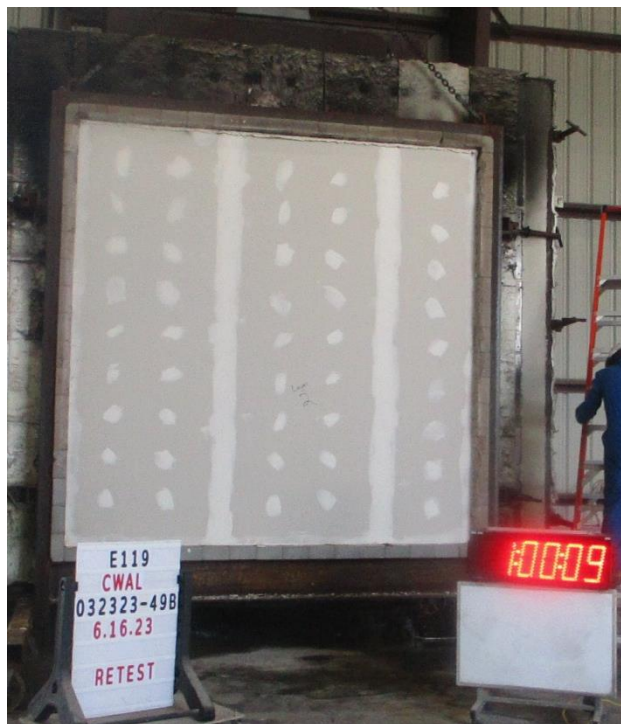


Photo No. 50
Exterior Exposure - Unexposed face - (Post-Fire Resistance Retest Period)



Photo No. 51
Exterior Exposure - Exposed Face – (Post-Fire Resistance Retest Period)



Photo No. 52
Exterior Exposure - Unexposed Face – (Post-Hose Stream Retest Application)



Photo No. 53
Exterior Exposure - Exposed Face – (Post-Hose Stream Retest Application)

