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**EVALUATION OF “BOREAL NATURE ELITE”  
SELF-ADHERED AIR BARRIER MEMBRANE ASSEMBLIES  
IN ACCORDANCE WITH CAN/ULC-S742-11**

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## 1.0 INTRODUCTION

At the request of Genyk, Element Materials Technology Inc. was retained to evaluate various wall assembly configurations using the "Boreal Nature Elite" spray polyurethane foam air vapour barrier applied to exterior gypsum sheathed and concrete masonry block (CMU) walls in accordance with CAN/ULC-S742-11 as outlined in Element proposal number 20-006-95292.

Upon receipt, construction and air barrier system application, the specimens were assigned the following Element Specimen Numbers:

### Steel Stud (SS) with Exterior Gypsum Sheathing Wall Specimens:

#### Client Specimen Description

Primary Air Barrier Material: *Boreal Nature Elite*  
*Spray Polyurethane Foam*

#### Element Specimen No.

20-06-B0040-SS-OP-1

#### Wall Specimen Description

*Opaque wall assembly test specimen with exterior gypsum with metal studs.*

Steel Studs: 18 ga. channel-shaped nominal 152 mm (6") deep on nominal 406 mm (16") O/C

Exterior Sheathing: nominal 1219 mm x 2438 mm x 12.7 mm thick (4' x 8' x 1/2" thick) thick Georgia Pacific gypsum exterior sheathing as per CAN/ULC-S742-11, Figure D4

#### Client Specimen Description

Primary Air Barrier Material: *Boreal Nature Elite*  
*Spray Polyurethane Foam*

#### Element Specimen No.

20-06-B0040-SS-PT-2

#### Wall Specimen Description

*Wall assembly test specimen with exterior gypsum with metal studs and penetrations (masonry ties and anchors).*

Steel Studs: 18 ga. channel-shaped nominal 152 mm (6") deep on nominal 406 mm (16") O/C

Exterior Sheathing: nominal 1219 mm x 2438 mm x 12.7 mm thick (4' x 8' x 1/2" thick) thick Georgia Pacific gypsum exterior sheathing as per CAN/ULC-S742-11, Figure D5

#### Client Specimen Description

Primary Air Barrier Material: *Boreal Nature Elite*  
*Spray Polyurethane Foam*

#### Element Specimen No.

20-06-B0040-SS-CB-3

#### Wall Specimen Description

*Opaque wall assembly test specimen with exterior gypsum with metal studs to foundation interface.*

Steel Studs: 18 ga. channel-shaped nominal 152 mm (6") deep on nominal 406 mm (16") O/C

Exterior Sheathing: nominal 1219 mm x 2438 mm x 12.7 mm thick (4' x 8' x 1/2" thick) thick Georgia Pacific gypsum exterior sheathing as per CAN/ULC-S742-11, Figure D6

**Masonry Block (CMU) Wall Specimens:**

**Client Specimen Description**

Primary Air Barrier Material: *Boreal Nature Elite*  
*Spray Polyurethane Foam*

**Wall Specimen Description**

*Opaque wall assembly test specimen for masonry block*

**Masonry Block:** 8" x 16" x 8" / 200 mm x 400 mm x 203 mm (Typical) as per CAN/ULC-S742-11, Figure D1

**Element Specimen No.**

20-06-B0040-CMU-OP-4

**Client Specimen Description**

Primary Air Barrier Material: *Boreal Nature Elite*  
*Spray Polyurethane Foam*

**Wall Specimen Description**

*Wall assembly test specimen for masonry block with penetrations (masonry ties and anchors).*

**Masonry Block:** 8" x 16" x 8" / 200 mm x 400 mm x 203 mm (Typical) as per CAN/ULC-S742-11, Figure D2

**Element Specimen No.**

20-06-B0040-CMU-PT-5

**Client Specimen Description**

Primary Air Barrier Material: *Boreal Nature Elite*  
*Spray Polyurethane Foam*

**Wall Specimen Description**

*Wall assembly test specimen for masonry block with foundation interface.*

**Masonry Block:** 8" x 16" x 8" / 200 mm x 400 mm x 203 mm (Typical) as per CAN/ULC-S742-11, Figure D3

**Element Specimen No.**

20-06-B0040-CMU-CB-6

Note: Photographs documenting the air barrier installation for each respective wall assembly are located in Appendices G to L. Detail drawings for both wall sections are located in Appendices M & N.



## 2.0 TEST WALL CONSTRUCTION

### 2.1 Steel Stud (SS) with Exterior Gypsum Sheathing Wall Specimens:

#### Opaque Wall Section – Specimens 20-06-B0040-SS-OP-1

The 2959 mm x 2959 mm (116.5" x 116.5") test wall section was constructed using commercially purchased steel studs/tracks, fasteners, and exterior gypsum during the period of March 16<sup>th</sup> – 27<sup>th</sup>, 2020 and built as per the construction details located in Figure D4 of CAN/ULC-S742-11.

The 18 ga. channel-shaped galvanized steel studs measured 152 mm (6") deep with 33.7 mm (1-21/64") long returns. The 18 ga galvanized steel top and bottom channels measured nominally 152 mm (6") deep (inside dimension) with 33.3 mm (1-5/16") returns. An 18 ga. horizontal channel-shaped galvanized steel bridging bar spanned the studs, passing through the pre-punched openings in the studs, approximately 1727 mm (68") up from the bottom of the test sample. The bridging bar measured 38.1 mm (1-1/2") wide with 12.7 mm (1/2") returns. The bridging bar was fastened to the studs via an 82.6 mm (3-1/4") long section of 38.1 mm x 38.1 mm (1-1/2" x 1-1/2") galvanized steel angle (bridging clip), one per stud. Two #8 x 12.7 mm (1/2") long modified truss-head self-drilling screws secured each bridging clip to the adjacent stud, and two #8 x 12.7 mm (1/2") long modified truss-head self-drilling screws secured each bridging clip to the bridging bar. The bridging bar spanned the intermediate studs. The gypsum sheathing was orientated with the long edges horizontal and fastened to the steel studs using #6 x 31.8 mm (1-1/4") long scavenger (flat)-head self-drilling drywall screws on nominal 203 mm (8") centers. Further details of the wall configurations are located in Appendix G.

#### Penetrations Wall Section – Specimens 20-06-B0040-SS-PT-2

The 2959 mm x 2959 mm (116.5" x 116.5") test wall section was constructed on top of the curb using commercially purchased steel studs/tracks, fasteners, and exterior gypsum during the period of March 16<sup>th</sup> – 27<sup>th</sup>, 2020 and built as per the construction details located in Figures D5 of CAN/ULC-S742-11.

The steel stud, steel top and bottom channel, and bridging bar detail (including fastening details) were as mentioned above. The bridging bar spanned the five intermediate studs adjacent to the window opening, 1197 mm (47-1/8") up from the bottom of the test sample. Additional steel stud sections and top and bottom steel channel sections were used in the construction of the rough window opening. The gypsum sheathing was orientated with the long edges horizontal and fastened to the steel studs using #6 x 31.8 mm (1-1/4") long scavenger (flat)-head self-drilling drywall screws on nominal 203 mm (8") centers. Further details of the wall configurations are located in Appendix H.

#### Opaque Foundation Interface Wall Section – Specimens 20-06-B0040-SS-CB-3

The steel test frame opening was complete with a 305 mm (12") high, 203 mm (8") deep concrete curb along the bottom. The 2959 mm x 2654 mm (116.5" x 104.5") test wall section was constructed on top of the curb using commercially purchased steel studs/tracks, fasteners, and exterior gypsum during the period of March 16<sup>th</sup> – 27<sup>th</sup>, 2020 and built as per the construction details located in Figures D6 of CAN/ULC-S742-11.

The steel stud, steel top and bottom channel, and bridging bar detail (including fastening details) were as mentioned above for the Opaque Wall Section. The gypsum sheathing was orientated with the long edges horizontal and fastened to the steel studs using #6 x 31.8 mm (1-1/4") long scavenger (flat)-head self-drilling drywall screws on nominal 203 mm (8") centers. Further details of the wall configurations are located in Appendix I.

## 2.2 Masonry Block (CMU) Wall Specimens:

### Opaque Wall Section – Specimens 20-06-B0040-CMU-OP-4

The 2959 mm x 2959 mm (116.5" x 116.5") test wall section was constructed using commercially purchased CMU block (8" x 16") on March 28<sup>th</sup>, 2020 and built as per the construction details located in Figure D1 of CAN/ULC-S742-11. Further details of the wall configurations are located in Appendix J. The wall assembly was permitted to cure for a minimum of 30-days prior to air barrier system application.

### Penetrations Wall Section – Specimens 20-06-B0040-CMU-PT-5

The 2959 mm x 2959 mm (116.5" x 116.5") test wall section was constructed using commercially purchased CMU block (8" x 16") on March 28<sup>th</sup>, 2020 and built as per the construction details located in Figures D2 of CAN/ULC-S742-11. Further details of the wall configurations are located in Appendix K. The wall assembly was permitted to cure for a minimum of 30-days prior to air barrier system application.

### Opaque Foundation Interface Wall Section – Specimens 20-06-B0040-CMU-CB-6

The 2959 mm x 2654 mm (116.5" x 104.5") test wall section was constructed using commercially purchased CMU block (8" x 16") on March 28<sup>th</sup>, 2020 and built as per the construction details located in Figures D3 of CAN/ULC-S742-11. Further details of the wall configurations are located in Appendix L. The wall assembly was permitted to cure for a minimum of 30-days prior to air barrier system application.

## 2.3 Application of Air Barrier

The "Boreal Nature Elite" spray polyurethane foam air vapour barrier was applied on the exterior side of the test walls at Element's Systems Laboratory by representatives from Genyk on April 3<sup>rd</sup>, 2020 for the steel stud walls with exterior gypsum and on May 27<sup>th</sup>, 2020 for the CMU block walls. The air barrier application was witnessed by representatives of Element's Building Systems Laboratory staff.

### Steel Stud (SS) with Exterior Gypsum Sheathing Wall Specimens:

The exterior gypsum surface to the test frame perimeter including Element's steel frame and wood liner, window rough openings, and foundation interfaces were primed with Henry Blueskin Adhesive followed by application of Henry Blueskin self-adhesive membrane, 1 mm (40 mil) x 229 mm (9"). The penetrations (brick-ties, electrical boxes, steel square box, and pipes) were sealed with Henry Blueskin 925 BES Sealant. Please refer to Appendice G to I for details.

The mock-up window was installed (shimmed and screwed in place) into the rough opening, the perimeter rough opening was fitted with backer rod, which was then sealed with low expansion insulating foam sealant on the exterior.

### Masonry Block (CMU) Wall Specimens:

The exterior CMU block surface to the test frame perimeter including Element's steel frame and wood liner, window rough openings, and foundation interfaces were primed with Henry Blueskin Adhesive followed by application of Henry Blueskin self-adhesive membrane, 1 mm (40 mil) x 229 mm (9"). The penetrations (brick-ties, electrical boxes, steel square box, and pipes) were sealed with Dow Dowsil Contractors Weatherproofing Sealant. Please refer to Appendice J to L for details.

The mock-up window was installed (shimmed and screwed in place) into the rough opening, the perimeter rough opening was fitted with backer rod, which was then sealed with low expansion insulating foam sealant on the exterior.

### 3.0 PROCEDURE

Test Method	Test Description
Section 6.3.2.1 (A), ASTM E2357-11, Section 9.1	Air Leakage
Section 6.3.3.2 (A)	Wind Pressure Loading
Section 6.3.4	Deflection
Section 6.3.2.1 (A), ASTM E2357-11, Section 9.3	Post Conditioning Air Permeance

Note: SI Units are the primary units of measure.

#### 3.1 Air Leakage Testing

Testing was conducted in both exfiltration (-) and infiltration (+) directions. Upon mounting the wall system on the wall test apparatus, a sheet of 6 mil poly was draped over and sealed against the exterior face of the specimen's test frame utilizing sheathing tape and double-sided gasket material for extraneous air leakage measurement purposes.

Using the procedure outlined in CAN/ULC-S742-11, Referencing ASTM E2357-11, Section 9.1.2, the wall section was subjected to positive and negative pressures of: 25, 50, 75, 100, 150, 250, and 300 Pa (0.52, 1.04, 1.57, 2.09, 3.13, 5.22, and 6.27 psf). Upon completion of the extraneous air leakage, the 6 mil poly was carefully removed and the actual specimen air leakage testing was conducted at the test pressure noted above.

As per ASTM E2357-11, Section 11.4.1 logarithmic graphs for each air leakage test (infiltration / exfiltration) displaying the linear regression ( $r^2 > 0.95$ ) values are located in Appendices A to F.

The air leakage testing as described above was also conducted upon completion of the "Wind Pressure Loading & Deflection" portion as outlined in the standard.

### 3.2 Wind Pressure Conditioning

The following wind pressure loading schedule was applied to the wall system using the loads prescribed for a sustained 1 in 50 hourly wind pressure difference of 650 Pa (13.58 psf) at a building height 12 meters (39.4 feet) above grade:

#### Sustained Loads, $P_1$ & $P'_1$ :

##### Deformation Test (Sustained Pressure, $P_1$ )

The wall system was subjected to increasing pressure in increasing stages for a minimum period of 10 seconds at each stage, up to a maximum pressure of 650 Pa (13.58 psf) which was maintained for 1-hour.

##### Deformation Test (Sustained Pressure, $P'_1$ )

The wall system was subjected to increasing pressure in increasing stages for a minimum period of 10 seconds at each stage, up to a maximum pressure of -650 Pa (-13.58 psf) which was maintained for 1-hour.

The deformation measurements were taken continuously during pressurisation.

Note: As per CAN/ULC-S742-11, Section 6.3.3.5,  $P_1$  air pressure differences are to be applied in 100 Pa (2.09 psf) increments. However, as testing was also conducted in conjunction with ASTM E2357-11, the loading increments used were 100 Pa (2.09 psf) stepping followed by the 650 Pa (13.58 psf) pressure hold (which exceeds the standard requirement of 600 Pa (12.53 psf) to match ASTM E2357-11). This is considered a more severe stepping increment and is representative of the procedure outlined in CAN 07272, in which the CAN/ULC-S742 standard is based.

#### Cyclic Loads, $P_2$ & $P'_2$ :

##### Repeated Positive and Negative Pressure Test (Cyclic Pressure, $P_2$ & $P'_2$ )

The wall system was subject to 2,000 cycles of pressure. The first 1000 cycles were from 0 to +950 Pa (19.84 psf) and was followed by 1,000 cycles from 0 to -950 Pa (-19.84 psf). The deformation measurements were taken continuously during cycling.

#### Gust Loads, $P_3$ & $P'_3$ :

The wall system was then subjected to a 'Gust Wind' pressure of +1410 Pa (29.45 psf) followed by a repeat 'Gust Wind' pressure of -1410 Pa (-29.45 psf). These pressures were held for a minimum of 3 seconds. The maximum deformation readings were taken after each gust pressure.

### 3.3 Deflection

Upon completing the wind pressure conditioning sub-section, the wall specimens were subjected to wind pressure loading of  $\pm 1440$  Pa ( $\pm 30.08$  psf) for 10 seconds (exceeding the  $P_2$  and  $P'_2$  values as per CAN/ULC-S742-11, Section 6.3.4) which matches the ASTM E2357-11, Table 2  $Q_{10} > 0.40$  kPa (8.35 psf) /  $D_{0.60}$  @ 1440 Pa (30.08 psf) values.

After completing the deflection loads above, air leakage testing was again conducted at ambient conditions at an exterior temperature of -20°C (-4°F) and the interior temperature of 20°C (68°F) as per CAN/ULC-S742-11, Section 6.3.2.3 in both exfiltration (-) and infiltration (+) cases.

### 3.4 Test Dates

<u>Specimen Number</u>	<u>Test Criteria</u>	<u>Testing Date</u>
20-06-B0040-SS-OP-1	Air Leakage (Exfiltration) - Prior	May 13, 2020
	Air Leakage (Infiltration) - Prior	May 13, 2020
	Wind Load Conditioning	May 14, 2020
	Wind Load Durability	May 14, 2020
	Air Leakage (Exfiltration) - Ambient	May 14, 2020
	Air Leakage (Infiltration) - Ambient	May 14, 2020
	Air Leakage (Exfiltration) - Cold	May 15, 2020
	Air Leakage (Infiltration) - Cold	May 15, 2020
20-06-B0040-SS-PT-2	Air Leakage (Exfiltration) - Prior	May 27, 2020
	Air Leakage (Infiltration) - Prior	May 27, 2020
	Wind Load Conditioning	May 28, 2020
	Wind Load Durability	May 28, 2020
	Air Leakage (Exfiltration) - Ambient	May 28, 2020
	Air Leakage (Infiltration) - Ambient	May 28, 2020
	Air Leakage (Exfiltration) - Cold	May 29, 2020
	Air Leakage (Infiltration) - Cold	May 29, 2020
20-06-B0040-SS-CB-3	Air Leakage (Exfiltration) - Prior	June 16, 2020
	Air Leakage (Infiltration) - Prior	June 16, 2020
	Wind Load Conditioning	June 16, 2020
	Wind Load Durability	June 16, 2020
	Air Leakage (Exfiltration) - Ambient	June 17, 2020
	Air Leakage (Infiltration) - Ambient	June 17, 2020
	Air Leakage (Exfiltration) - Cold	June 18, 2020
	Air Leakage (Infiltration) - Cold	June 18, 2020
20-06-B0040-CMU-OP-4	Air Leakage (Exfiltration) - Prior	June 29, 2020
	Air Leakage (Infiltration) - Prior	June 29, 2020
	Wind Load Conditioning	June 30, 2020
	Wind Load Durability	June 30, 2020
	Air Leakage (Exfiltration) - Ambient	June 30, 2020
	Air Leakage (Infiltration) - Ambient	June 30, 2020
	Air Leakage (Exfiltration) - Cold	July 2, 2020
	Air Leakage (Infiltration) - Cold	July 2, 2020
20-06-B0040-CMU-PT-5	Air Leakage (Exfiltration) - Prior	July 3, 2020
	Air Leakage (Infiltration) - Prior	July 3, 2020
	Wind Load Conditioning	July 6, 2020
	Wind Load Durability	July 6, 2020
	Air Leakage (Exfiltration) - Ambient	July 6, 2020
	Air Leakage (Infiltration) - Ambient	July 6, 2020
	Air Leakage (Exfiltration) - Cold	July 7, 2020
	Air Leakage (Infiltration) - Cold	July 7, 2020
20-06-B0040-CMU-CB-5	Air Leakage (Exfiltration) - Prior	July 22, 2020
	Air Leakage (Infiltration) - Prior	July 22, 2020
	Wind Load Conditioning	July 23, 2020
	Wind Load Durability	July 23, 2020
	Air Leakage (Exfiltration) - Ambient	July 23, 2020
	Air Leakage (Infiltration) - Ambient	July 23, 2020
	Air Leakage (Exfiltration) - Cold	July 25, 2020
	Air Leakage (Infiltration) - Cold	July 25, 2020



### 3.5 General Test Specimen Setup Photographs



Figure 1 – Hygrothermal Chamber Prior to Specimen Installation Displaying Location of Air Seal



Figure 2 – General Specimen Installation between Warm Side and Hygrothermal Chamber

4.0 RESULTS FOR STEEL STUDS (SS) WITH EXTERIOR GYPSUM SHEATHING WALL SPECIMENS

Table 1 – Summarized Air Leakage Results at 75 Pa (1.57 psf) in Accordance with CAN/ULC-S742-11, Section 6.3.2.1 (A), referencing ASTM E2357-11 – Section 9.1, Air Leakage Testing					
Element Specimen No.:	Airflow Direction	Optional	Ambient	Cold	Air Leakage Rate Classification <sup>(2)</sup>
		Calculated Air Leakage at 75 Pa (1.57 psf) Prior to Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	
20-06-B0040-SS-OP-1 (Opaque Wall)	- EXF	0.0037 (0.0007)	0.0044 (0.0009)	0.0099 (0.0020)	A1 <sup>(2)</sup>
	+ INF	0.0083 (0.0017)	0.0139 <sup>(1)</sup> (0.0028)	0.0132 (0.0027)	
20-06-B0040-SS-PT-2 (Penetration Wall)	- EXF	0.0462 (0.0093)	0.0500 (0.0100)	0.0245 (0.0049)	
	+ INF	0.0474 (0.0095)	0.0503 <sup>(1)</sup> (0.0101)	0.0354 (0.0071)	
20-06-B0040-SS-PT-3 (Opaque Wall with Foundation Interface)	- EXF	0.0440 (0.0088)	0.0469 <sup>(1)</sup> (0.0094)	0.0183 (0.0037)	
	+ INF	0.0473 (0.0095)	0.0434 (0.0087)	0.0212 (0.0043)	

Notes: '-' denotes exfiltration airflow direction (simulated negative wind loading)  
'+' denotes infiltration airflow direction (simulated positive wind loading)

<sup>(1)</sup> Highest measured air leakage rate at 75 Pa (1.57 psf).

<sup>(2)</sup> As per CAN/ULC-S742-11, an air barrier in compliance with this standard shall be classified as one of the types listed in clause 4.1.1.1 to clause 4.1.1.5 according to its reference air leakage rate:

- 4.1.1.1 A1 – The reference air leakage rate shall not exceed 0.05 L/(s·m<sup>2</sup>) (0.009 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.2 A2 – The reference air leakage rate shall not exceed 0.10 L/(s·m<sup>2</sup>) (0.019 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.3 A3 – The reference air leakage rate shall not exceed 0.15 L/(s·m<sup>2</sup>) (0.029 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.4 A4 – The reference air leakage rate shall not exceed 0.20 L/(s·m<sup>2</sup>) (0.039 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.5 A5 – The reference air leakage rate shall not exceed 0.50 L/(s·m<sup>2</sup>) (0.098 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).

The reference air leakage rate is the highest air leakage rate of those recorded among all specimens when tested in accordance with CAN/ULC-S742-11, Section 6.

4.1 Detailed Element Specimen No. 20-06-B0040-SS-OP-1 Results

Table 2 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-SS-OP-1 (Exfiltration '-')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0027	0.0005	0.0035	0.0007	0.0058	0.0012
50 (1.04)	0.0033	0.0007	0.0040	0.0008	0.0081	0.0016
<b>75 (1.57)</b>	<b>0.0037</b>	<b>0.0007</b>	<b>0.0044</b>	<b>0.0009</b>	<b>0.0099</b>	<b>0.0020</b>
100 (2.09)	0.0040	0.0008	0.0047	0.0009	0.0113	0.0023
150 (3.13)	0.0045	0.0009	0.0051	0.0010	0.0137	0.0028
250 (5.22)	0.0053	0.0011	0.0057	0.0011	0.0175	0.0035
300 (6.24)	0.0056	0.0011	0.0059	0.0012	0.0190	0.0038

Table 3 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-SS-OP-1 (Infiltration '+')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0031	0.0006	0.0068	0.0014	0.0060	0.0012
50 (1.04)	0.0057	0.0012	0.0107	0.0021	0.0099	0.0020
<b>75 (1.57)</b>	<b>0.0083</b>	<b>0.0017</b>	<b>0.0139</b>	<b>0.0028</b>	<b>0.0132</b>	<b>0.0027</b>
100 (2.09)	0.0108	0.0022	0.0168	0.0034	0.0163	0.0033
150 (3.13)	0.0155	0.0031	0.0219	0.0044	0.0219	0.0044
250 (5.22)	0.0246	0.0049	0.0306	0.0061	0.0317	0.0064
300 (6.24)	0.0290	0.0058	0.0344	0.0069	0.0362	0.0073

\* As per ASTM E2357-11, logarithmic graphs for each air leakage test (infiltration/exfiltration) displaying the linear regression (r<sup>2</sup>) value are located in Appendix A.



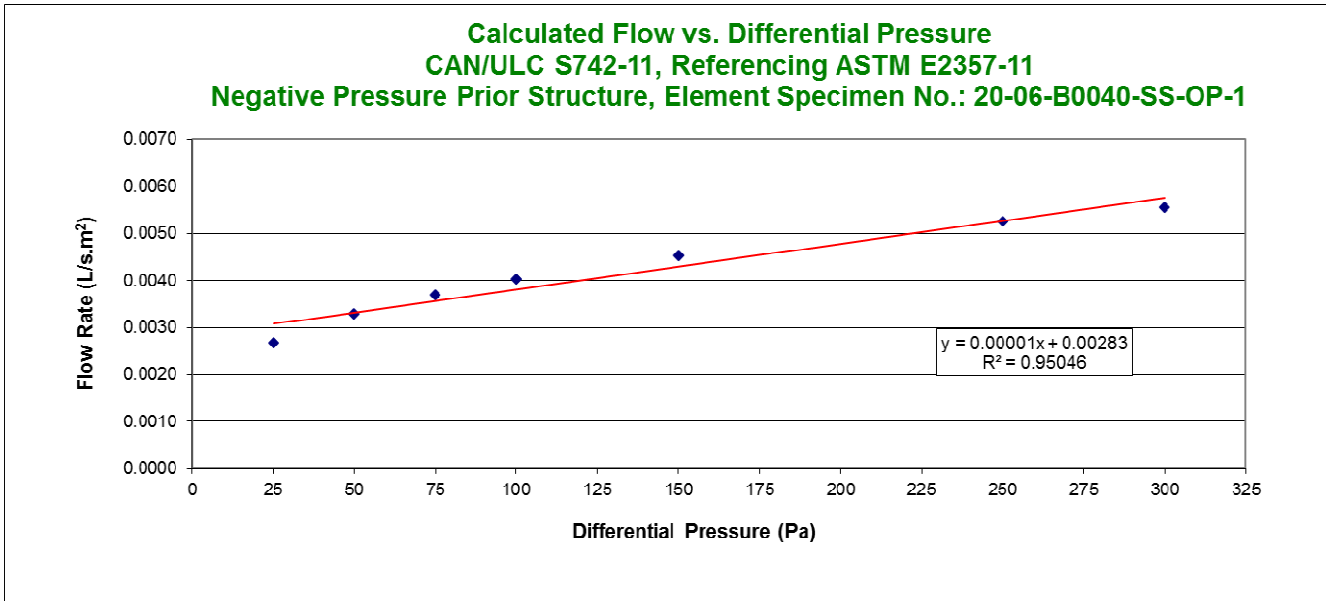


Figure 3 – Element Specimen No.: 20-06-B0040-SS-OP-1 Exfiltration Air Leakage Prior to Wind Conditioning

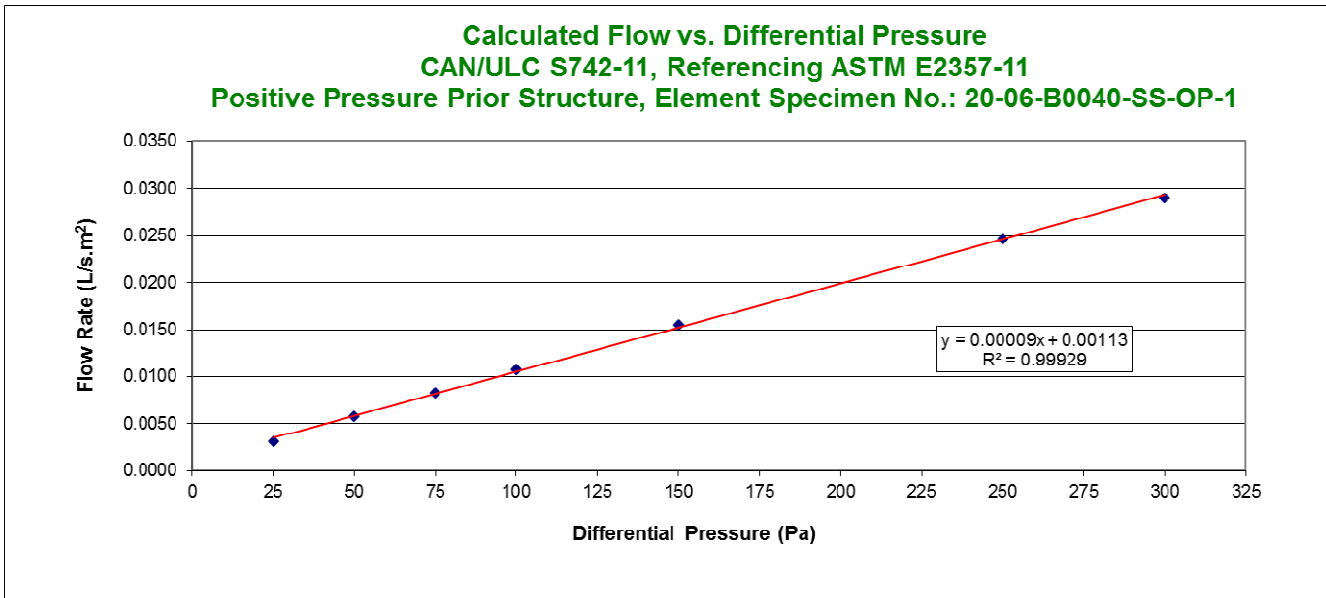


Figure 4 – Element Specimen No.: 20-06-B0040-SS-OP-1 Infiltration Air Leakage Prior to Wind Conditioning