Appendix B - Data

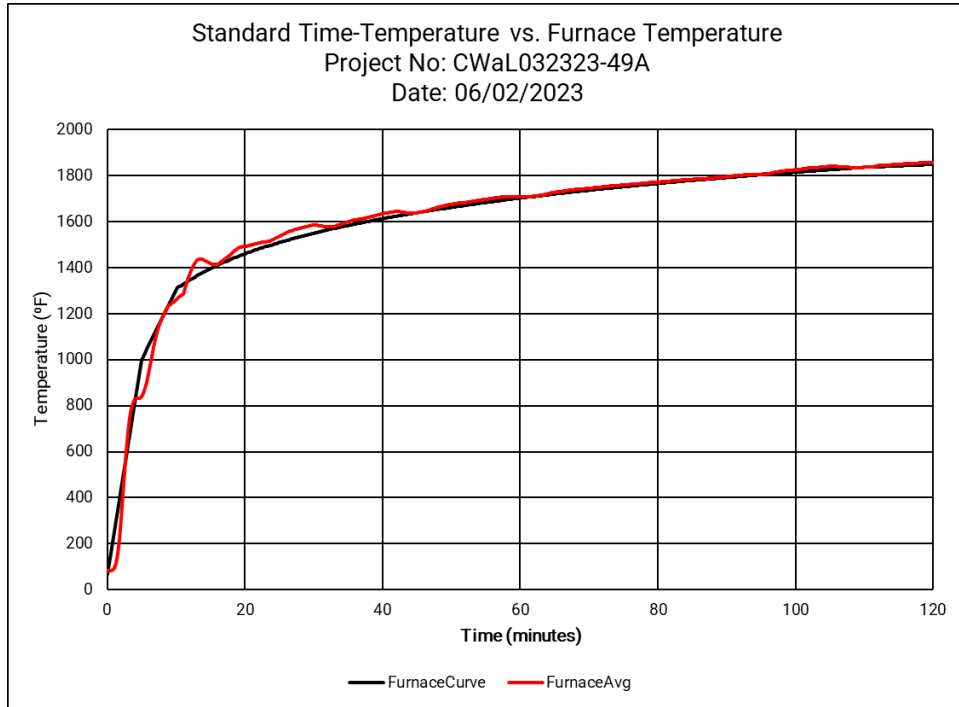


Figure No. 1

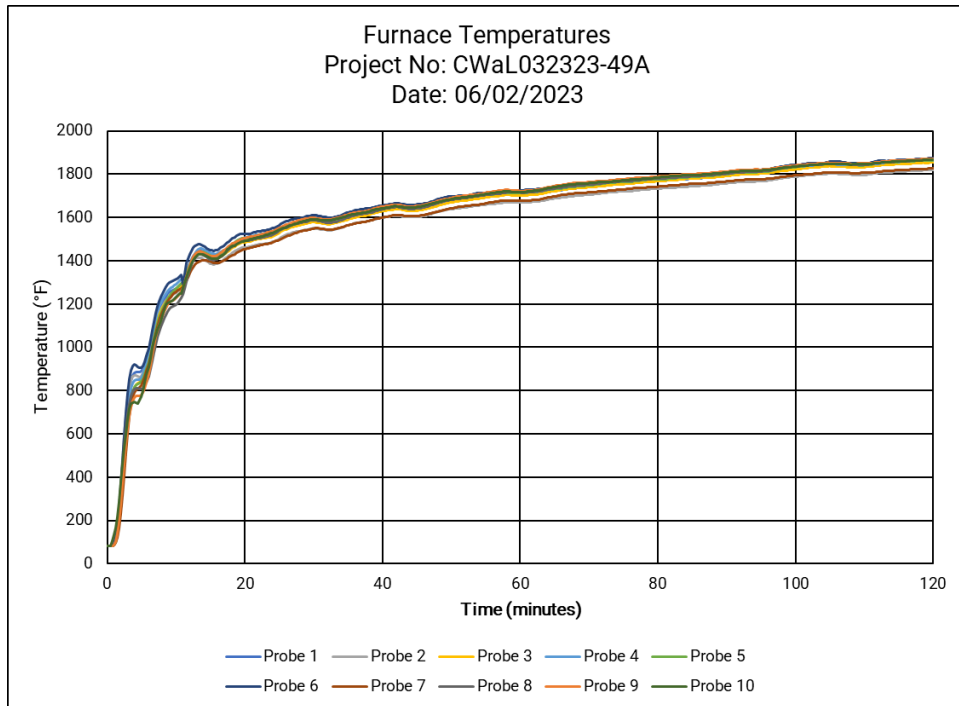


Figure No. 2

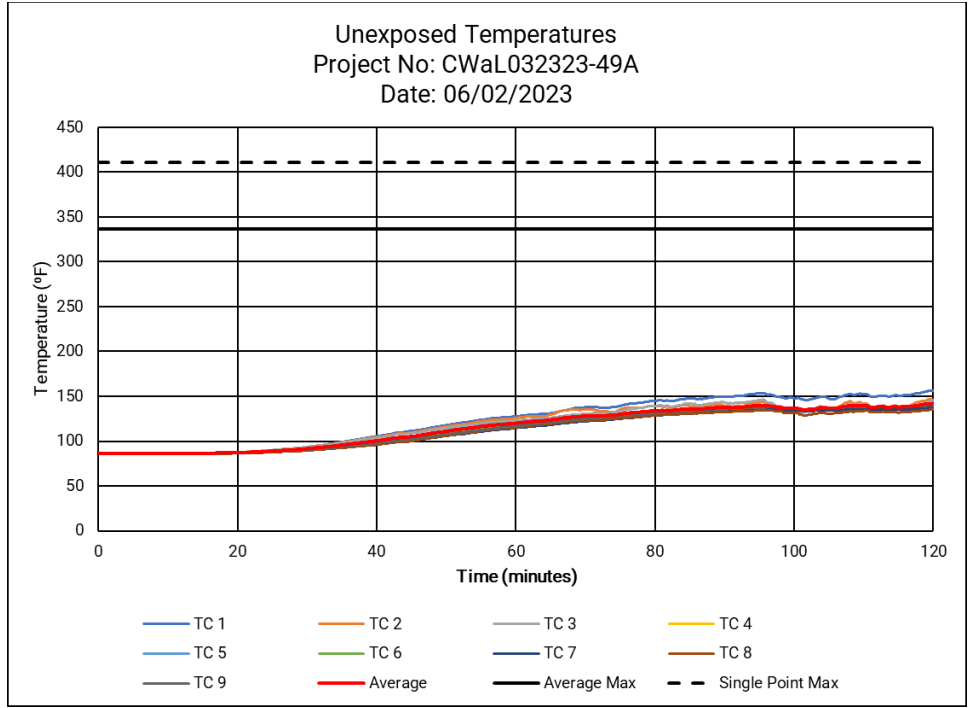


Figure No. 3

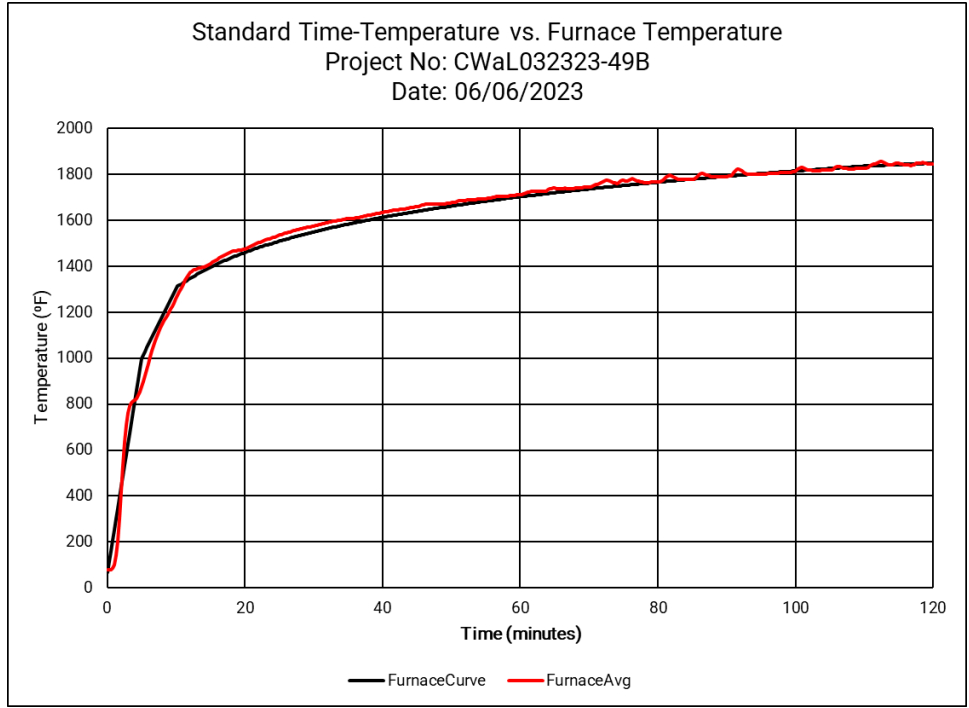


Figure No. 4

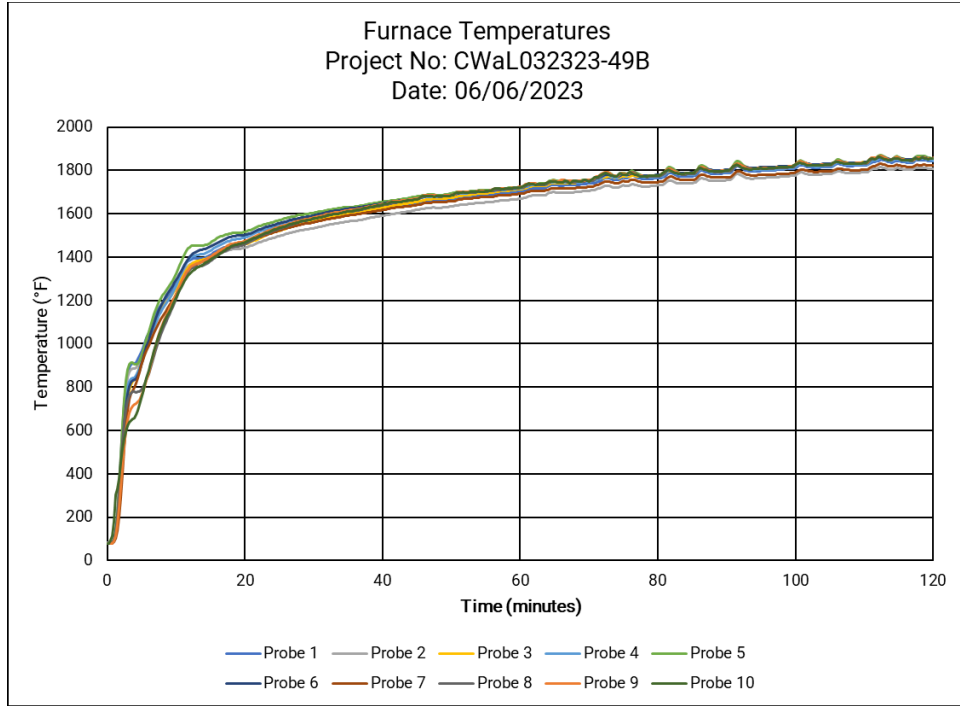


Figure No. 5

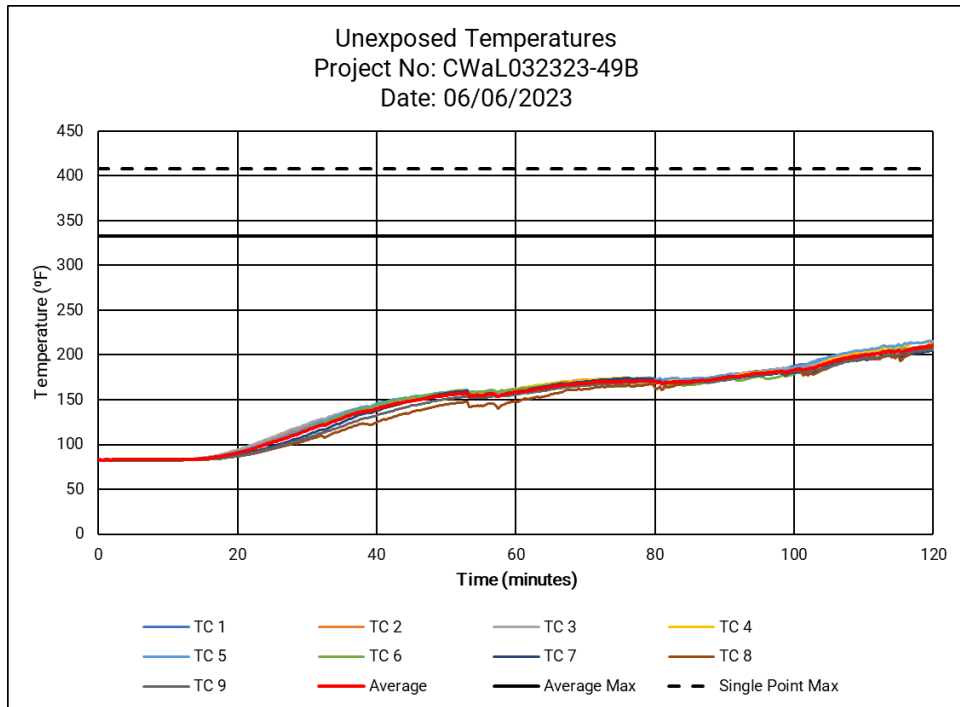


Figure No. 6

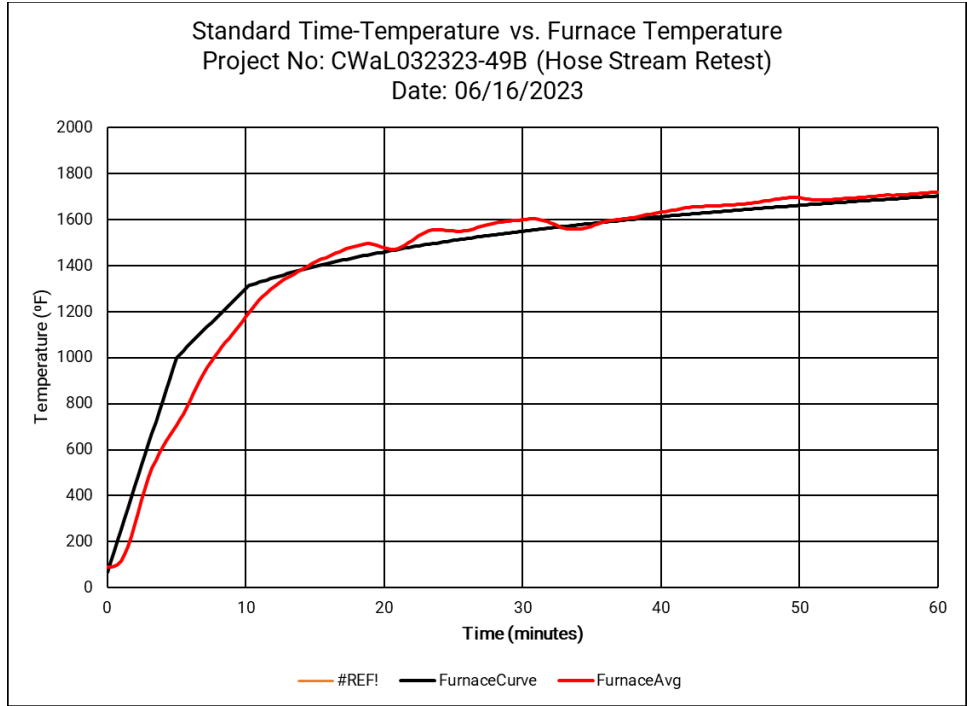


Figure No. 7

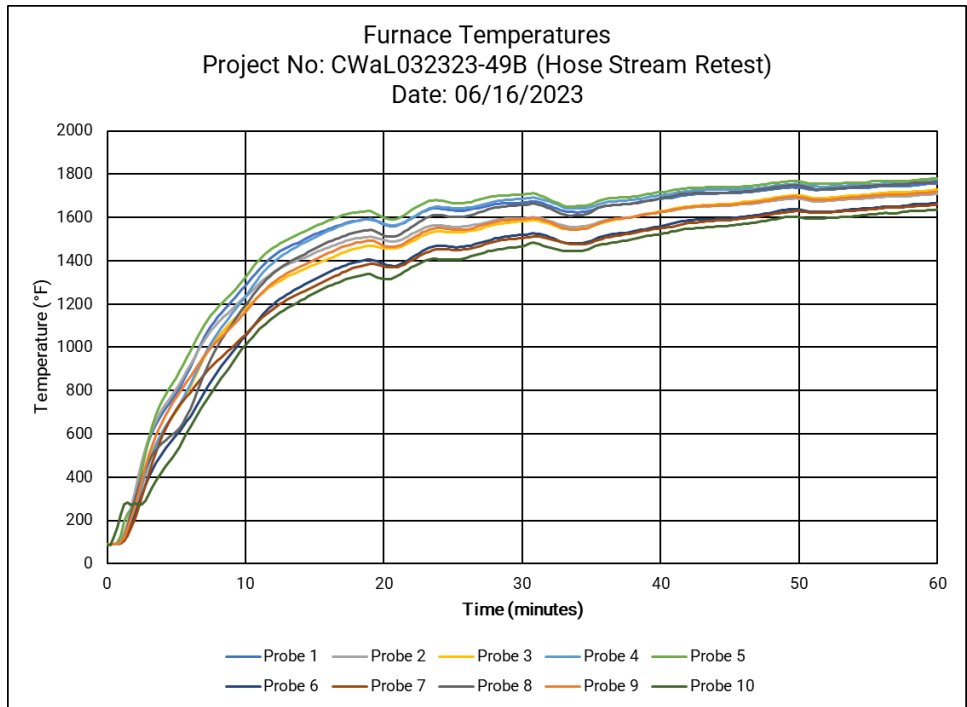


Figure No. 8

Tabular Data

CWaL032323-49A - Furnace Temperatures – Interior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
0	83	83	82	82	82	82	82	81	81	82	82
1	91	94	88	91	86	94	86	87	87	134	94
2	335	369	294	306	261	357	231	332	276	377	314
3	735	765	652	701	637	789	604	692	627	666	687
4	883	871	814	848	815	920	793	806	767	747	826
5	889	868	852	858	841	904	825	807	781	773	840
6	980	971	950	971	934	996	922	867	877	908	938
7	1124	1115	1093	1133	1079	1156	1064	1012	1045	1056	1088
8	1207	1191	1183	1223	1177	1249	1165	1113	1146	1148	1180
9	1255	1233	1236	1269	1238	1298	1224	1178	1208	1207	1235
10	1272	1253	1261	1293	1274	1315	1258	1199	1228	1231	1258
11	1303	1284	1292	1314	1294	1291	1278	1246	1276	1276	1285
12	1389	1374	1379	1382	1383	1431	1342	1360	1377	1368	1378
13	1437	1413	1431	1446	1433	1473	1389	1424	1437	1423	1431
14	1440	1407	1434	1454	1440	1469	1402	1426	1438	1428	1434
15	1421	1388	1415	1437	1426	1450	1397	1407	1422	1413	1418
16	1418	1386	1409	1432	1425	1450	1389	1408	1425	1411	1415
17	1437	1406	1427	1450	1443	1470	1401	1430	1448	1431	1434
18	1460	1431	1453	1467	1469	1496	1421	1459	1473	1465	1459
19	1486	1455	1477	1495	1497	1521	1441	1485	1494	1480	1483
20	1494	1461	1486	1507	1505	1525	1454	1493	1506	1492	1492
21	1500	1467	1492	1514	1510	1528	1461	1497	1512	1501	1498
22	1508	1475	1500	1521	1518	1536	1470	1504	1519	1510	1506
23	1513	1479	1506	1528	1522	1540	1476	1511	1527	1518	1512
24	1521	1487	1512	1536	1528	1550	1485	1520	1537	1529	1520
25	1536	1502	1529	1549	1544	1565	1498	1538	1551	1543	1536
26	1553	1519	1545	1563	1562	1581	1512	1553	1565	1557	1551
27	1564	1531	1557	1574	1573	1592	1524	1566	1577	1568	1562
28	1570	1537	1565	1584	1579	1596	1534	1574	1587	1577	1570
29	1577	1544	1572	1589	1586	1605	1541	1581	1594	1585	1577
30	1584	1550	1578	1597	1594	1611	1549	1588	1600	1592	1584
31	1581	1545	1574	1596	1593	1606	1549	1582	1593	1588	1581
32	1577	1541	1569	1592	1588	1600	1544	1575	1590	1586	1576
33	1578	1544	1573	1594	1588	1602	1547	1579	1594	1591	1579
34	1587	1553	1581	1602	1595	1611	1555	1588	1604	1600	1588
35	1598	1564	1592	1610	1607	1623	1564	1600	1614	1609	1598
36	1608	1574	1601	1618	1617	1633	1572	1609	1623	1616	1607
37	1613	1578	1606	1623	1622	1638	1578	1616	1627	1621	1612
38	1619	1584	1612	1630	1627	1642	1584	1621	1633	1628	1618
39	1627	1591	1621	1640	1636	1648	1593	1629	1643	1637	1627
40	1634	1599	1628	1647	1643	1655	1600	1637	1650	1642	1633
41	1638	1604	1633	1651	1647	1661	1605	1643	1654	1647	1638
42	1644	1609	1638	1657	1653	1666	1611	1648	1660	1652	1644
43	1641	1604	1635	1653	1651	1662	1610	1644	1655	1648	1640
44	1639	1601	1630	1648	1647	1658	1606	1639	1650	1646	1636
45	1639	1602	1632	1650	1648	1660	1607	1641	1653	1649	1638
46	1642	1607	1637	1656	1652	1664	1612	1647	1660	1655	1643
47	1651	1616	1645	1664	1660	1673	1620	1656	1667	1662	1651
48	1661	1625	1654	1671	1671	1685	1628	1667	1676	1671	1661
49	1669	1633	1663	1679	1679	1693	1636	1676	1685	1678	1669
50	1675	1639	1670	1685	1684	1697	1642	1682	1691	1684	1675
51	1678	1643	1675	1692	1687	1699	1648	1686	1697	1690	1680
52	1680	1646	1678	1697	1689	1701	1652	1689	1701	1694	1683
53	1686	1651	1682	1699	1695	1707	1656	1694	1704	1698	1687
54	1691	1655	1686	1702	1700	1712	1659	1699	1708	1702	1692
55	1694	1659	1692	1709	1703	1715	1665	1704	1714	1708	1696
56	1697	1663	1697	1715	1707	1717	1671	1708	1719	1713	1701

CWaL032323-49A - Furnace Temperatures – Interior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
57	1702	1666	1700	1721	1709	1720	1676	1711	1725	1718	1705
58	1706	1670	1703	1722	1715	1726	1678	1715	1727	1720	1708
59	1706	1669	1703	1721	1715	1726	1678	1715	1725	1718	1707
60	1705	1669	1702	1718	1714	1726	1677	1715	1723	1718	1707
61	1706	1670	1703	1719	1715	1728	1678	1716	1723	1720	1708
62	1709	1672	1705	1722	1718	1730	1680	1719	1726	1723	1710
63	1712	1676	1709	1726	1722	1733	1684	1722	1731	1728	1714
64	1718	1682	1716	1735	1727	1736	1692	1729	1739	1735	1721
65	1722	1688	1721	1741	1731	1741	1697	1734	1745	1740	1726
66	1726	1692	1727	1747	1735	1745	1703	1739	1750	1746	1731
67	1731	1696	1732	1753	1739	1749	1708	1743	1756	1751	1736
68	1734	1700	1735	1755	1742	1753	1711	1746	1759	1754	1739
69	1737	1703	1737	1756	1745	1756	1713	1749	1761	1756	1741
70	1741	1706	1740	1758	1749	1760	1716	1752	1764	1759	1744
71	1744	1709	1742	1760	1752	1763	1719	1755	1766	1762	1747
72	1747	1712	1745	1761	1756	1767	1721	1759	1768	1763	1750
73	1751	1716	1749	1766	1761	1771	1724	1763	1771	1766	1754
74	1753	1718	1752	1769	1762	1772	1727	1765	1774	1769	1756
75	1755	1720	1754	1771	1764	1774	1730	1768	1777	1771	1758
76	1757	1721	1756	1776	1765	1775	1733	1769	1780	1775	1761
77	1760	1725	1759	1778	1768	1779	1736	1772	1782	1777	1764
78	1764	1729	1763	1779	1773	1783	1738	1775	1784	1779	1767
79	1766	1731	1765	1781	1775	1785	1740	1778	1786	1781	1769
80	1767	1733	1767	1784	1775	1785	1742	1779	1789	1785	1771
81	1770	1735	1770	1787	1777	1787	1746	1782	1792	1788	1773
82	1772	1737	1772	1790	1780	1789	1748	1784	1795	1790	1776
83	1775	1740	1775	1792	1783	1792	1750	1786	1796	1793	1778
84	1778	1743	1778	1795	1786	1795	1753	1789	1799	1794	1781
85	1779	1744	1780	1796	1787	1796	1755	1791	1801	1796	1783
86	1781	1746	1782	1797	1790	1799	1756	1792	1802	1797	1784
87	1783	1748	1783	1799	1792	1801	1758	1794	1804	1799	1786
88	1786	1751	1785	1802	1794	1804	1761	1797	1807	1802	1789
89	1790	1755	1788	1805	1797	1807	1764	1800	1810	1805	1792
90	1792	1757	1791	1807	1800	1810	1766	1802	1812	1807	1794
91	1797	1761	1795	1811	1805	1814	1770	1806	1815	1812	1799
92	1798	1763	1798	1814	1806	1815	1773	1808	1819	1814	1801
93	1800	1764	1799	1815	1808	1817	1774	1810	1820	1815	1802
94	1802	1766	1801	1817	1809	1818	1776	1811	1822	1816	1804
95	1803	1768	1802	1816	1811	1821	1776	1813	1821	1817	1805
96	1805	1770	1804	1818	1813	1823	1779	1816	1824	1819	1807
97	1812	1776	1810	1822	1821	1830	1783	1822	1828	1824	1813
98	1818	1781	1815	1827	1827	1836	1787	1827	1833	1829	1818
99	1822	1785	1818	1830	1830	1840	1791	1832	1837	1832	1822
100	1824	1789	1822	1834	1833	1842	1795	1835	1841	1836	1825
101	1827	1792	1826	1836	1837	1845	1797	1838	1843	1839	1828
102	1833	1796	1829	1839	1841	1850	1800	1842	1846	1841	1832
103	1834	1798	1831	1842	1843	1852	1803	1844	1849	1844	1834
104	1835	1799	1834	1846	1844	1852	1806	1845	1851	1846	1836
105	1840	1803	1837	1848	1849	1857	1808	1848	1853	1847	1839
106	1843	1802	1835	1845	1852	1859	1807	1849	1852	1847	1839
107	1837	1799	1834	1845	1847	1854	1806	1847	1850	1846	1837
108	1834	1798	1832	1843	1843	1852	1805	1844	1849	1845	1835
109	1833	1796	1831	1844	1842	1850	1805	1843	1849	1846	1834
110	1834	1797	1833	1846	1842	1850	1806	1844	1851	1848	1835
111	1837	1800	1834	1846	1845	1853	1807	1846	1852	1848	1837
112	1845	1806	1840	1849	1853	1862	1811	1852	1855	1852	1842
113	1844	1807	1843	1854	1853	1861	1814	1854	1859	1855	1844
114	1845	1809	1844	1856	1854	1862	1817	1855	1861	1857	1846
115	1848	1812	1846	1856	1857	1866	1819	1859	1863	1859	1848
116	1850	1813	1848	1858	1859	1867	1820	1860	1865	1860	1850
117	1851	1815	1849	1861	1860	1868	1822	1861	1867	1863	1852
118	1852	1817	1852	1863	1862	1870	1824	1864	1868	1864	1854