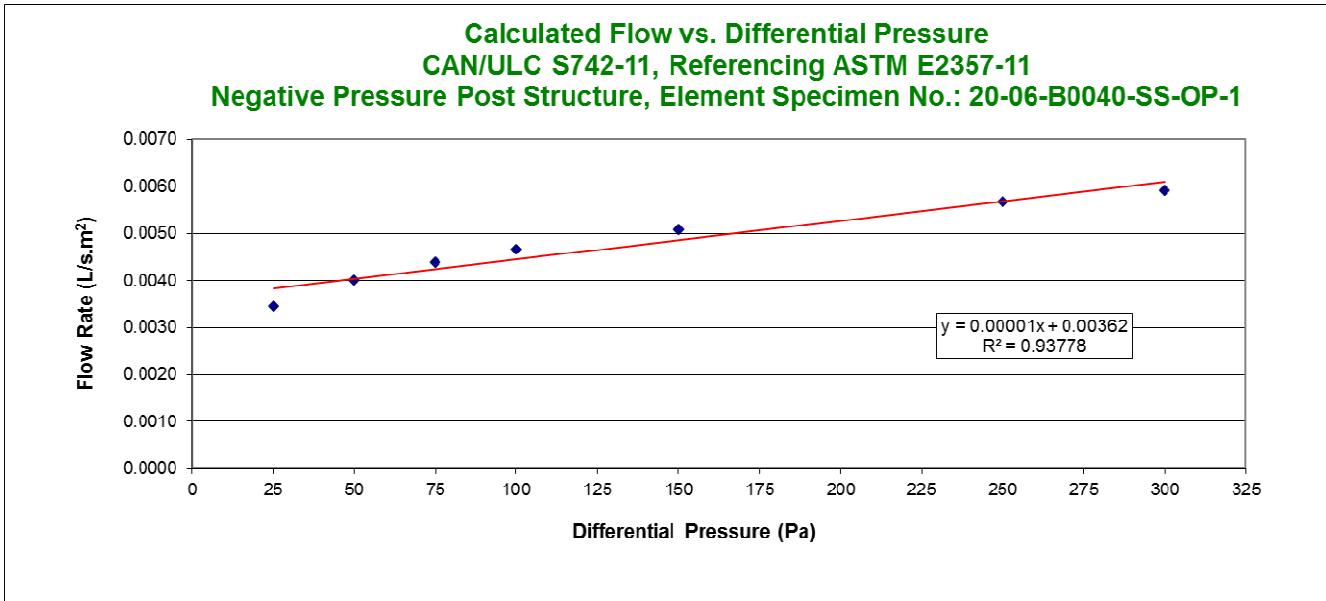


Figure 5 – Element Specimen No.: 20-06-B0040-SS-OP-1 Exfiltration Air Leakage After Wind Conditioning (Ambient)

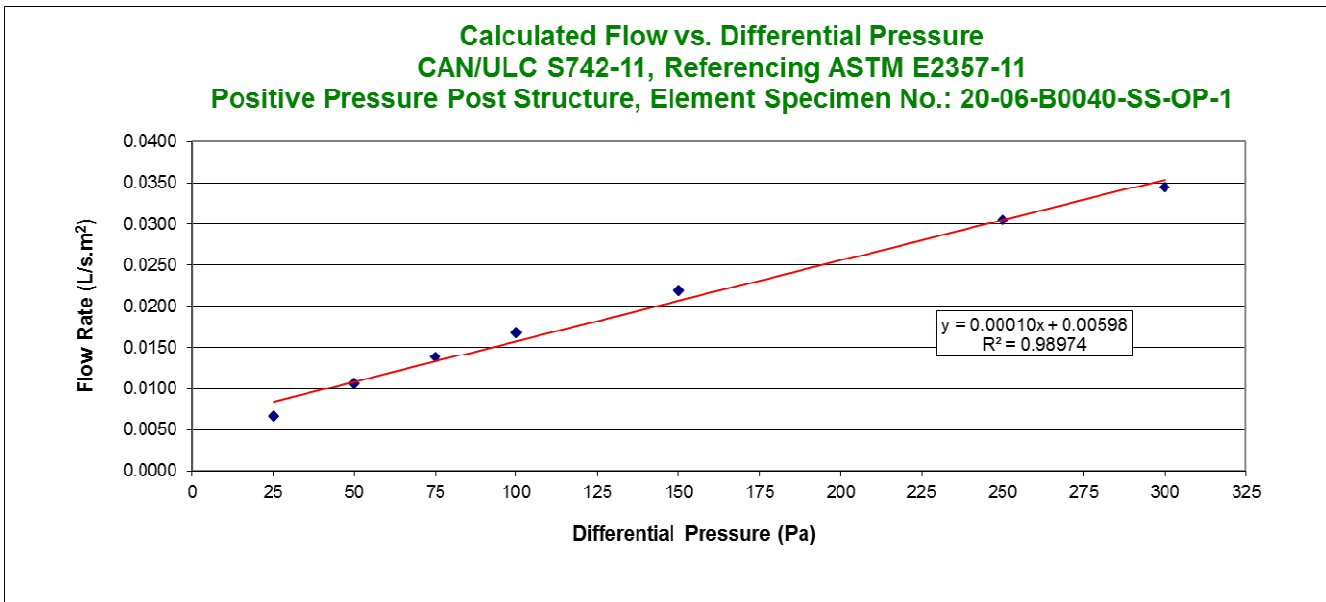


Figure 6 – Element Specimen No.: 20-06-B0040-SS-OP-1 Infiltration Air Leakage After Wind Conditioning (Ambient)

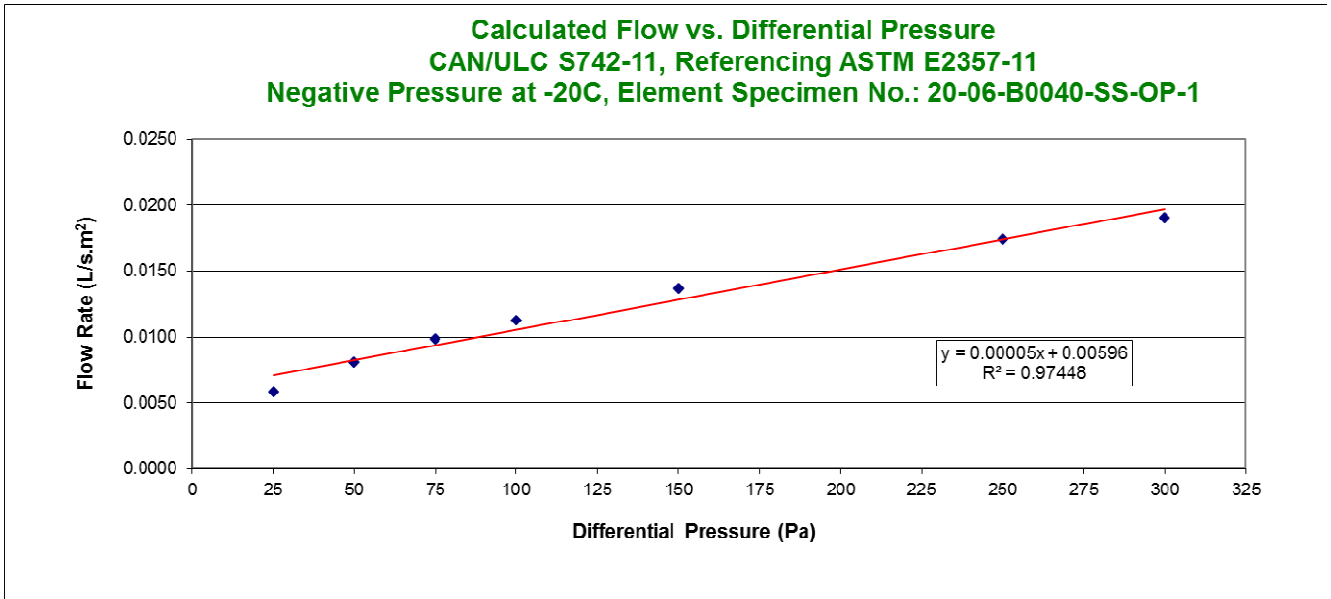


Figure 7 – Element Specimen No.: 20-06-B0040-SS-OP-1 Exfiltration Air Leakage After Wind Conditioning (Cold)

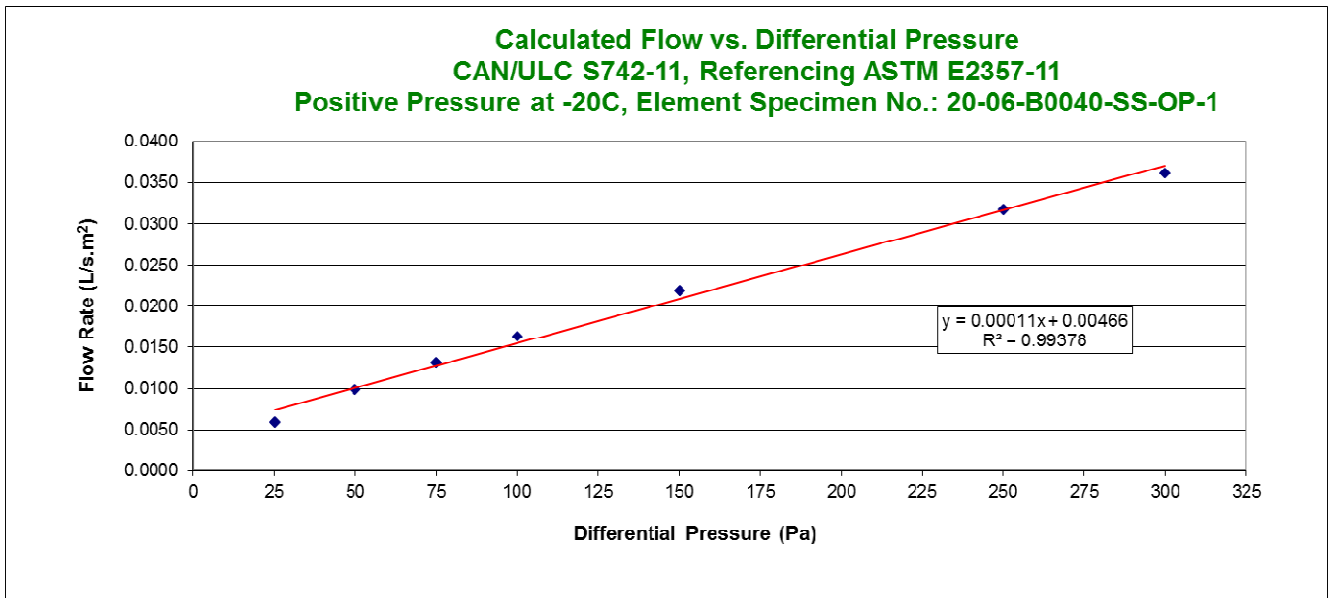


Figure 8 – Element Specimen No.: 20-06-B0040-SS-OP-1 Infiltration Air Leakage After Wind Conditioning (Cold)

Table 4 – Wind Pressure Loading Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-SS-OP-1								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Sustained Loads	100	0.19	-0.13	0.09	-0.28	-0.26	-0.33	-0.06
	200	-0.07	0.13	-0.60	-0.54	-0.73	-0.24	-0.15
	300	-0.04	0.84	-0.87	-0.69	-1.10	-0.15	-0.32
	400	-0.02	-0.20	-1.60	-1.12	-1.58	-0.20	-0.39
	500	-0.65	-0.13	-1.60	-1.51	-1.99	-0.41	-0.65
	600	-0.73	-0.13	-1.79	-1.75	-2.40	-0.28	-0.61
	<b>650 (P<sub>1</sub>)</b>	-0.87	-0.33	-2.20	-2.14	-1.36	-0.56	-1.13
	-100	-0.06	0.45	0.24	0.41	0.13	-0.02	0.13
	-200	-0.04	0.09	0.60	0.74	0.82	0.07	0.45
	-300	0.04	-0.28	1.17	1.23	1.23	0.07	0.58
	-400	-0.15	0.09	1.54	1.60	1.36	0.04	0.82
	-500	0.07	0.20	1.88	1.93	1.86	0.22	1.06
	-600	0.43	0.15	2.27	2.38	2.68	0.22	1.34
	<b>-650 (P'<sub>1</sub>)</b>	0.71	-0.97	2.94	3.16	2.96	0.22	1.67
Cyclic Loads	<b>0 to 950 (P<sub>2</sub>)</b>	-1.23	-0.09	-2.51	-2.47	-2.33	-0.32	-1.60
	<b>0 to -950 (P'<sub>2</sub>)</b>	1.43	0.26	3.26	3.31	2.90	-0.89	2.72
Gust Loads	<b>0 to 1410 (P<sub>2</sub>)</b>	-1.66	-0.50	-5.34	-5.15	-5.49	-0.24	-1.88
	<b>0 to -1410 (P'<sub>2</sub>)</b>	1.77	0.97	6.21	6.75	6.81	0.74	4.33

Table 5 – Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-SS-OP-1								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Wind Loading	0 to +1440	-2.49	-0.45	-5.54	-5.67	-6.08	-0.58	-2.85
	0 to -1440	2.44	0.17	5.95	6.38	5.64	1.17	3.24

Note: The locations for each gauge number are located in Figure 9.