CWaL032323-49A - Furnace Temperatures – Interior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
119	1854	1818	1853	1863	1864	1872	1825	1865	1869	1865	1855
120	1855	1819	1854	1865	1864	1873	1827	1866	1871	1867	1856

CWaL032323-49A - Unexposed Face Temperatures – Interior Exposure											
Time (minutes)	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7	TC 8	TC 9	Average	
0	86	86	86	86	86	86	86	85	85	86	
1	86	86	86	86	86	86	86	85	85	86	
2	86	86	86	86	86	86	86	85	85	86	
3	86	86	86	86	86	86	86	85	85	86	
4	86	86	86	86	86	86	86	86	85	86	
5	86	87	86	86	86	86	86	86	86	86	
6	86	87	87	86	86	86	86	86	86	86	
7	86	87	87	87	86	86	86	86	86	86	
8	86	87	87	87	86	86	86	86	86	86	
9	86	87	87	87	86	86	86	86	86	86	
10	86	87	87	87	86	86	86	86	86	86	
11	86	87	87	87	86	86	86	86	86	86	
12	87	87	87	87	86	86	86	86	86	86	
13	86	87	87	87	86	86	86	86	86	86	
14	87	87	87	87	87	86	86	86	86	86	
15	87	87	87	87	87	86	86	86	86	86	
16	87	87	87	87	87	86	86	86	86	87	
17	87	87	87	87	87	87	87	86	86	87	
18	87	87	87	87	87	87	87	86	86	87	
19	87	88	88	87	87	87	87	86	87	87	
20	88	88	88	87	87	87	87	86	87	87	
21	88	88	88	88	87	87	87	87	87	87	
22	88	88	88	88	88	88	87	87	87	88	
23	89	89	89	88	88	88	87	87	87	88	
24	89	89	89	89	88	88	88	87	88	88	
25	90	90	90	89	89	89	88	88	88	89	
26	90	91	91	89	89	89	88	88	89	89	
27	91	91	91	90	90	90	89	88	89	90	
28	92	92	92	90	90	90	89	89	89	90	
29	93	93	92	91	91	91	90	89	90	91	
30	94	93	93	91	91	92	90	90	90	92	
31	94	94	94	92	92	92	90	90	91	92	
32	96	95	95	93	93	93	91	91	91	93	
33	97	96	96	93	94	94	92	91	92	94	
34	98	98	97	94	95	95	92	92	93	95	
35	99	99	98	95	96	96	93	93	94	96	
36	100	100	99	96	97	96	94	93	94	97	
37	102	101	101	97	97	97	94	94	95	98	
38	103	102	102	98	99	98	95	95	96	99	
39	104	103	102	98	99	99	96	95	97	99	
40	105	104	104	99	100	100	96	96	97	100	
41	107	106	105	100	101	101	97	97	98	101	
42	108	107	106	101	103	102	98	98	100	103	
43	109	108	107	102	104	103	99	99	101	104	
44	110	109	108	103	104	104	100	99	101	104	
45	111	110	109	104	105	105	101	100	102	105	
46	112	111	110	105	107	106	102	101	103	106	
47	114	112	111	106	108	107	103	103	104	108	
48	115	114	113	107	109	108	104	104	105	109	
49	116	115	114	108	111	109	105	105	106	110	

CWaL032323-49A - Unexposed Face Temperatures – Interior Exposure										
Time (minutes)	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7	TC 8	TC 9	Average
50	118	116	115	109	112	110	106	106	107	111
51	119	117	116	110	113	112	107	107	109	112
52	120	119	117	111	114	113	108	108	110	113
53	121	119	118	112	115	113	109	109	110	114
54	122	121	119	113	116	114	110	110	112	115
55	124	122	120	114	117	115	111	111	113	116
56	125	123	121	115	118	116	112	113	113	117
57	126	124	121	116	119	117	112	113	114	118
58	126	124	122	116	120	118	113	114	115	119
59	127	125	122	117	120	118	114	115	116	119
60	128	126	123	117	121	119	115	115	117	120
61	128	127	124	118	121	120	115	116	118	121
62	129	128	124	119	122	120	116	117	118	122
63	130	128	125	119	123	121	117	118	119	122
64	130	128	125	120	124	122	117	119	120	123
65	131	130	126	121	124	122	118	119	121	124
66	133	132	127	122	125	123	119	120	122	125
67	134	134	128	122	126	124	120	121	123	126
68	136	135	129	123	127	125	121	122	124	127
69	137	135	130	124	127	125	121	122	124	127
70	138	136	130	124	128	126	122	123	125	128
71	138	135	131	125	128	126	123	124	126	128
72	137	133	131	125	128	127	123	123	126	128
73	137	133	131	126	129	127	123	124	127	129
74	138	133	132	126	129	128	124	125	128	129
75	139	135	133	127	129	128	125	125	128	130
76	141	137	135	128	130	129	126	126	129	131
77	142	137	136	128	131	129	126	127	129	132
78	143	137	137	129	131	130	127	127	130	132
79	144	139	139	129	132	131	128	128	131	133
80	145	139	139	130	132	131	129	129	131	134
81	145	139	140	130	132	132	129	129	132	134
82	145	138	139	131	132	132	129	129	132	134
83	145	139	139	131	132	132	130	130	133	135
84	147	140	141	132	133	133	130	130	133	135
85	148	139	142	132	133	133	131	131	134	136
86	147	137	140	132	134	133	131	131	134	136
87	148	138	141	133	134	134	132	131	134	136
88	149	140	142	133	134	134	132	132	135	137
89	149	140	143	134	135	134	133	132	135	137
90	150	139	143	134	135	134	133	132	136	137
91	150	138	142	134	135	135	133	133	136	137
92	151	140	143	135	135	135	134	133	136	138
93	151	140	143	135	136	135	134	133	137	138
94	153	142	145	136	136	136	135	134	137	139
95	153	143	145	136	136	136	135	134	137	140
96	152	141	144	136	137	136	135	134	138	139
97	152	140	142	137	137	136	135	134	138	139
98	150	138	139	136	136	136	135	133	138	138
99	148	136	136	136	134	136	134	132	136	137
100	148	135	136	136	134	136	134	131	137	136
101	147	135	134	135	134	135	134	130	136	136
102	146	134	134	135	133	135	133	129	136	135
103	148	136	136	136	134	135	134	130	136	136
104	149	138	138	136	135	136	134	131	137	137

CWaL032323-49A - Unexposed Face Temperatures – Interior Exposure										
Time (minutes)	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7	TC 8	TC 9	Average
105	148	137	136	136	135	136	134	131	137	137
106	148	137	135	136	135	136	134	131	137	137
107	150	141	138	137	136	136	135	132	138	138
108	153	144	142	137	137	137	135	133	138	140
109	152	143	141	138	137	137	136	133	138	139
110	152	142	141	138	137	137	136	134	138	139
111	149	138	137	138	137	137	135	132	138	138
112	150	139	137	138	136	137	135	133	138	138
113	150	139	137	138	137	137	135	133	138	138
114	150	139	136	138	136	137	135	132	138	138
115	150	138	135	138	136	137	135	131	138	138
116	151	139	137	138	137	138	135	132	138	138
117	152	141	137	138	137	138	136	133	139	139
118	154	144	140	139	138	138	136	134	139	140
119	156	146	143	139	138	139	137	135	140	141
120	156	146	145	140	139	139	137	135	140	142