Table 6 – Wind Pressure Loading Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-SS-OP-1								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Sustained Loads	2.09	0.007	-0.005	0.004	-0.011	-0.010	-0.013	-0.002
	4.18	-0.003	0.005	-0.024	-0.021	-0.029	-0.009	-0.006
	6.27	-0.002	0.033	-0.034	-0.027	-0.043	-0.006	-0.013
	8.35	-0.001	-0.008	-0.063	-0.044	-0.062	-0.008	-0.015
	10.44	-0.026	-0.005	-0.063	-0.059	-0.078	-0.016	-0.026
	12.53	-0.029	-0.005	-0.070	-0.069	-0.094	-0.011	-0.024
	<b>13.58 (P<sub>1</sub>)</b>	-0.034	-0.013	-0.087	-0.084	-0.054	-0.022	-0.044
	-2.09	-0.002	0.018	0.009	0.016	0.005	-0.001	0.005
	-4.18	-0.002	0.004	0.024	0.029	0.032	0.003	0.018
	-6.27	0.002	-0.011	0.046	0.048	0.048	0.003	0.023
	-8.35	-0.006	0.004	0.061	0.063	0.054	0.002	0.032
	-10.44	0.003	0.008	0.074	0.076	0.073	0.009	0.042
	-12.53	0.017	0.006	0.089	0.094	0.106	0.009	0.053
	<b>-13.58 (P'<sub>1</sub>)</b>	0.028	-0.038	0.116	0.124	0.117	0.009	0.066
Cyclic Loads	<b>0 to 19.84 (P<sub>2</sub>)</b>	-0.048	-0.004	-0.099	-0.097	-0.092	-0.013	-0.063
	<b>0 to -19.84 (P'<sub>2</sub>)</b>	0.056	0.010	0.128	0.130	0.114	-0.035	0.107
Gust Loads	<b>0 to 29.45 (P<sub>2</sub>)</b>	-0.065	-0.020	-0.210	-0.203	-0.216	-0.009	-0.074
	<b>0 to -29.45 (P'<sub>2</sub>)</b>	0.070	0.038	0.244	0.266	0.268	0.029	0.170

Table 7 – Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-SS-OP-1								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Wind Loading	0 to +30.08	-0.098	-0.018	-0.218	-0.223	-0.239	-0.023	-0.112
	0 to -30.08	0.096	0.007	0.234	0.251	0.222	0.046	0.128

Note: The locations for each gauge number are located in Figure 9.

**Wall Section Observations During Structural Wind Loading**

During the wind loading schedule as shown in Tables 4 and 5, there were no visible signs of Element Specimen No. 20-06-B0040-SS-OP-1 tearing, cracking or peeling from the wall section.

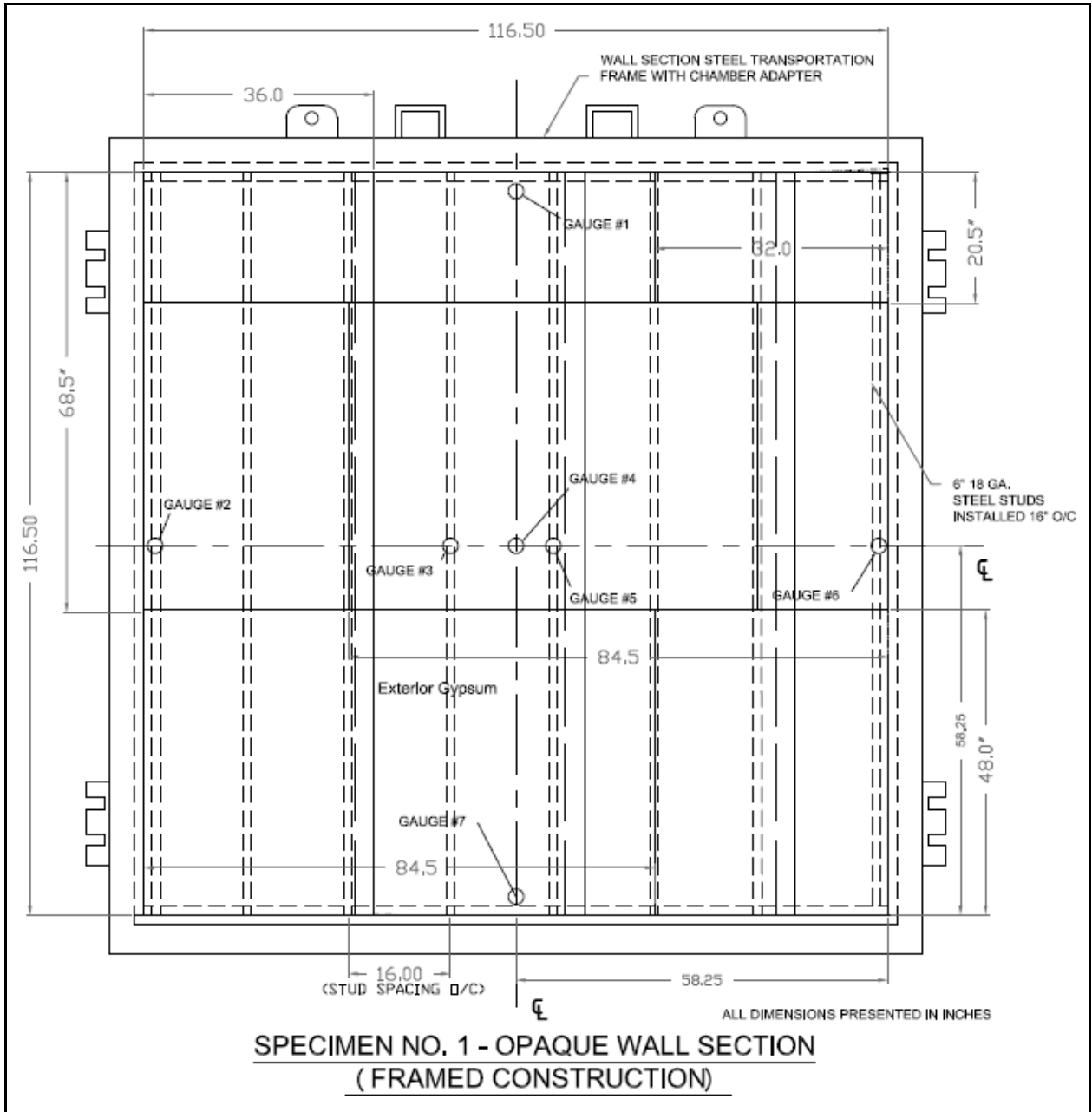


Figure 9 – Element Specimen 20-06-B0040-SS-OP-1 Gauge Locations

4.2 Detailed Element Specimen No. 20-06-B0040-SS-PT-2 Results

Table 8 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-SS-PT-2 (Exfiltration '-')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0226	0.0045	0.0247	0.0050	0.0088	0.0018
50 (1.04)	0.0355	0.0071	0.0386	0.0077	0.0168	0.0034
<b>75 (1.57)</b>	<b>0.0462</b>	<b>0.0093</b>	<b>0.0500</b>	<b>0.0100</b>	<b>0.0245</b>	<b>0.0049</b>
100 (2.09)	0.0557	0.0112	0.0601	0.0121	0.0320	0.0064
150 (3.13)	0.0726	0.0146	0.0778	0.0156	0.0468	0.0094
250 (5.22)	0.1014	0.0204	0.1079	0.0217	0.0755	0.0152
300 (6.24)	0.1142	0.0229	0.1213	0.0244	0.0896	0.0180

Table 9 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-SS-PT-2 (Infiltration '+')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0207	0.0042	0.0225	0.0045	0.0108	0.0022
50 (1.04)	0.0349	0.0070	0.0374	0.0075	0.0229	0.0046
<b>75 (1.57)</b>	<b>0.0474</b>	<b>0.0095</b>	<b>0.0503</b>	<b>0.0101</b>	<b>0.0354</b>	<b>0.0071</b>
100 (2.09)	0.0589	0.0118	0.0621	0.0125	0.0484	0.0097
150 (3.13)	0.0799	0.0161	0.0837	0.0168	0.0750	0.0151
250 (5.22)	0.1176	0.0236	0.1217	0.0244	0.1302	0.0262
300 (6.24)	0.1349	0.0271	0.1391	0.0279	0.1586	0.0319

\* As per ASTM E2357-11, logarithmic graphs for each air leakage test (infiltration/exfiltration) displaying the linear regression (r<sup>2</sup>) value are located in Appendix B.

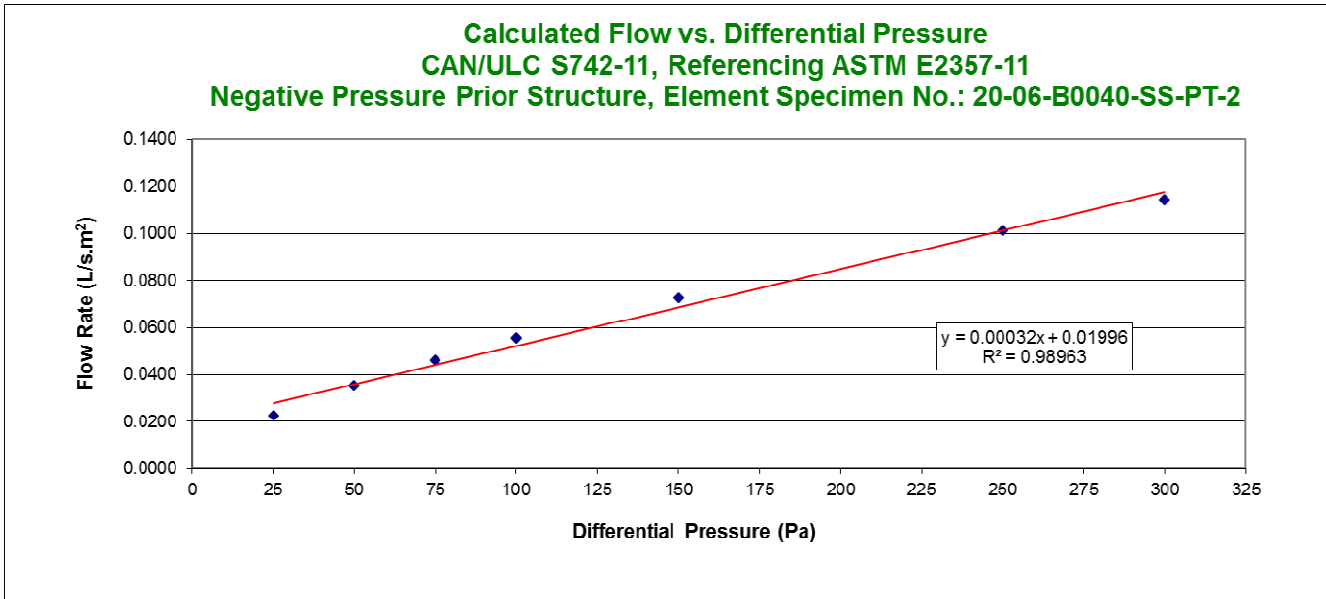


Figure 10 – Element Specimen No.: 20-06-B0040-SS-PT-2 Exfiltration Air Leakage Prior to Wind Conditioning

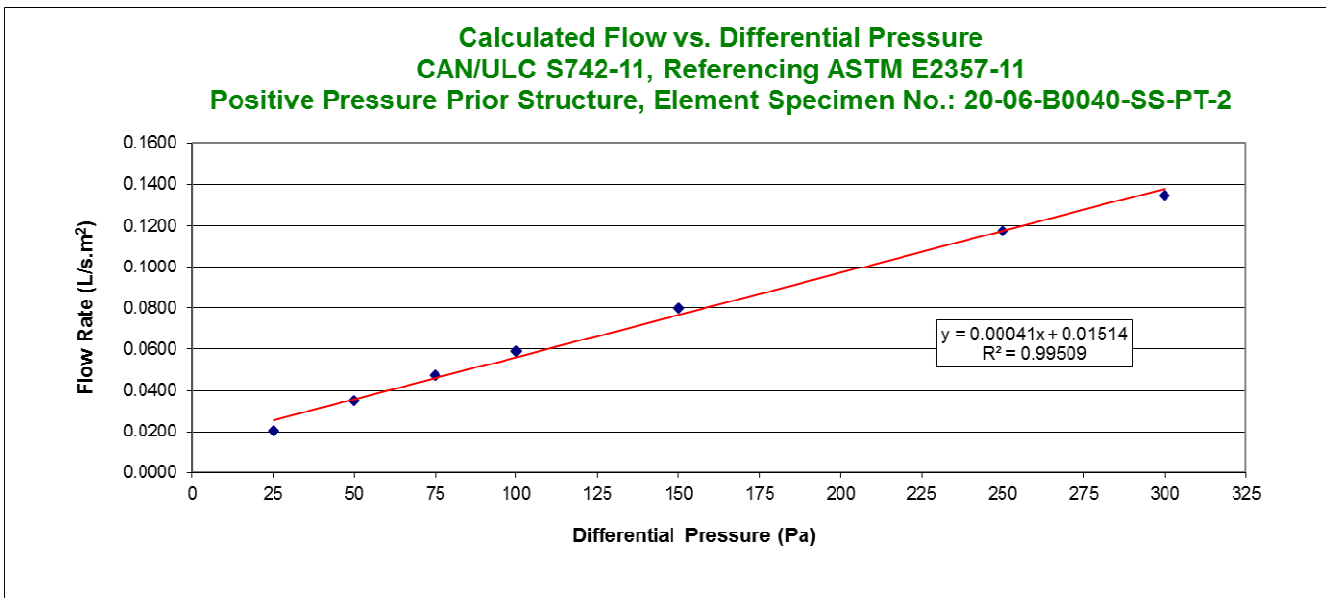


Figure 11 – Element Specimen No.: 20-06-B0040-SS-PT-2 Infiltration Air Leakage Prior to Wind Conditioning