CWaL032323-49B - Furnace Temperatures – Exterior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
0	80	80	79	79	79	79	79	78	78	78	79
1	94	98	90	92	98	95	86	90	89	179	101
2	467	487	386	454	481	394	290	445	344	454	420
3	859	846	751	802	881	769	694	736	647	620	760
4	909	884	834	843	907	834	797	778	719	659	817
5	961	941	915	912	939	901	900	788	758	746	876
6	1051	1040	1016	1003	1054	1018	991	861	867	877	978
7	1136	1122	1106	1096	1159	1118	1067	971	992	994	1076
8	1188	1172	1167	1161	1223	1190	1126	1063	1090	1083	1146
9	1225	1212	1211	1209	1266	1245	1175	1134	1160	1147	1198
10	1277	1263	1257	1270	1325	1294	1228	1208	1230	1212	1256
11	1345	1324	1313	1343	1399	1351	1290	1289	1301	1277	1323
12	1387	1366	1361	1394	1447	1402	1342	1343	1350	1324	1372
13	1394	1376	1381	1409	1452	1426	1368	1355	1369	1349	1388
14	1396	1381	1389	1416	1454	1436	1383	1362	1382	1367	1396
15	1409	1393	1399	1430	1466	1448	1398	1381	1401	1387	1411
16	1430	1409	1414	1450	1487	1464	1416	1406	1422	1407	1430
17	1444	1424	1430	1465	1501	1482	1434	1426	1442	1429	1448
18	1455	1435	1445	1478	1509	1494	1448	1443	1459	1447	1462
19	1459	1438	1454	1484	1512	1501	1457	1450	1467	1460	1468
20	1464	1443	1461	1492	1517	1502	1463	1460	1475	1469	1475
21	1478	1455	1472	1504	1529	1513	1475	1477	1489	1484	1488
22	1493	1468	1485	1517	1542	1526	1491	1492	1503	1497	1502
23	1503	1479	1499	1528	1552	1538	1502	1506	1516	1511	1513
24	1513	1488	1512	1538	1561	1547	1512	1519	1528	1524	1524
25	1524	1498	1522	1549	1570	1556	1523	1531	1539	1535	1535
26	1534	1506	1532	1560	1580	1565	1532	1542	1549	1545	1544
27	1543	1515	1542	1568	1587	1574	1541	1551	1560	1556	1554
28	1553	1523	1550	1577	1594	1580	1549	1562	1568	1565	1562
29	1557	1528	1558	1582	1598	1586	1555	1569	1575	1571	1568
30	1561	1534	1566	1588	1603	1592	1560	1576	1582	1577	1574
31	1570	1541	1572	1595	1611	1599	1568	1584	1591	1585	1582
32	1577	1548	1580	1603	1617	1607	1575	1592	1599	1593	1589
33	1584	1555	1588	1609	1622	1613	1581	1600	1605	1600	1596
34	1589	1559	1594	1615	1627	1617	1587	1606	1609	1604	1601
35	1594	1565	1599	1619	1631	1624	1592	1610	1616	1611	1606
36	1598	1568	1603	1621	1633	1626	1596	1614	1619	1616	1609
37	1602	1573	1610	1627	1638	1632	1601	1620	1626	1623	1615
38	1610	1580	1616	1633	1644	1637	1606	1627	1633	1630	1622
39	1616	1585	1622	1638	1650	1642	1612	1633	1639	1635	1627

CWaL032323-49B - Furnace Temperatures – Exterior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
40	1622	1591	1627	1644	1656	1647	1617	1640	1644	1641	1633
41	1627	1596	1635	1649	1659	1654	1624	1646	1653	1651	1639
42	1633	1602	1640	1653	1663	1659	1629	1651	1658	1653	1644
43	1638	1607	1644	1658	1668	1662	1632	1656	1661	1656	1648
44	1645	1612	1649	1664	1675	1666	1636	1662	1666	1662	1654
45	1651	1618	1655	1669	1680	1671	1641	1668	1671	1667	1659
46	1657	1624	1662	1676	1686	1679	1648	1679	1685	1682	1668
47	1661	1628	1667	1679	1688	1681	1652	1681	1685	1681	1670
48	1661	1628	1669	1679	1686	1683	1653	1680	1683	1680	1670
49	1662	1629	1670	1680	1688	1683	1654	1681	1683	1682	1671
50	1667	1634	1674	1686	1694	1687	1658	1685	1687	1685	1675
51	1674	1640	1680	1693	1701	1694	1664	1695	1700	1698	1684
52	1676	1643	1685	1694	1702	1700	1669	1696	1702	1699	1686
53	1679	1646	1688	1697	1704	1700	1671	1698	1702	1700	1689
54	1683	1650	1692	1700	1707	1704	1675	1701	1705	1704	1692
55	1685	1652	1694	1703	1709	1705	1676	1702	1705	1704	1694
56	1688	1655	1698	1705	1712	1709	1679	1706	1712	1714	1698
57	1693	1660	1703	1709	1717	1714	1684	1711	1718	1715	1703
58	1696	1663	1705	1712	1719	1715	1686	1713	1717	1716	1704
59	1699	1666	1709	1714	1720	1719	1688	1715	1720	1719	1707
60	1703	1670	1713	1717	1724	1723	1693	1719	1724	1723	1711
61	1710	1677	1720	1726	1733	1732	1700	1731	1738	1737	1720
62	1718	1684	1728	1731	1739	1737	1706	1736	1740	1735	1725
63	1718	1685	1728	1732	1739	1736	1706	1734	1737	1736	1725
64	1725	1692	1732	1739	1746	1741	1711	1741	1744	1746	1732
65	1734	1700	1742	1746	1755	1749	1718	1748	1750	1749	1739
66	1730	1696	1740	1743	1749	1749	1718	1747	1757	1745	1737
67	1731	1697	1741	1743	1749	1748	1718	1746	1753	1750	1738
68	1733	1699	1742	1744	1751	1749	1719	1746	1751	1750	1738
69	1737	1704	1747	1747	1755	1752	1722	1749	1754	1753	1742
70	1739	1706	1750	1750	1758	1756	1724	1752	1756	1749	1744
71	1746	1713	1756	1757	1765	1764	1731	1763	1771	1770	1754
72	1759	1724	1765	1772	1782	1775	1743	1781	1787	1783	1767
73	1763	1727	1770	1776	1786	1779	1748	1784	1786	1780	1770
74	1755	1720	1765	1766	1773	1772	1741	1771	1773	1772	1761
75	1767	1731	1773	1781	1789	1781	1751	1784	1785	1782	1773
76	1775	1734	1773	1791	1795	1784	1755	1791	1790	1791	1778
77	1769	1731	1773	1781	1788	1780	1752	1782	1781	1778	1771
78	1759	1725	1771	1769	1776	1775	1744	1771	1774	1774	1764
79	1761	1728	1773	1768	1776	1776	1744	1771	1775	1775	1765
80	1763	1731	1776	1770	1778	1779	1746	1773	1777	1776	1767
81	1773	1740	1784	1782	1793	1790	1756	1789	1796	1795	1780
82	1787	1752	1797	1798	1812	1803	1771	1803	1803	1796	1792
83	1773	1740	1785	1783	1792	1789	1758	1785	1787	1785	1778
84	1772	1739	1785	1779	1788	1788	1756	1781	1786	1786	1776
85	1774	1742	1788	1780	1788	1791	1757	1783	1789	1788	1778
86	1795	1762	1804	1805	1819	1809	1775	1810	1813	1811	1800
87	1794	1759	1803	1802	1814	1809	1777	1806	1807	1802	1797
88	1784	1751	1797	1792	1801	1800	1768	1795	1797	1795	1788
89	1784	1752	1798	1790	1799	1801	1767	1793	1797	1797	1788
90	1787	1755	1802	1791	1801	1802	1768	1794	1799	1798	1790
91	1802	1769	1811	1809	1822	1814	1781	1811	1819	1817	1805
92	1815	1780	1822	1824	1838	1827	1794	1825	1828	1818	1817
93	1798	1764	1809	1806	1815	1814	1781	1810	1811	1806	1801
94	1795	1762	1808	1802	1810	1811	1777	1806	1808	1808	1799
95	1798	1765	1811	1803	1811	1814	1779	1808	1811	1810	1801
96	1799	1767	1813	1803	1812	1814	1779	1808	1811	1810	1802
97	1801	1769	1815	1805	1815	1816	1782	1810	1813	1812	1804
98	1804	1771	1817	1807	1817	1819	1784	1811	1816	1814	1806
99	1808	1774	1818	1811	1820	1820	1785	1814	1818	1815	1808
100	1811	1777	1822	1815	1826	1826	1791	1822	1828	1827	1815
101	1825	1790	1835	1831	1844	1838	1804	1837	1840	1833	1828

CWaL032323-49B - Furnace Temperatures – Exterior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
102	1815	1780	1826	1821	1830	1830	1796	1826	1828	1824	1818
103	1813	1779	1825	1817	1826	1827	1793	1822	1824	1823	1815
104	1815	1782	1828	1819	1828	1829	1794	1823	1827	1825	1817
105	1816	1784	1830	1820	1828	1832	1796	1824	1828	1827	1819
106	1829	1795	1838	1837	1849	1843	1808	1841	1844	1841	1833
107	1825	1790	1835	1831	1840	1839	1805	1836	1837	1833	1827
108	1821	1788	1834	1826	1834	1835	1802	1831	1832	1831	1823
109	1823	1789	1836	1826	1835	1835	1801	1830	1834	1832	1824
110	1824	1792	1838	1827	1836	1837	1803	1832	1835	1834	1826
111	1836	1803	1850	1843	1855	1852	1817	1851	1857	1853	1842
112	1845	1812	1857	1853	1866	1860	1826	1861	1864	1862	1850
113	1845	1810	1856	1852	1863	1859	1826	1858	1859	1852	1848
114	1836	1802	1848	1842	1850	1851	1818	1848	1850	1849	1840
115	1844	1810	1854	1851	1863	1858	1825	1857	1859	1853	1847
116	1837	1804	1851	1843	1852	1851	1818	1847	1849	1846	1840
117	1837	1804	1852	1841	1849	1850	1817	1844	1847	1846	1839
118	1846	1812	1855	1853	1865	1858	1825	1856	1857	1852	1848
119	1845	1810	1854	1853	1864	1857	1824	1858	1856	1853	1847
120	1841	1807	1853	1847	1856	1856	1822	1855	1858	1856	1845

CWaL032323-49B - Unexposed Face Temperatures – Exterior Exposure										
Time (minutes)	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7	TC 8	TC 9	Average
0	84	83	83	83	83	83	83	82	82	83
1	83	83	83	83	83	83	83	82	82	83
2	83	83	83	83	83	83	83	83	82	83
3	83	83	83	83	83	83	83	83	82	83
4	83	83	83	83	83	83	83	83	82	83
5	83	83	83	83	83	83	83	83	82	83
6	83	83	83	83	83	83	83	83	82	83
7	83	83	83	83	83	83	83	83	82	83
8	83	83	83	83	83	83	83	83	82	83
9	83	83	83	83	83	83	83	82	82	83
10	83	83	83	83	83	83	83	82	82	83
11	83	83	83	83	83	83	83	82	82	83
12	83	84	84	83	83	83	83	83	82	83
13	84	84	84	84	84	83	83	83	83	83
14	84	84	84	84	84	84	83	83	83	84
15	85	85	85	84	85	84	83	83	83	84
16	86	86	86	85	85	85	84	83	83	85
17	87	88	88	86	87	86	85	84	84	86
18	89	89	90	88	88	87	86	85	85	87
19	91	91	92	89	90	89	87	86	86	89
20	94	93	94	91	92	91	88	87	87	91
21	96	95	96	93	94	93	90	88	89	93
22	99	98	99	96	96	95	92	89	90	95
23	102	100	102	98	99	97	94	91	92	97
24	104	103	105	101	102	100	96	93	94	100
25	107	106	108	104	104	103	98	95	96	102
26	110	109	111	106	107	105	100	97	98	105
27	113	111	114	109	110	108	103	99	100	107
28	115	114	118	112	113	111	105	101	103	110
29	118	117	120	115	116	114	108	103	105	113
30	121	120	123	118	119	117	111	105	107	116
31	124	123	126	122	123	120	114	107	110	119
32	126	126	129	125	126	123	117	110	113	122
33	128	128	130	126	128	126	118	110	115	123
34	131	131	133	130	131	129	122	113	118	126



CWaL032323-49B - Unexposed Face Temperatures – Exterior Exposure										
Time (minutes)	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7	TC 8	TC 9	Average
35	134	134	135	133	134	132	125	116	120	129
36	136	137	138	136	137	135	128	119	123	132
37	138	139	140	139	140	138	131	121	126	135
38	140	141	142	141	142	140	134	124	129	137
39	141	142	141	142	142	141	135	122	130	137
40	143	144	144	144	146	144	138	125	133	140
41	145	146	146	147	148	146	141	128	135	142
42	146	148	147	148	150	148	143	130	137	144
43	148	149	148	150	151	150	145	132	139	146
44	150	151	149	152	152	151	147	135	141	148
45	150	151	150	153	153	153	149	136	144	149
46	151	153	151	154	154	154	150	138	145	150
47	152	154	152	155	155	155	152	140	146	151
48	154	155	153	156	156	156	154	142	148	153
49	155	156	154	158	158	157	156	143	150	154
50	155	157	155	158	159	158	157	145	151	155
51	156	158	155	160	159	159	158	146	152	156
52	157	158	156	161	160	160	159	147	153	157
53	157	159	157	161	161	160	160	148	154	157
54	155	157	155	158	159	159	156	143	153	155
55	156	158	155	158	159	159	155	144	152	155
56	157	159	156	160	160	160	157	145	153	156
57	157	159	155	160	160	160	156	145	154	156
58	156	158	154	159	159	161	155	144	154	156
59	158	161	156	161	161	161	158	147	155	157
60	159	162	157	163	162	162	159	149	156	159
61	160	162	157	164	162	163	160	150	158	160
62	161	164	159	164	163	163	161	151	158	161
63	162	166	160	166	164	165	163	153	159	162
64	163	167	161	167	165	166	164	154	160	163
65	164	168	162	168	167	167	166	156	162	164
66	165	169	163	169	168	168	167	158	163	166
67	166	170	164	171	169	169	168	160	164	167
68	166	171	164	170	169	169	168	161	165	167
69	167	172	165	171	170	170	169	162	165	168
70	168	172	166	171	170	170	170	162	166	168
71	169	173	166	173	171	171	171	163	167	169
72	169	172	167	173	172	171	172	164	167	170
73	170	172	167	173	172	168	173	164	168	170
74	170	172	168	174	173	164	173	165	168	170
75	171	173	168	174	173	165	173	166	169	170
76	171	173	169	175	174	165	174	166	169	171
77	171	172	169	174	174	166	173	165	169	170
78	171	173	169	174	174	166	173	166	170	171
79	172	172	169	175	175	168	174	167	171	171
80	171	171	168	172	173	169	171	164	171	170
81	170	169	167	171	173	169	169	161	168	168
82	170	168	167	171	174	167	170	164	170	169
83	171	170	169	173	174	167	171	166	170	170
84	171	170	169	172	173	166	169	167	169	170
85	172	172	171	172	174	166	170	168	169	170
86	173	173	172	172	174	167	170	169	169	171
87	174	174	173	173	174	168	171	170	170	172
88	175	174	174	173	175	169	170	170	170	172
89	176	175	175	174	176	171	171	172	171	173



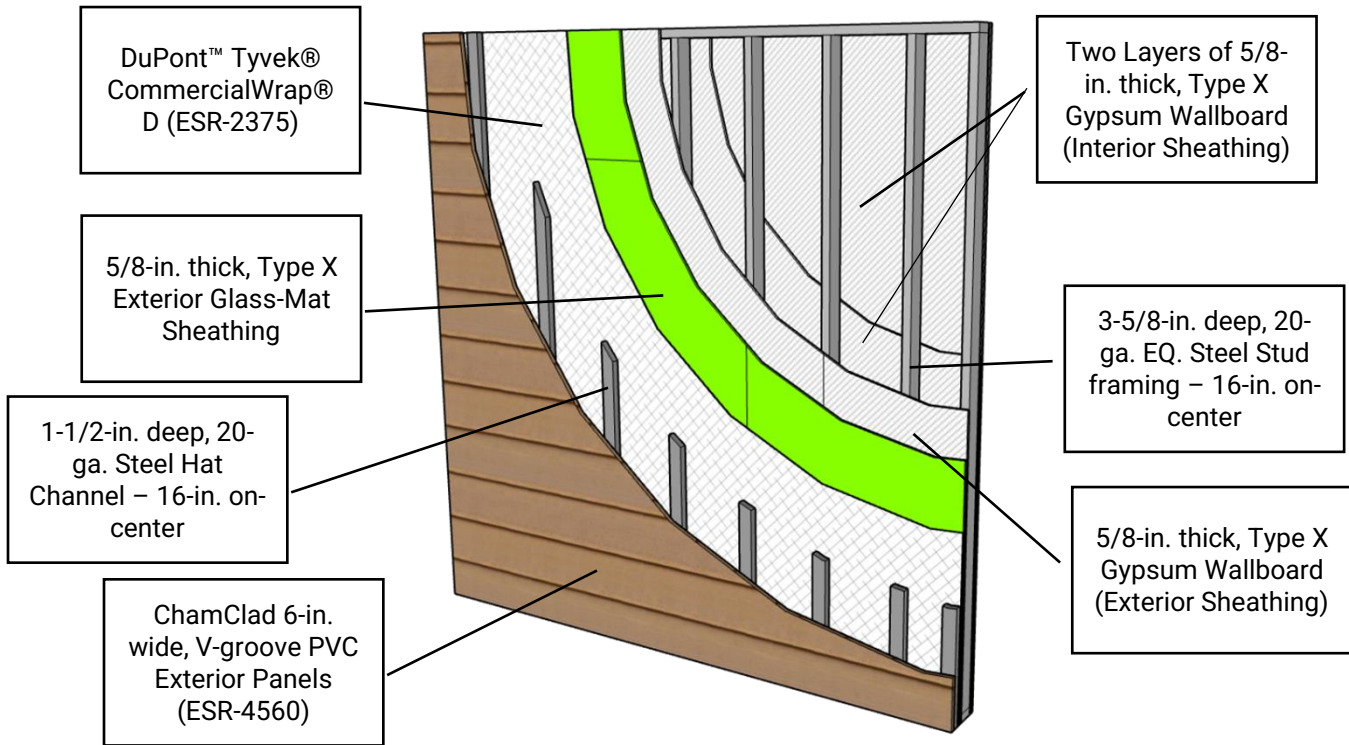
CWaL032323-49B - Unexposed Face Temperatures – Exterior Exposure										
Time (minutes)	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7	TC 8	TC 9	Average
90	177	177	176	175	178	172	172	173	172	175
91	178	178	177	176	179	174	173	175	173	176
92	179	178	178	178	176	172	174	176	174	176
93	180	180	179	179	176	172	176	177	176	177
94	181	180	180	180	177	175	177	179	177	179
95	182	181	182	181	179	176	177	180	178	180
96	183	182	183	179	180	174	178	181	179	180
97	184	183	184	179	181	174	179	181	179	181
98	185	183	185	180	183	176	180	182	180	181
99	185	183	185	178	183	177	178	179	181	181
100	188	184	186	182	186	179	180	182	182	183
101	190	186	188	183	188	180	181	182	182	184
102	190	187	188	183	190	181	180	177	181	184
103	191	188	189	186	193	185	181	179	183	186
104	194	190	192	191	195	187	185	183	185	189
105	195	193	195	194	198	190	188	186	187	192
106	197	194	197	197	200	192	190	189	189	194
107	198	195	199	199	202	194	192	192	191	196
108	200	197	200	201	203	195	194	195	193	197
109	201	197	201	202	204	197	193	195	194	198
110	202	199	202	204	205	199	195	196	196	200
111	202	200	203	205	207	200	195	196	196	201
112	203	202	203	206	208	202	197	196	197	202
113	204	202	205	208	210	205	198	199	200	203
114	205	203	206	208	210	206	199	197	200	204
115	206	205	206	210	212	207	200	200	201	205
116	206	205	206	210	213	208	199	198	202	205
117	208	206	208	213	214	207	201	203	204	207
118	209	207	208	214	214	207	202	205	204	208
119	210	211	210	214	215	208	204	206	205	209
120	211	214	210	215	216	209	205	208	206	211