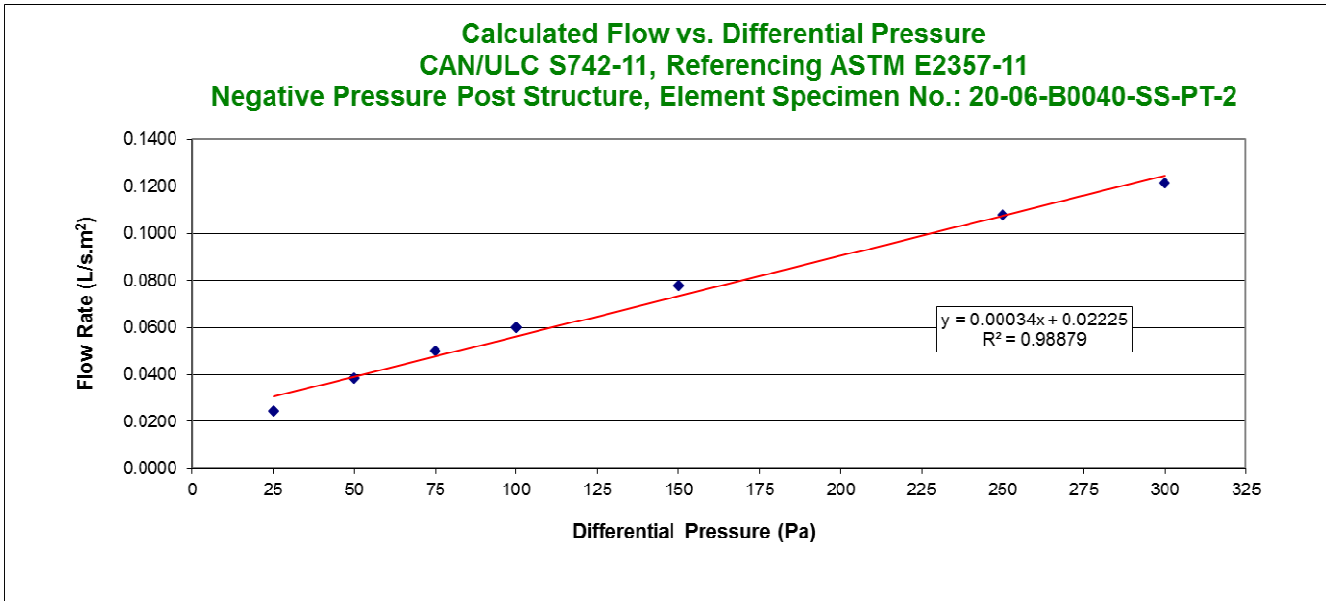


Figure 12 – Element Specimen No.: 20-06-B0040-SS-PT-2 Exfiltration Air Leakage After Wind Conditioning (Ambient)

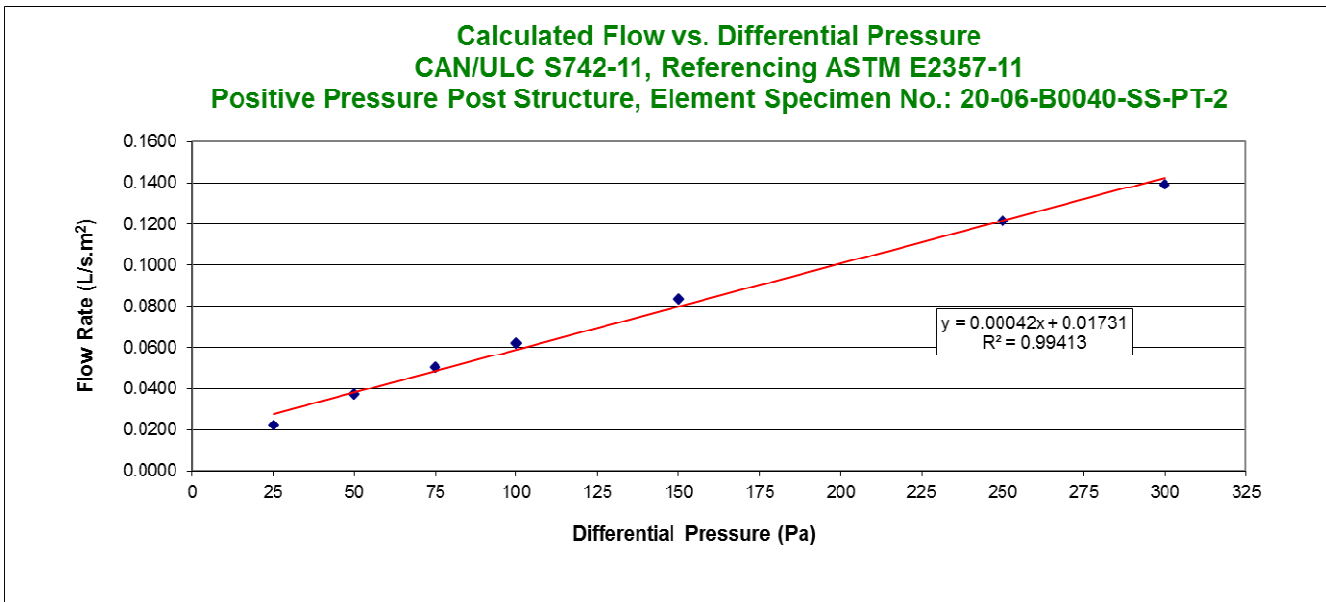


Figure 13 – Element Specimen No.: 20-06-B0040-SS-PT-2 Infiltration Air Leakage After Wind Conditioning (Ambient)

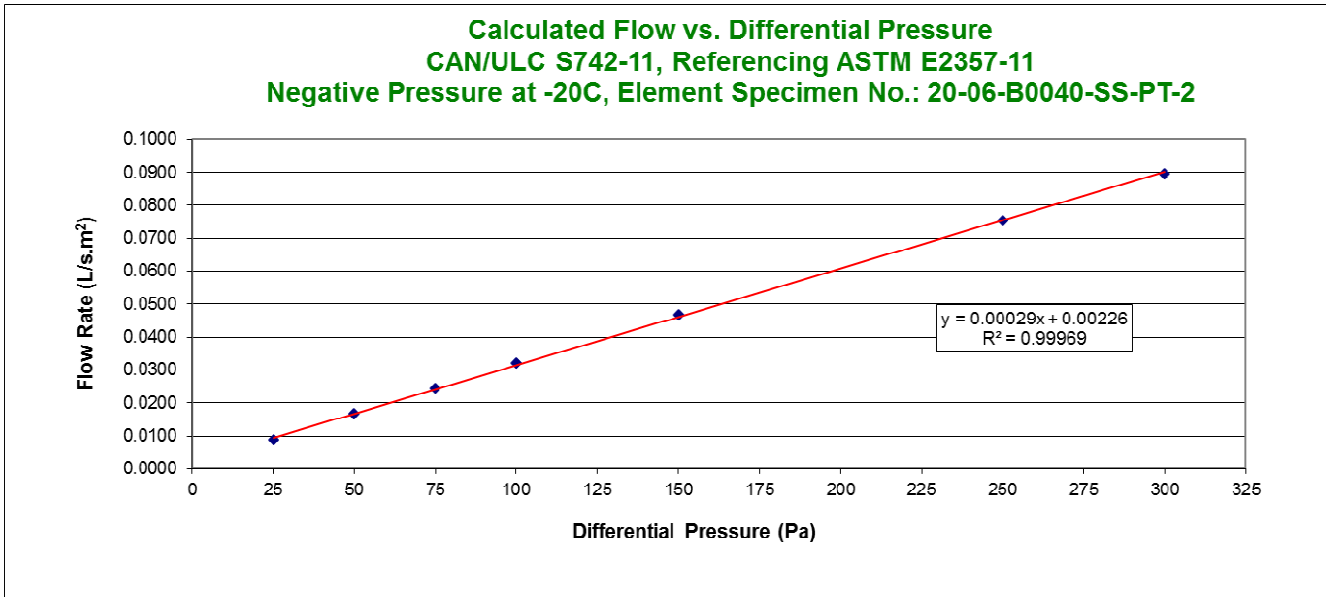


Figure 14 – Element Specimen No.: 20-06-B0040-SS-PT-2 Exfiltration Air Leakage After Wind Conditioning (Cold)

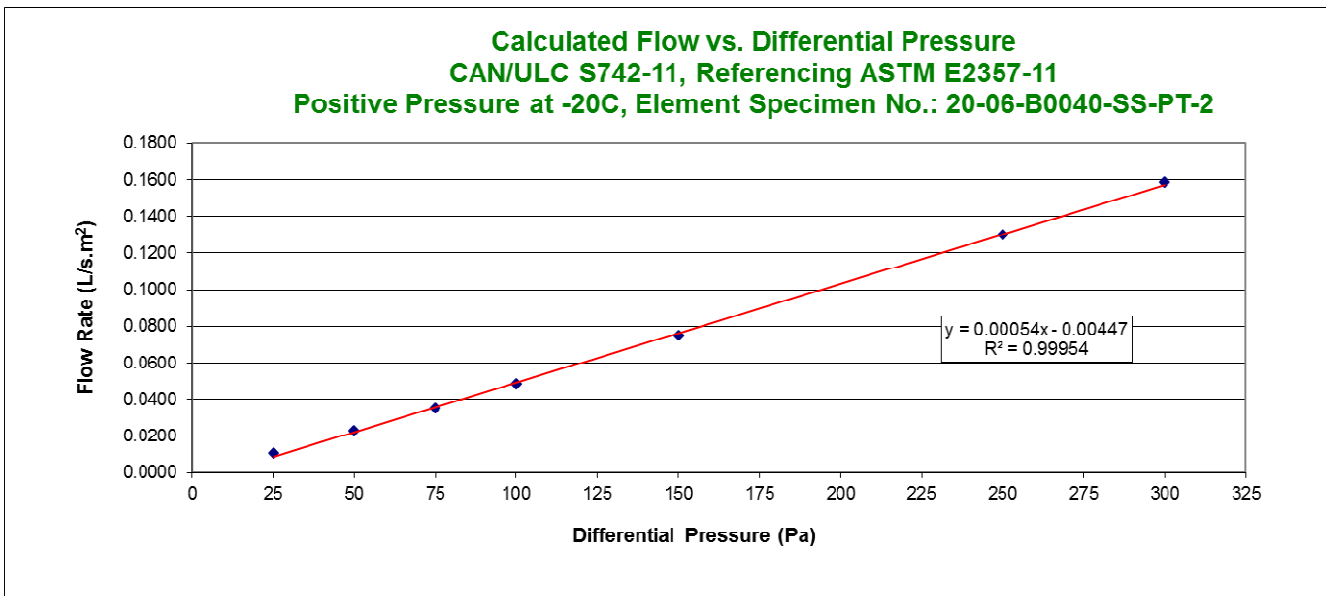


Figure 15 – Element Specimen No.: 20-06-B0040-SS-PT-2 Infiltration Air Leakage After Wind Conditioning (Cold)

Table 10 – Wind Pressure Loading Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-SS-PT-2								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Sustained Loads	100	-0.24	-0.04	-0.06	-0.30	-0.45	0.32	-0.78
	200	-0.43	0.07	-0.47	-0.60	-0.65	-0.04	-0.99
	300	-0.50	-0.04	-0.89	-0.84	-1.32	0.07	-0.93
	400	-0.37	0.37	-0.86	-1.00	-1.69	0.04	-0.97
	500	-0.71	-0.28	-1.12	-1.41	-2.42	-0.07	-1.34
	600	-0.84	-0.32	-1.25	-1.64	-3.22	-0.22	-1.36
	650 (P <sub>1</sub> )	-0.91	-0.09	-2.21	-1.90	-3.40	-0.32	-1.28
	-100	-0.20	-0.56	0.30	0.45	0.19	0.04	0.07
	-200	-0.13	-0.20	0.41	0.74	0.50	-0.15	0.20
	-300	-0.09	0.26	0.67	0.93	0.78	0.09	0.13
	-400	-0.63	-0.07	0.99	1.25	1.40	0.02	0.32
	-500	0.17	-0.11	1.38	1.49	1.62	-0.15	0.28
	-600	-0.41	0.09	1.66	1.71	1.88	-0.19	0.47
	-650 (P' <sub>1</sub> )	0.78	0.09	2.03	2.14	2.55	0.22	0.52
Cyclic Loads	0 to 950 (P <sub>2</sub> )	-0.89	-0.02	-1.75	-1.77	3.65	-0.09	-0.71
	0 to -950 (P' <sub>2</sub> )	0.22	0.02	1.71	1.90	1.53	-0.13	0.78
Gust Loads	0 to 1410 (P <sub>2</sub> )	-0.82	-0.78	-4.28	-4.41	-5.10	-1.67	-1.12
	0 to -1410 (P' <sub>2</sub> )	0.63	0.09	4.28	4.28	4.93	-0.09	0.97

Table 11 – Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-SS-PT-2								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Wind Loading	0 to +1440	-1.30	-0.28	-4.50	-4.48	-5.30	-0.13	-1.21
	0 to -1440	1.06	0.22	4.58	4.80	5.43	0.33	1.21

Note: The locations for each gauge number are located on the following page in Figure 16.

Table 12 – Wind Pressure Loading Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-SS-PT-2								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Sustained Loads	2.09	-0.009	-0.002	-0.002	-0.012	-0.018	0.013	-0.031
	4.18	-0.017	0.003	-0.019	-0.024	-0.026	-0.002	-0.039
	6.27	-0.020	-0.002	-0.035	-0.033	-0.052	0.003	-0.037
	8.35	-0.015	0.015	-0.034	-0.039	-0.067	0.002	-0.038
	10.44	-0.028	-0.011	-0.044	-0.056	-0.095	-0.003	-0.053
	12.53	-0.033	-0.013	-0.049	-0.065	-0.127	-0.009	-0.054
	<b>13.58 (P<sub>1</sub>)</b>	-0.036	-0.004	-0.087	-0.075	-0.134	-0.013	-0.050
	-2.09	-0.008	-0.022	0.012	0.018	0.007	0.002	0.003
	-4.18	-0.005	-0.008	0.016	0.029	0.020	-0.006	0.008
	-6.27	-0.004	0.010	0.026	0.037	0.031	0.004	0.005
	-8.35	-0.025	-0.003	0.039	0.049	0.055	0.001	0.013
	-10.44	0.007	-0.004	0.054	0.059	0.064	-0.006	0.011
	-12.53	-0.016	0.004	0.065	0.067	0.074	-0.007	0.019
	<b>-13.58 (P'<sub>1</sub>)</b>	0.031	0.004	0.080	0.084	0.100	0.009	0.020
Cyclic Loads	<b>0 to 19.84 (P<sub>2</sub>)</b>	-0.035	-0.001	-0.069	-0.070	0.144	-0.004	-0.028
	<b>0 to -19.84 (P'<sub>2</sub>)</b>	0.009	0.001	0.067	0.075	0.060	-0.005	0.031
Gust Loads	<b>0 to 29.45 (P<sub>2</sub>)</b>	-0.032	-0.031	-0.169	-0.174	-0.201	-0.066	-0.044
	<b>0 to -29.45 (P'<sub>2</sub>)</b>	0.025	0.004	0.169	0.169	0.194	-0.004	0.038

Table 13 – Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-SS-PT-2								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Wind Loading	0 to +30.08	-0.051	-0.011	-0.177	-0.176	-0.209	-0.005	-0.048
	0 to -30.08	0.042	0.009	0.180	0.189	0.214	0.013	0.048

Note: The locations for each gauge number are located on the following page in Figure 16.

**Wall Section Observations During Structural Wind Loading**

During the wind loading schedule as shown in Tables 10 and 11, there were no visible signs of Element Specimen No. 20-06-B0040-SS-PT-2 tearing, peeling or cracking away from the wall section.

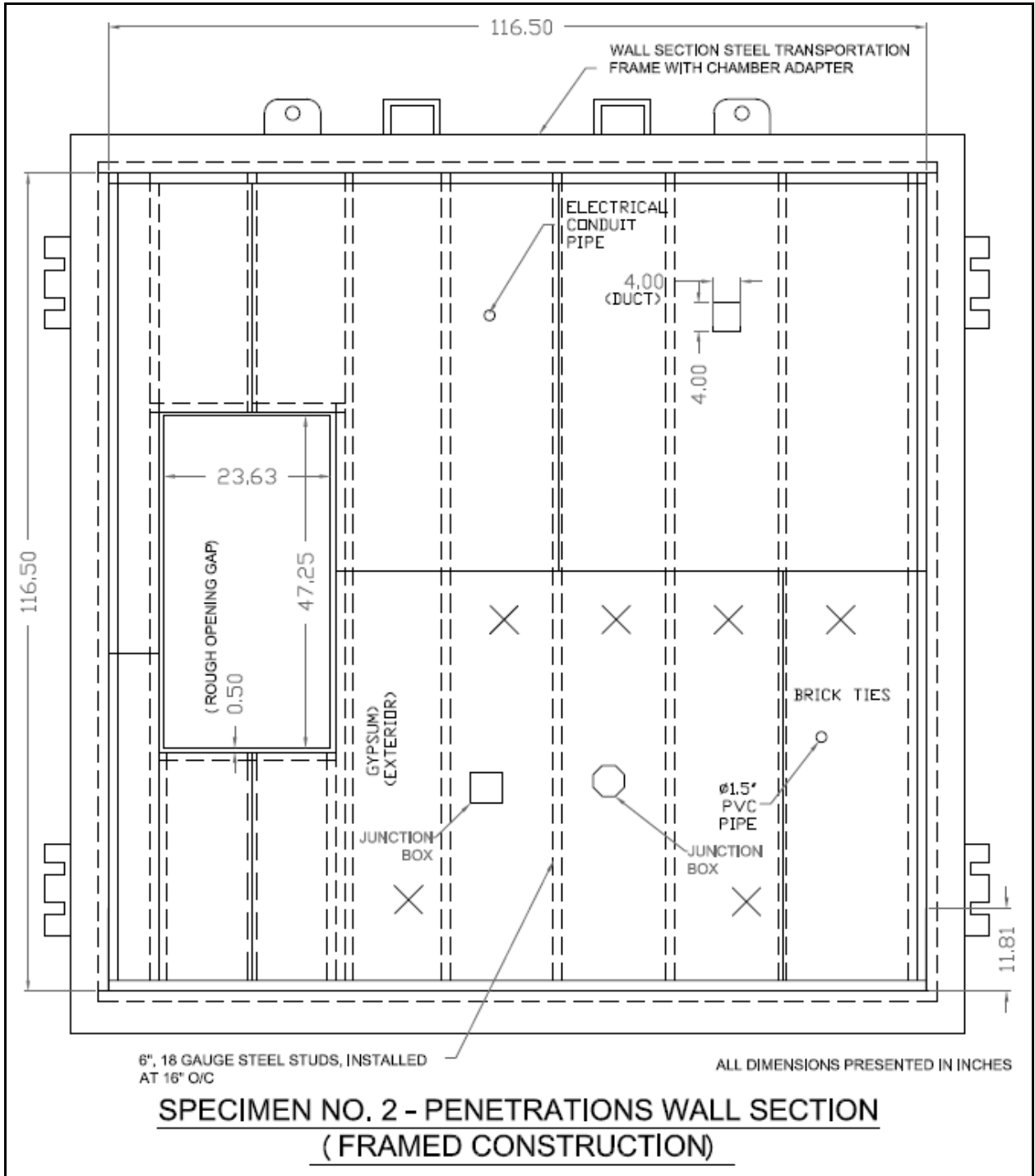


Figure 16 – Element Specimen 20-06-B0040-SS-PT-2 Gauge Locations

4.3 Detailed Element Specimen No. 20-06-B0040-SS-CB-3 Results

Table 14 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-SS-CB-3 (Exfiltration '-')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0240	0.0048	0.0292	0.0059	0.0107	0.0021
50 (1.04)	0.0352	0.0071	0.0394	0.0079	0.0150	0.0030
<b>75 (1.57)</b>	<b>0.0440</b>	<b>0.0088</b>	<b>0.0469</b>	<b>0.0094</b>	<b>0.0183</b>	<b>0.0037</b>
100 (2.09)	0.0516	0.0104	0.0531	0.0107	0.0210	0.0042
150 (3.13)	0.0644	0.0129	0.0633	0.0127	0.0256	0.0051
250 (5.22)	0.0854	0.0172	0.0789	0.0158	0.0329	0.0066
300 (6.24)	0.0944	0.0190	0.0853	0.0171	0.0359	0.0072

Table 15 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-SS-CB-3 (Infiltration '+')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0233	0.0047	0.0208	0.0042	0.0074	0.0015
50 (1.04)	0.0364	0.0073	0.0331	0.0066	0.0144	0.0029
<b>75 (1.57)</b>	<b>0.0473</b>	<b>0.0095</b>	<b>0.0434</b>	<b>0.0087</b>	<b>0.0212</b>	<b>0.0043</b>
100 (2.09)	0.0569	0.0114	0.0527	0.0106	0.0279	0.0056
150 (3.13)	0.0740	0.0149	0.0692	0.0139	0.0412	0.0083
250 (5.22)	0.1028	0.0207	0.0976	0.0196	0.0673	0.0135
300 (6.24)	0.1157	0.0232	0.1103	0.0222	0.0802	0.0161

\* As per ASTM E2357-11, logarithmic graphs for each air leakage test (infiltration/exfiltration) displaying the linear regression (r<sup>2</sup>) value are located in Appendix A.

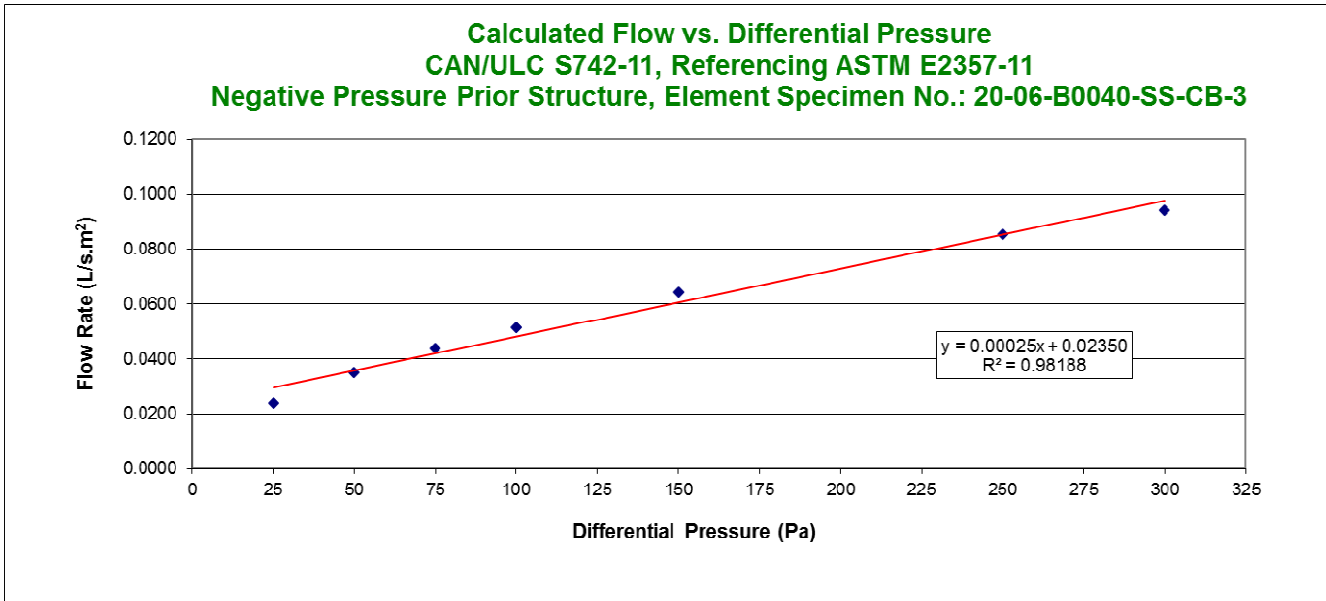


Figure 17 – Element Specimen No.: 20-06-B0040-SS-OP-1 Exfiltration Air Leakage Prior to Wind Conditioning

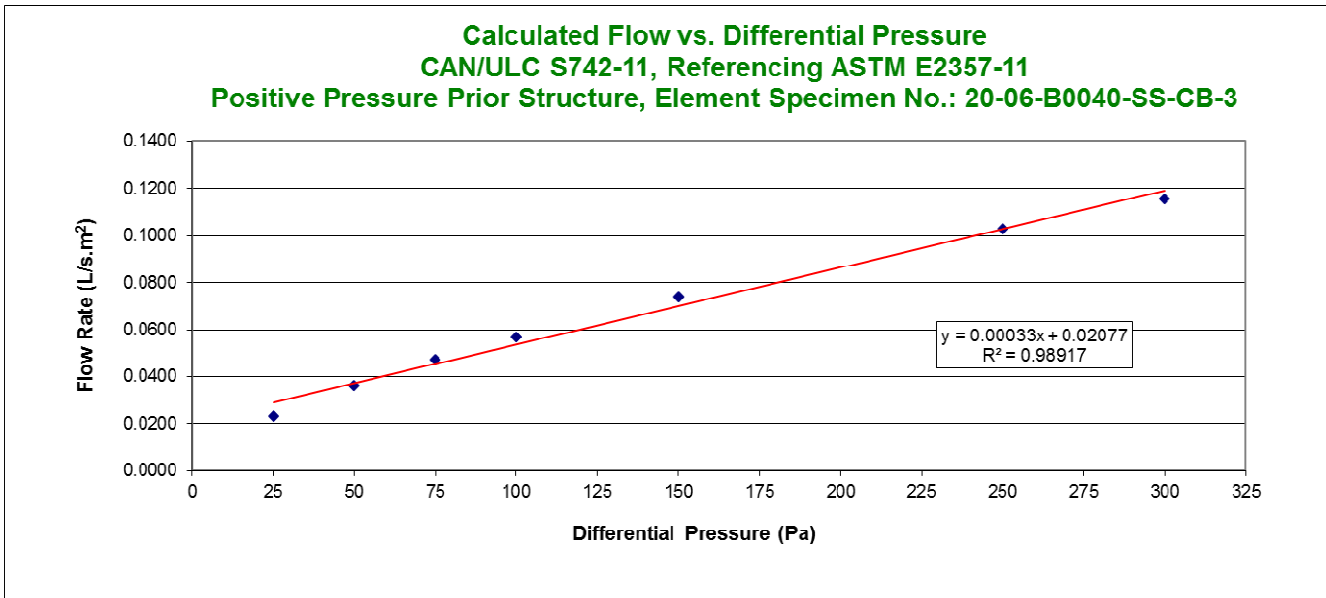


Figure 18 – Element Specimen No.: 20-06-B0040-SS-OP-1 Infiltration Air Leakage Prior to Wind Conditioning

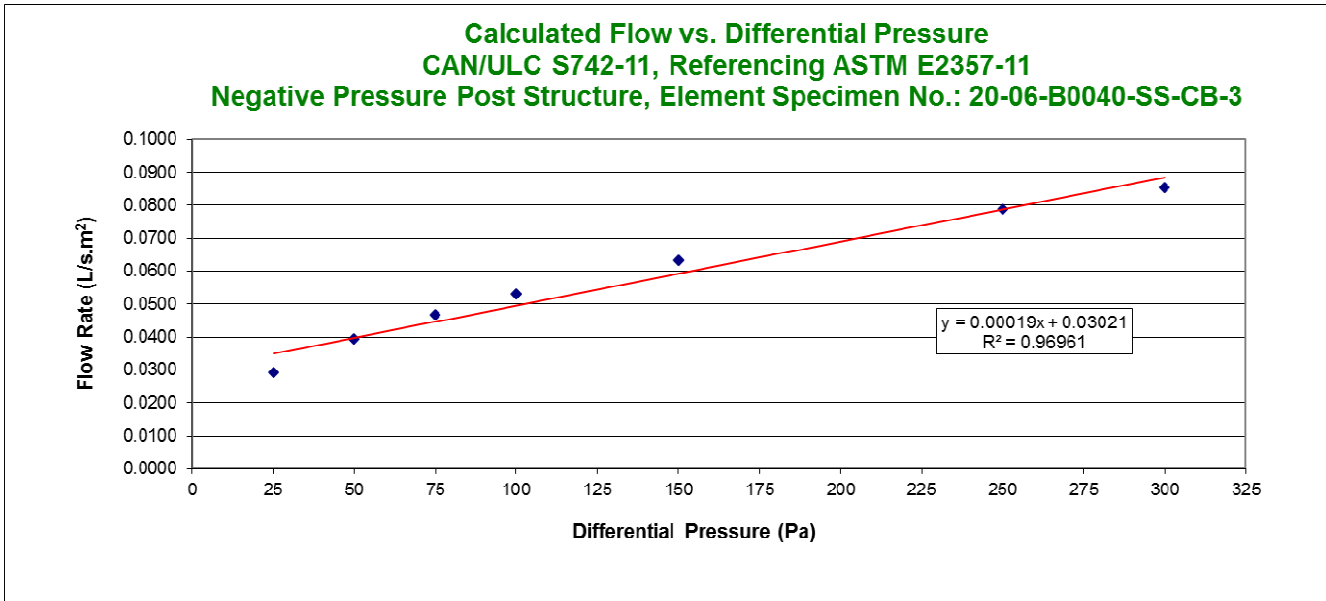


Figure 20 – Element Specimen No.: 20-06-B0040-SS-OP-1 Exfiltration Air Leakage After Wind Conditioning (Ambient)