CWaL032323-49B - Furnace Temperatures (Hose Stream Retest) – Exterior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
0	90	89	88	90	89	88	88	88	88	87	89
1	105	108	97	97	131	97	94	99	101	226	116
2	331	335	280	244	271	226	210	297	268	278	274
3	569	581	476	465	580	400	418	475	502	321	479
4	696	715	608	612	756	513	593	558	658	430	614
5	786	807	703	710	860	592	709	611	768	516	706
6	909	919	818	830	983	682	792	717	864	633	815
7	1045	1033	951	962	1104	791	875	877	960	739	934
8	1140	1113	1048	1067	1184	889	940	1008	1032	835	1026
9	1211	1174	1117	1152	1249	971	997	1103	1095	920	1099
10	1287	1235	1180	1237	1326	1055	1059	1196	1166	1011	1175
11	1361	1296	1240	1325	1407	1135	1126	1278	1241	1085	1249
12	1421	1346	1289	1392	1460	1198	1178	1342	1299	1139	1307
13	1461	1382	1326	1439	1497	1244	1220	1387	1342	1181	1348
14	1490	1408	1354	1475	1528	1281	1252	1422	1373	1216	1380
15	1523	1438	1384	1510	1559	1316	1284	1457	1405	1252	1413
16	1546	1461	1409	1539	1586	1348	1315	1487	1436	1282	1441
17	1569	1486	1436	1565	1610	1374	1345	1511	1463	1307	1467
18	1584	1502	1459	1583	1623	1393	1370	1532	1483	1328	1486
19	1592	1511	1470	1593	1629	1406	1385	1542	1494	1338	1496

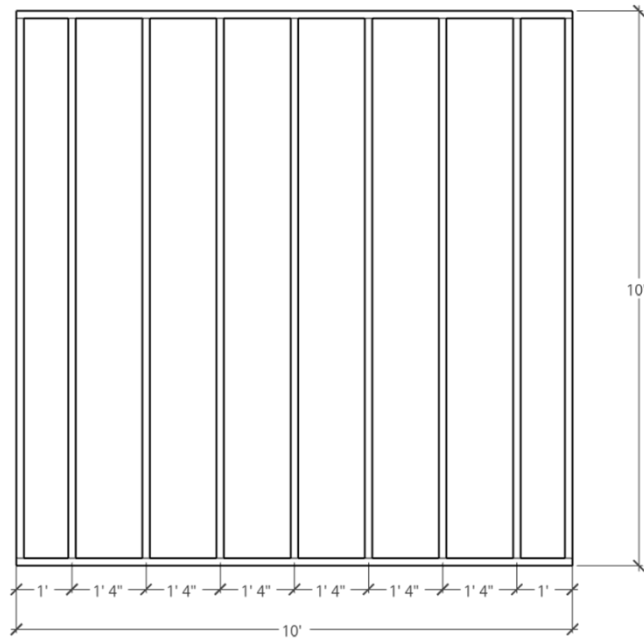
CWaL032323-49B - Furnace Temperatures (Hose Stream Retest) – Exterior Exposure											
Time (minutes)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6	Probe 7	Probe 8	Probe 9	Probe 10	Average
20	1568	1494	1459	1572	1598	1384	1374	1518	1470	1316	1475
21	1564	1493	1459	1567	1596	1378	1371	1517	1467	1330	1474
22	1596	1523	1489	1597	1634	1413	1402	1557	1501	1369	1508
23	1631	1554	1522	1634	1670	1453	1436	1597	1537	1401	1544
24	1643	1564	1535	1649	1679	1470	1454	1611	1553	1408	1557
25	1632	1557	1531	1643	1667	1464	1451	1602	1543	1404	1549
26	1633	1561	1535	1644	1669	1467	1454	1607	1545	1415	1553
27	1646	1572	1549	1657	1684	1484	1470	1627	1564	1434	1569
28	1661	1587	1566	1673	1698	1502	1488	1644	1579	1450	1585
29	1666	1594	1576	1681	1703	1514	1499	1653	1588	1459	1593
30	1669	1596	1582	1686	1707	1520	1505	1658	1592	1467	1598
31	1673	1600	1587	1690	1708	1525	1511	1662	1596	1480	1603
32	1652	1584	1570	1672	1682	1509	1501	1641	1578	1462	1585
33	1631	1562	1548	1648	1655	1484	1483	1614	1550	1445	1562
34	1624	1557	1547	1640	1652	1480	1477	1610	1545	1445	1558
35	1633	1566	1558	1648	1664	1492	1485	1626	1559	1460	1569
36	1654	1587	1581	1669	1686	1516	1506	1653	1583	1478	1591
37	1660	1596	1593	1677	1691	1526	1518	1659	1594	1488	1600
38	1666	1603	1602	1682	1696	1534	1528	1664	1602	1500	1608
39	1678	1615	1617	1693	1708	1549	1541	1676	1615	1514	1621
40	1687	1626	1629	1703	1717	1560	1551	1689	1625	1524	1631
41	1694	1635	1641	1712	1727	1575	1561	1702	1637	1537	1642
42	1705	1646	1652	1722	1736	1587	1573	1711	1647	1548	1653
43	1708	1650	1656	1726	1737	1591	1580	1712	1652	1553	1656
44	1711	1653	1661	1729	1741	1593	1585	1714	1656	1558	1660
45	1712	1656	1664	1729	1740	1596	1588	1715	1657	1562	1662
46	1715	1661	1672	1731	1743	1604	1595	1720	1664	1570	1668
47	1722	1667	1679	1736	1750	1612	1604	1727	1672	1578	1675
48	1730	1676	1689	1745	1759	1624	1614	1737	1683	1590	1685
49	1737	1684	1699	1751	1765	1635	1624	1745	1693	1601	1693
50	1737	1686	1702	1754	1767	1637	1629	1747	1695	1602	1696
51	1727	1675	1691	1744	1756	1626	1622	1732	1683	1595	1685
52	1728	1676	1691	1742	1756	1625	1622	1731	1682	1597	1685
53	1734	1682	1697	1744	1758	1632	1628	1736	1688	1603	1690
54	1735	1685	1701	1747	1759	1637	1631	1741	1693	1605	1694
55	1738	1689	1707	1751	1764	1643	1636	1746	1698	1613	1698
56	1744	1695	1714	1755	1769	1648	1644	1750	1705	1620	1704
57	1743	1696	1715	1755	1767	1651	1646	1751	1706	1620	1705
58	1746	1699	1718	1758	1770	1657	1650	1757	1709	1628	1709
59	1753	1704	1722	1764	1776	1662	1654	1760	1713	1631	1714
60	1757	1710	1729	1769	1781	1667	1660	1764	1721	1637	1720

Note: Tabular data reported in one (1) minute intervals. Data measured and recorded in 15 second intervals available upon request.