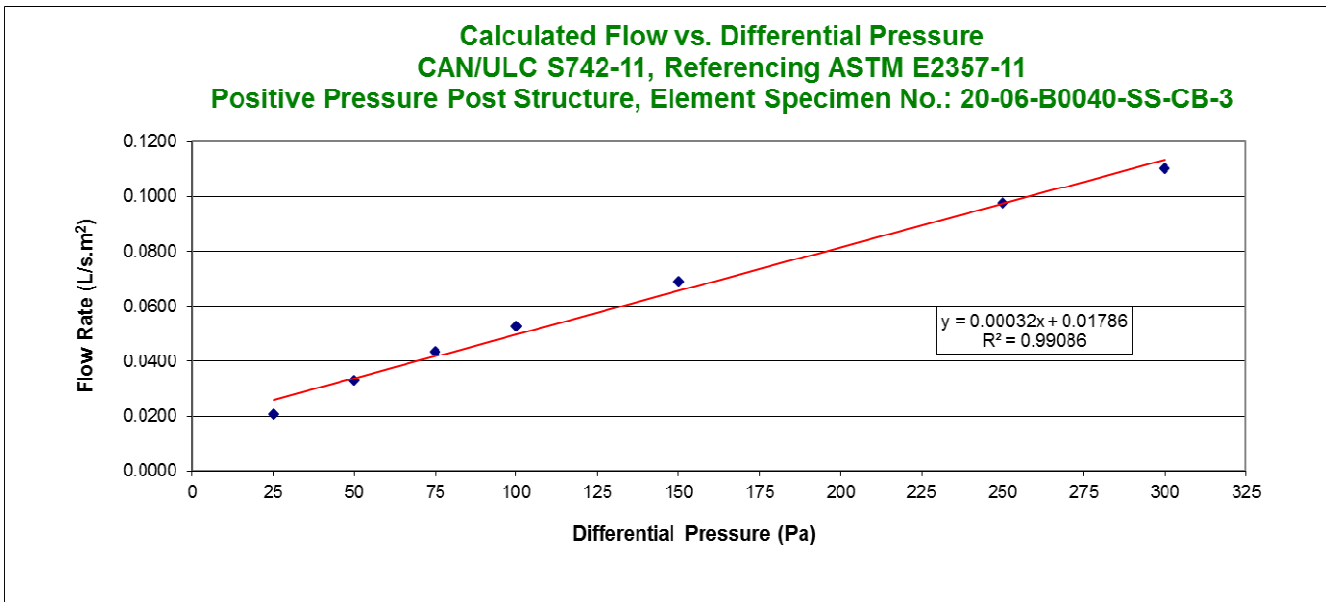


Figure 21 – Element Specimen No.: 20-06-B0040-SS-OP-1 Infiltration Air Leakage After Wind Conditioning (Ambient)



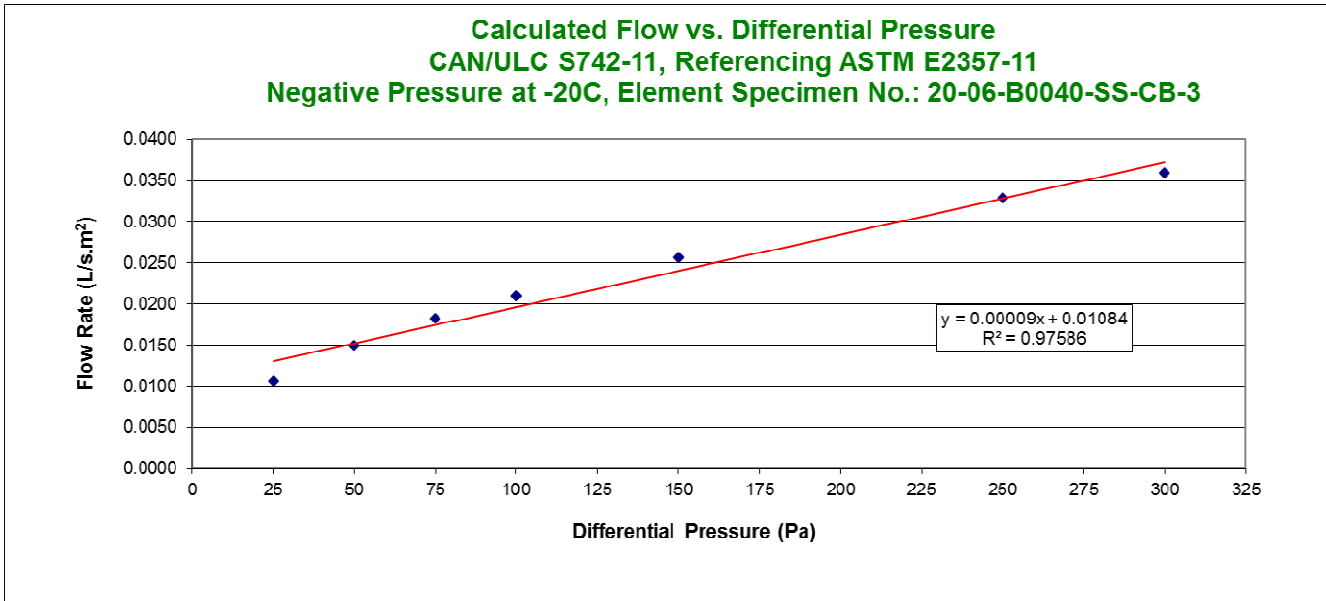


Figure 22 – Element Specimen No.: 20-06-B0040-SS-OP-1 Exfiltration Air Leakage After Wind Conditioning (Cold)

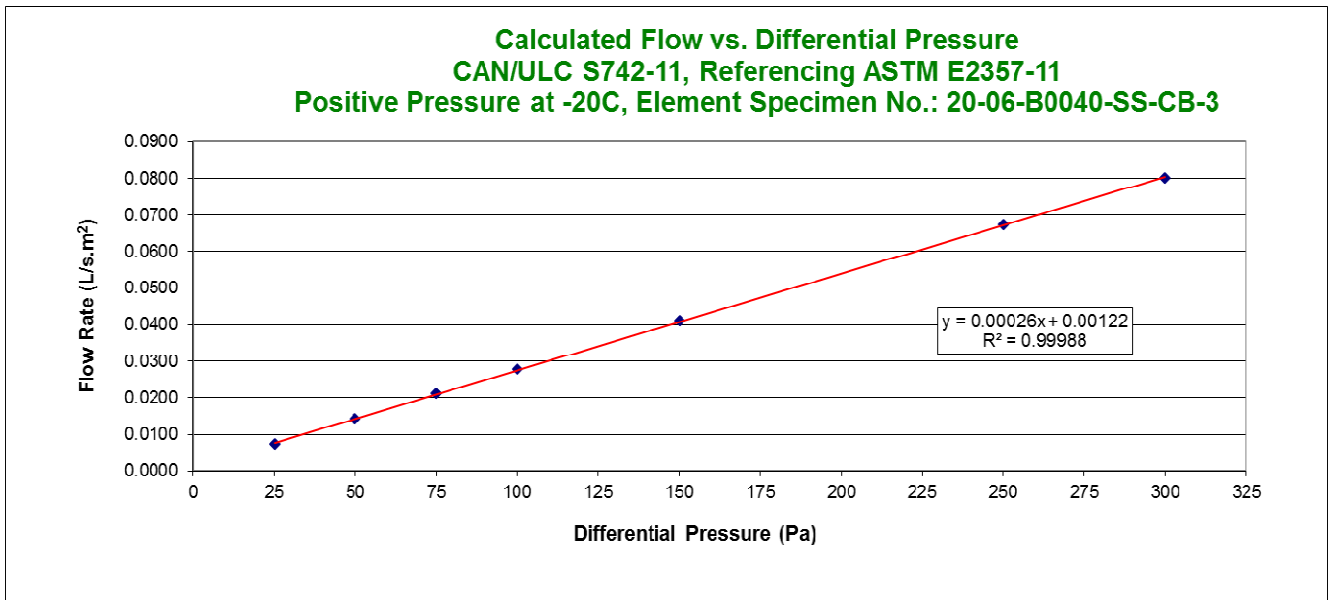


Figure 23 – Element Specimen No.: 20-06-B0040-SS-OP-1 Infiltration Air Leakage After Wind Conditioning (Cold)

Table 16 – Wind Pressure Loading Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-SS-CB-3								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Sustained Loads	100	-0.33	0.04	0.69	-0.19	-0.60	-0.15	0.20
	200	-0.33	-0.04	-0.33	-0.58	-0.69	0.07	-0.04
	300	-0.20	-0.09	-0.54	-0.71	-0.78	0.09	0.11
	400	-0.15	0.04	-0.73	-0.82	-1.06	-0.15	-0.04
	500	-0.73	-0.07	-0.93	-1.19	-1.28	0.32	-0.30
	600	-0.15	-0.13	-1.17	-1.56	-1.45	0.43	-0.20
	<b>650 (P<sub>1</sub>)</b>	-0.87	-0.19	-1.54	-1.82	-1.82	-0.32	-0.30
	-100	0.06	0.13	0.41	0.47	0.47	-0.06	-0.04
	-200	0.48	0.20	0.52	0.65	0.61	0.02	0.19
	-300	0.52	0.24	1.02	0.84	0.95	0.11	0.00
	-400	0.47	0.20	1.27	1.25	1.45	0.07	0.37
	-500	0.93	0.17	1.49	1.36	1.54	0.02	0.20
	-600	0.71	0.13	1.66	1.67	1.86	0.26	0.45
	<b>-650 (P'<sub>1</sub>)</b>	0.99	0.22	2.18	1.99	2.20	0.19	0.54
Cyclic Loads	<b>0 to 950 (P<sub>2</sub>)</b>	-1.43	-0.32	-2.49	-1.90	-2.34	-0.24	-0.71
	<b>0 to -950 (P'<sub>2</sub>)</b>	1.62	0.35	2.06	2.98	2.08	0.28	0.80
Gust Loads	<b>0 to 1410 (P<sub>2</sub>)</b>	-1.84	-0.65	-4.22	-4.26	-4.13	-0.47	-1.49
	<b>0 to -1410 (P'<sub>2</sub>)</b>	0.30	0.48	3.96	4.43	3.85	0.24	1.41

Table 17 – Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-SS-CB-3								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Wind Loading	0 to +1440	-2.18	-0.99	-3.96	-4.35	-3.83	0.26	-1.27
	0 to -1440	1.19	0.63	4.41	4.41	4.73	0.54	1.54

Note: The locations for each gauge number are located in Figure 9.

Table 18 – Wind Pressure Loading Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-SS-CB-3								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Sustained Loads	2.09	-0.013	0.002	0.027	-0.007	-0.024	-0.006	0.008
	4.18	-0.013	-0.002	-0.013	-0.023	-0.027	0.003	-0.002
	6.27	-0.008	-0.004	-0.021	-0.028	-0.031	0.004	0.004
	8.35	-0.006	0.002	-0.029	-0.032	-0.042	-0.006	-0.002
	10.44	-0.029	-0.003	-0.037	-0.047	-0.050	0.013	-0.012
	12.53	-0.006	-0.005	-0.046	-0.061	-0.057	0.017	-0.008
	<b>13.58 (P<sub>1</sub>)</b>	-0.034	-0.007	-0.061	-0.072	-0.072	-0.013	-0.012
	-2.09	0.002	0.005	0.016	0.019	0.019	-0.002	-0.002
	-4.18	0.019	0.008	0.020	0.026	0.024	0.001	0.007
	-6.27	0.020	0.009	0.040	0.033	0.037	0.004	0.000
	-8.35	0.019	0.008	0.050	0.049	0.057	0.003	0.015
	-10.44	0.037	0.007	0.059	0.054	0.061	0.001	0.008
	-12.53	0.028	0.005	0.065	0.066	0.073	0.010	0.018
	<b>-13.58 (P'<sub>1</sub>)</b>	0.039	0.009	0.086	0.078	0.087	0.007	0.021
Cyclic Loads	<b>0 to 19.84 (P<sub>2</sub>)</b>	-0.056	-0.013	-0.098	-0.075	-0.092	-0.009	-0.028
	<b>0 to -19.84 (P'<sub>2</sub>)</b>	0.064	0.014	0.081	0.117	0.082	0.011	0.031
Gust Loads	<b>0 to 29.45 (P<sub>2</sub>)</b>	-0.072	-0.026	-0.166	-0.168	-0.163	-0.019	-0.059
	<b>0 to -29.45 (P'<sub>2</sub>)</b>	0.012	0.019	0.156	0.174	0.152	0.009	0.056

Table 19 – Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-SS-CB-3								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Wind Loading	0 to +30.08	-0.086	-0.039	-0.156	-0.171	-0.151	0.010	-0.050
	0 to -30.08	0.047	0.025	0.174	0.174	0.186	0.021	0.061

Note: The locations for each gauge number are located in Figure 9.

**Wall Section Observations During Structural Wind Loading**

During the wind loading schedule as shown in Tables 16 and 17, there were no visible signs of Element Specimen No. 20-06-B0040-SS-CB-3 tearing, cracking or peeling from the wall section.