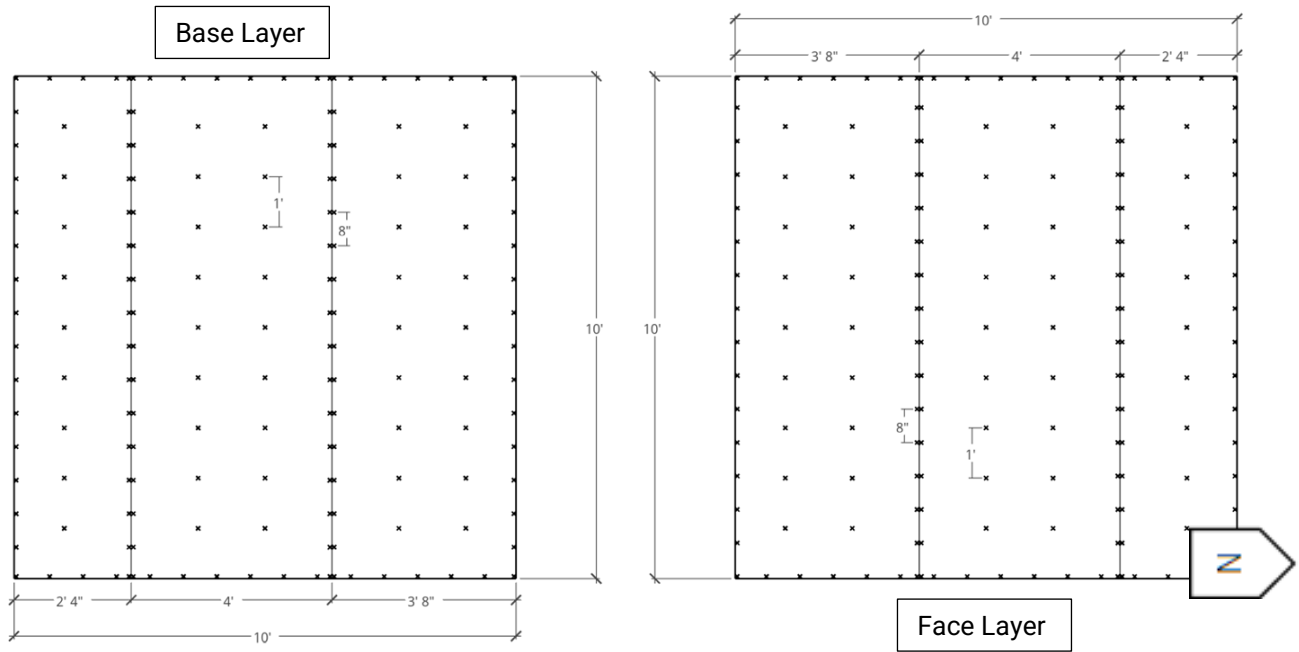
Appendix C - Drawings



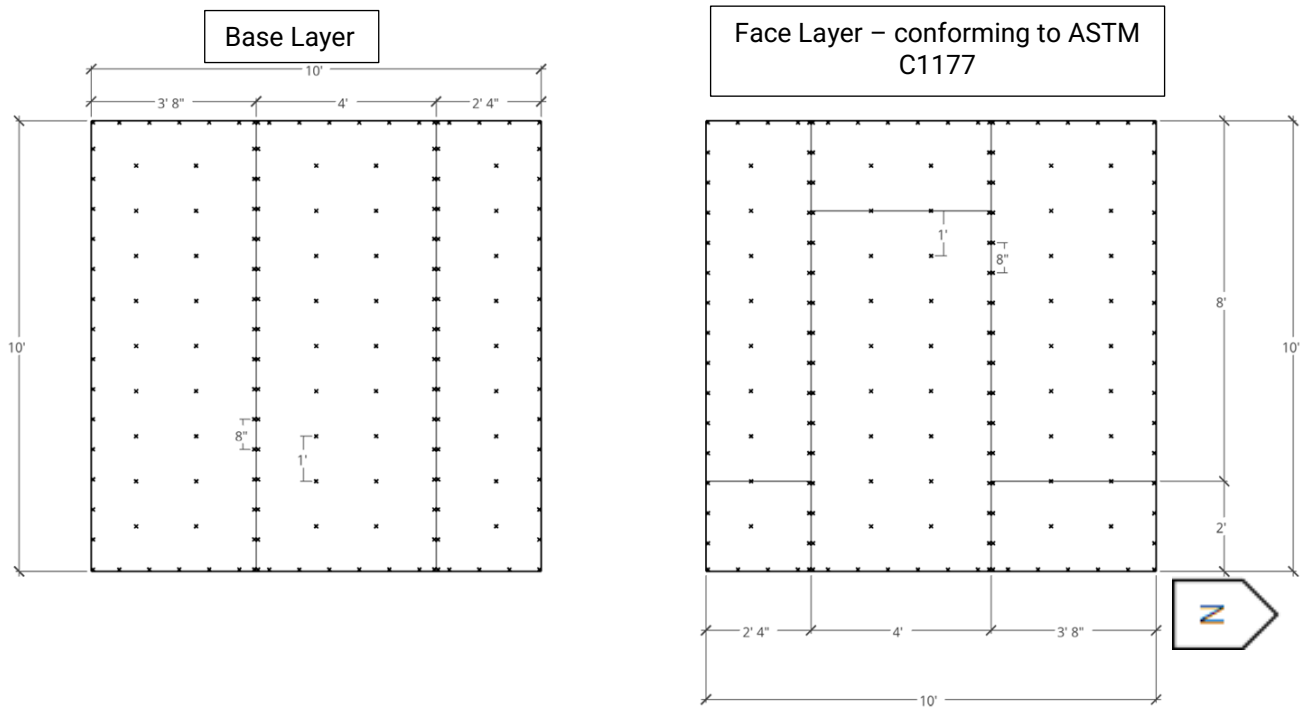
Drawing No. 1
Wall Assembly Plan View



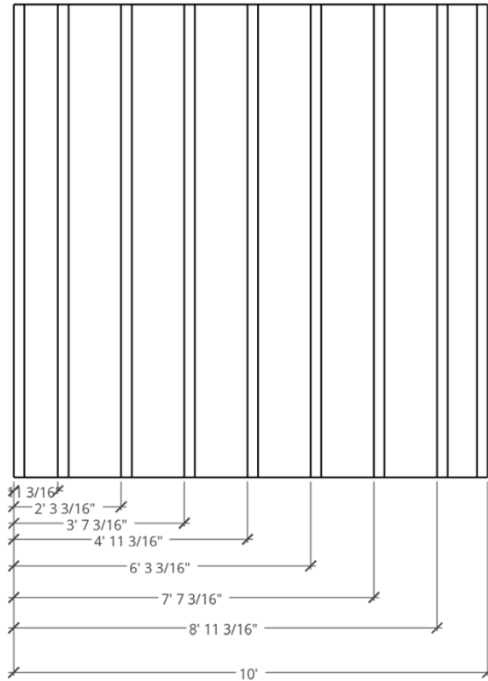
Drawing No. 2
3-5/8-in. deep, 20-ga. EQ. Steel Stud Framing Layout



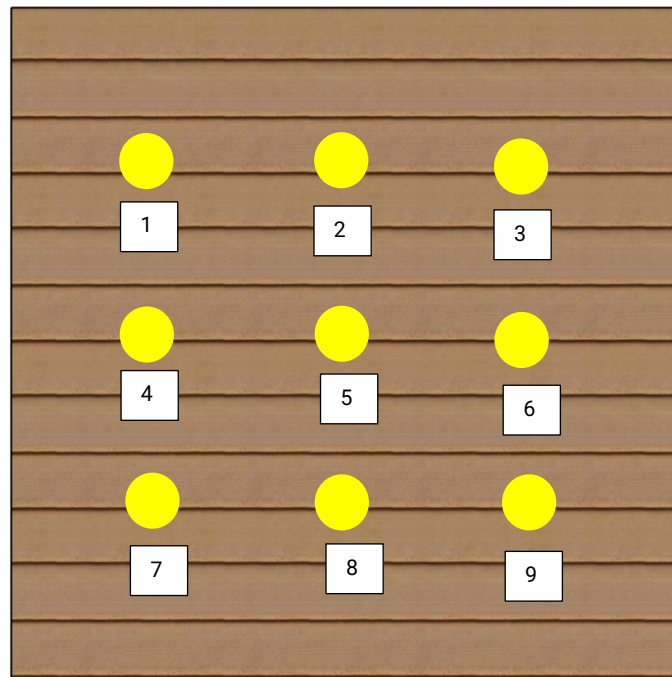
Drawing No. 3
Interior Sheathing GWB layout and fastener schedule



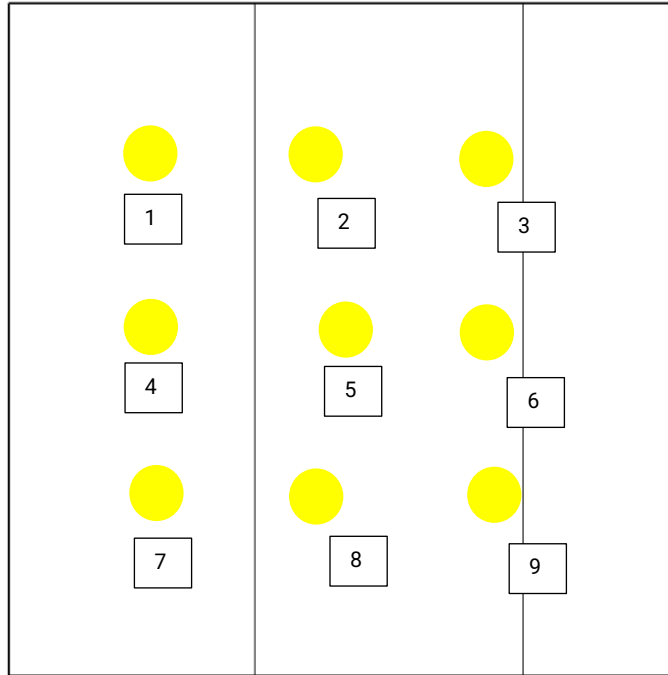
Drawing No. 4
Exterior Sheathing GWB layout and fastener schedule



**Drawing No. 5
Hat Channel Layout**



**Drawing No. 6
Unexposed Thermocouple Layout - Interior Exposure Test**



Drawing No. 7
Unexposed Thermocouple Layout – Exterior Exposure Test

Appendix D – Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	06/23/2023	N/A	Original report issue