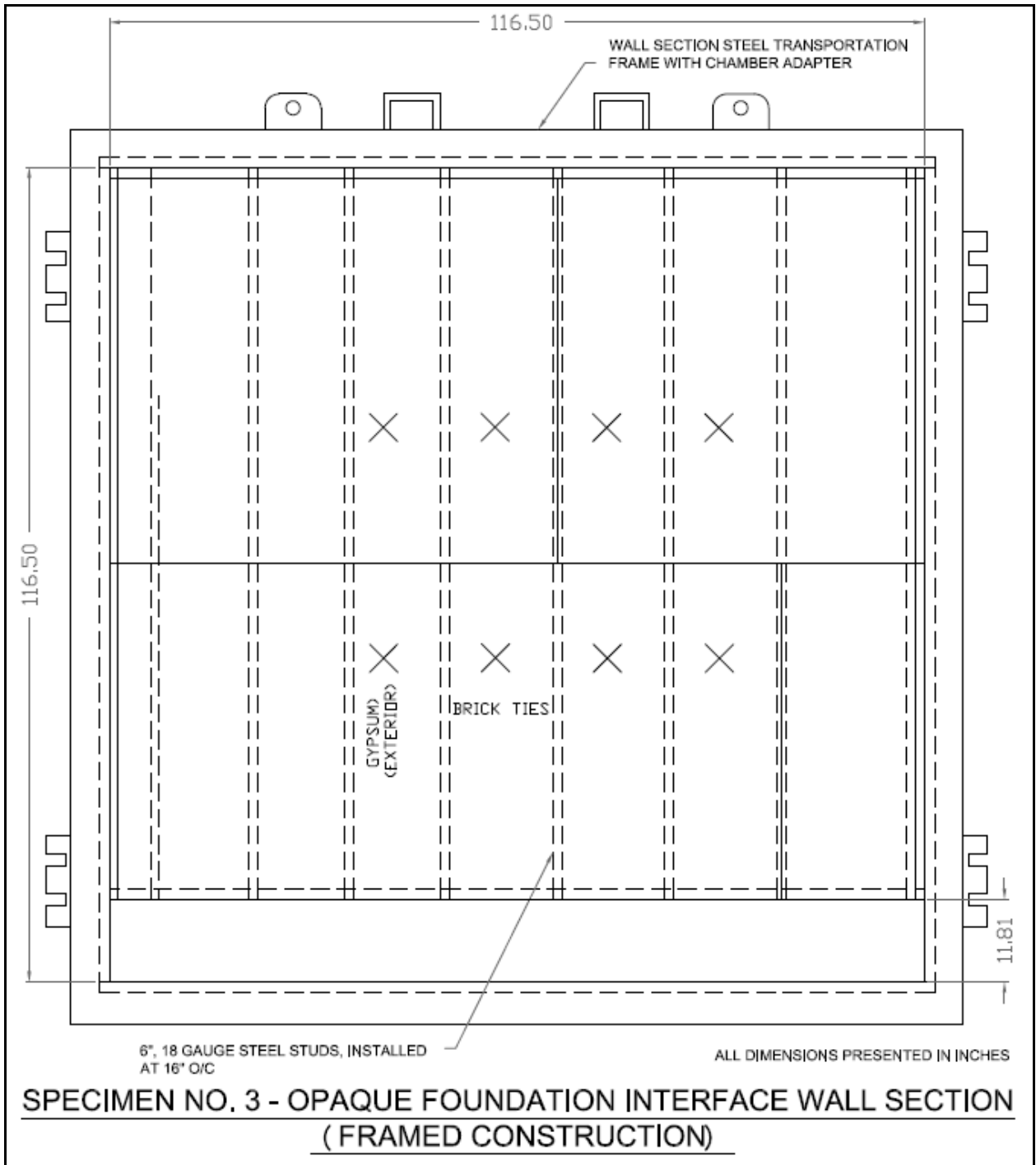


Figure 24 – Element Specimen 20-06-B0040-SS-CB-3 Gauge Locations

4.4 Client requested test – Water penetration resistance

Table 20 – ASTM E331-00 (2016) - Water Penetration Resistance Element Specimen No.: 20-06-B0040-SS-PT-2			
Requested Test Pressure Pa (psf)	Requirements	Results	Comments
137 (2.86) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing and sheathing joints.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets requested requirement</b>
300 (6.27) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing and sheathing joints.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets requested requirement</b>

Table 21 – ASTM E331-00 (2016) - Water Penetration Resistance Element Specimen No.: 20-06-B0040-SS-CB-3			
Requested Test Pressure Pa (psf)	Requirements	Results	Comments
137 (2.86) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing, sheathing joints, PVC and metal pipe, electrical junction boxes, square metal duct, brick ties, roof and foundation interface, and around the window rough opening.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets requested requirement</b>
300 (6.27) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing, sheathing joints, PVC and metal pipe, electrical junction boxes, square metal duct, brick ties, roof and foundation interface, and around the window rough opening.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets requested requirement</b>

5.0 RESULTS FOR MASONRY BLOCK WALL (CMU) SPECIMENS

Table 22 – Summarized Air Leakage Results at 75 Pa (1.57 psf) in Accordance with CAN/ULC-S742-11, Section 6.3.2.1 (A), referencing ASTM E2357-11 – Section 9.1, Air Leakage Testing					
Element Specimen No.:	Airflow Direction	Optional	Ambient	Cold	Air Leakage Rate Classification <sup>(2)</sup>
		Calculated Air Leakage at 75 Pa (1.57 psf) Prior to Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	
20-06-B0040-CMU-OP-4 (Opaque Wall)	- EXF	0.0083 (0.0017)	0.0165 <sup>(1)</sup> (0.0033)	0.0053 (0.0011)	A1 <sup>(2)</sup>
	+ INF	0.0009 (0.0002)	0.0030 (0.0006)	0.0053 (0.0011)	
20-06-B0040-CMU-PT-5 (Penetration Wall)	- EXF	0.0008 (0.0002)	0.0011 (0.0002)	0.0237 <sup>(1)</sup> (0.0048)	
	+ INF	0.0023 (0.0005)	0.0059 (0.0012)	0.0053 (0.0011)	
20-06-B0040-CMU-CB-6 (Opaque Wall with Foundation Interface)	- EXF	0.0037 (0.0007)	0.0044 (0.0009)	0.0088 (0.0018)	
	+ INF	0.0083 (0.0017)	0.0139 <sup>(1)</sup> (0.0028)	0.0107 (0.0021)	

Notes: '-' denotes exfiltration airflow direction (simulated negative wind loading)  
'+' denotes infiltration airflow direction (simulated positive wind loading)

(1) Highest measured air leakage rate at 75 Pa (1.57 psf).

(2) As per CAN/ULC-S742-11, an air barrier in compliance with this standard shall be classified as one of the types listed in clause 4.1.1.1 to clause 4.1.1.5 according to its reference air leakage rate:

- 4.1.1.1 A1 – The reference air leakage rate shall not exceed 0.05 L/(s·m<sup>2</sup>) (0.009 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.2 A2 – The reference air leakage rate shall not exceed 0.10 L/(s·m<sup>2</sup>) (0.019 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.3 A3 – The reference air leakage rate shall not exceed 0.15 L/(s·m<sup>2</sup>) (0.029 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.4 A4 – The reference air leakage rate shall not exceed 0.20 L/(s·m<sup>2</sup>) (0.039 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).
- 4.1.1.5 A5 – The reference air leakage rate shall not exceed 0.50 L/(s·m<sup>2</sup>) (0.098 cfm/ft<sup>2</sup>) at a pressure difference of 75 Pa (1.57 psf).

The reference air leakage rate is the highest air leakage rate of those recorded among all specimens when tested in accordance with CAN/ULC-S742-11, Section 6.

5.1 Detailed Element Specimen No. 20-06-B0040-CMU-OP-4 Results

Table 23 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-CMU-OP-4 (Exfiltration '-')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0037	0.0007	0.0084	0.0017	0.0022	0.0004
50 (1.04)	0.0061	0.0012	0.0128	0.0026	0.0039	0.0008
<b>75 (1.57)</b>	<b>0.0083</b>	<b>0.0017</b>	<b>0.0165</b>	<b>0.0033</b>	<b>0.0053</b>	<b>0.0011</b>
100 (2.09)	0.0103	0.0021	0.0197	0.0040	0.0067	0.0013
150 (3.13)	0.0139	0.0028	0.0253	0.0051	0.0092	0.0019
250 (5.22)	0.0203	0.0041	0.0347	0.0070	0.0139	0.0028
300 (6.24)	0.0232	0.0047	0.0389	0.0078	0.0160	0.0032

Table 24 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-CMU-OP-4 (Infiltration '+')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0002	0.0000	0.0007	0.0001	0.0020	0.0004
50 (1.04)	0.0005	0.0001	0.0017	0.0003	0.0037	0.0007
<b>75 (1.57)</b>	<b>0.0009</b>	<b>0.0002</b>	<b>0.0030</b>	<b>0.0006</b>	<b>0.0053</b>	<b>0.0011</b>
100 (2.09)	0.0012	0.0002	0.0043	0.0009	0.0069	0.0014
150 (3.13)	0.0019	0.0004	0.0074	0.0015	0.0101	0.0020
250 (5.22)	0.0033	0.0007	0.0144	0.0029	0.0160	0.0032
300 (6.24)	0.0041	0.0008	0.0183	0.0037	0.0189	0.0038

\* As per ASTM E2357-11, logarithmic graphs for each air leakage test (infiltration/exfiltration) displaying the linear regression (r<sup>2</sup>) value are located in Appendix C.

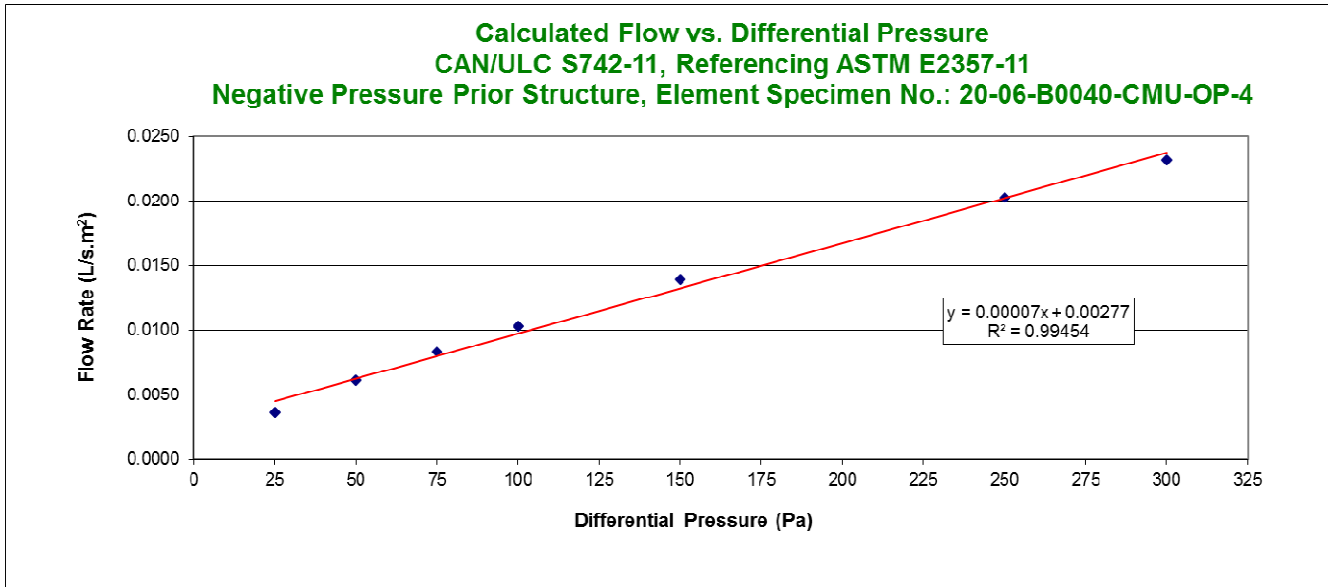


Figure 25 – Element Specimen No.: 20-06-B0040-CMU-OP-4 Exfiltration Air Leakage Prior to Wind Conditioning

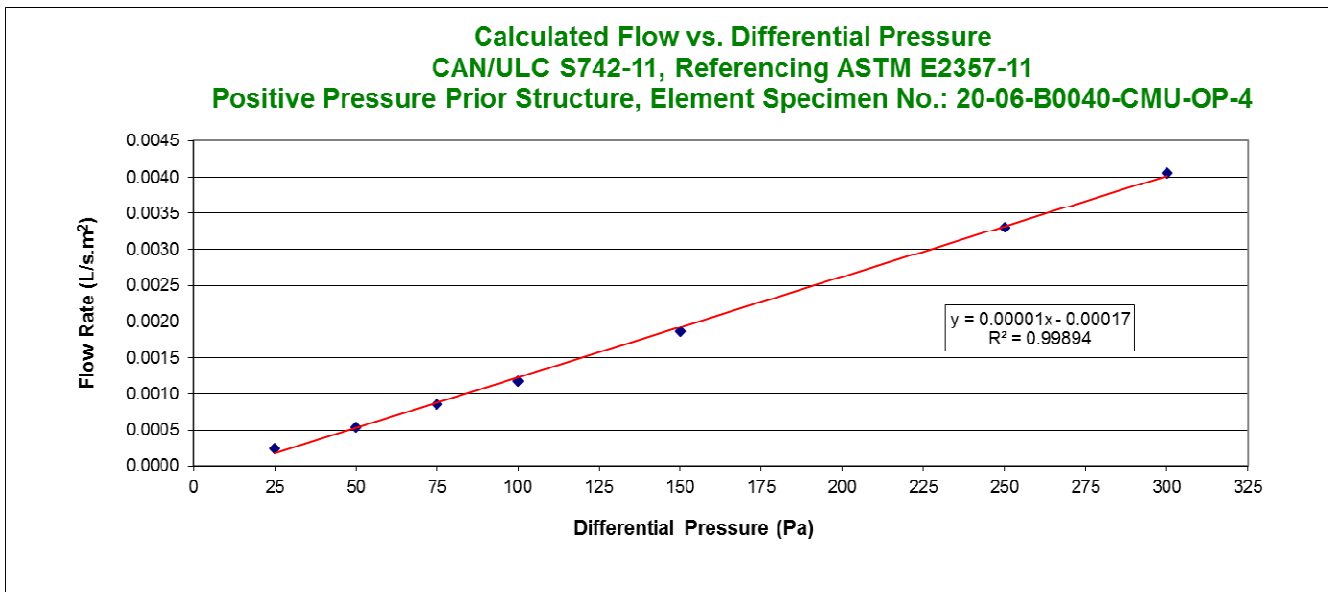


Figure 26 – Element Specimen No.: 20-06-B0040-CMU-OP-4 Infiltration Air Leakage Prior to Wind Conditioning



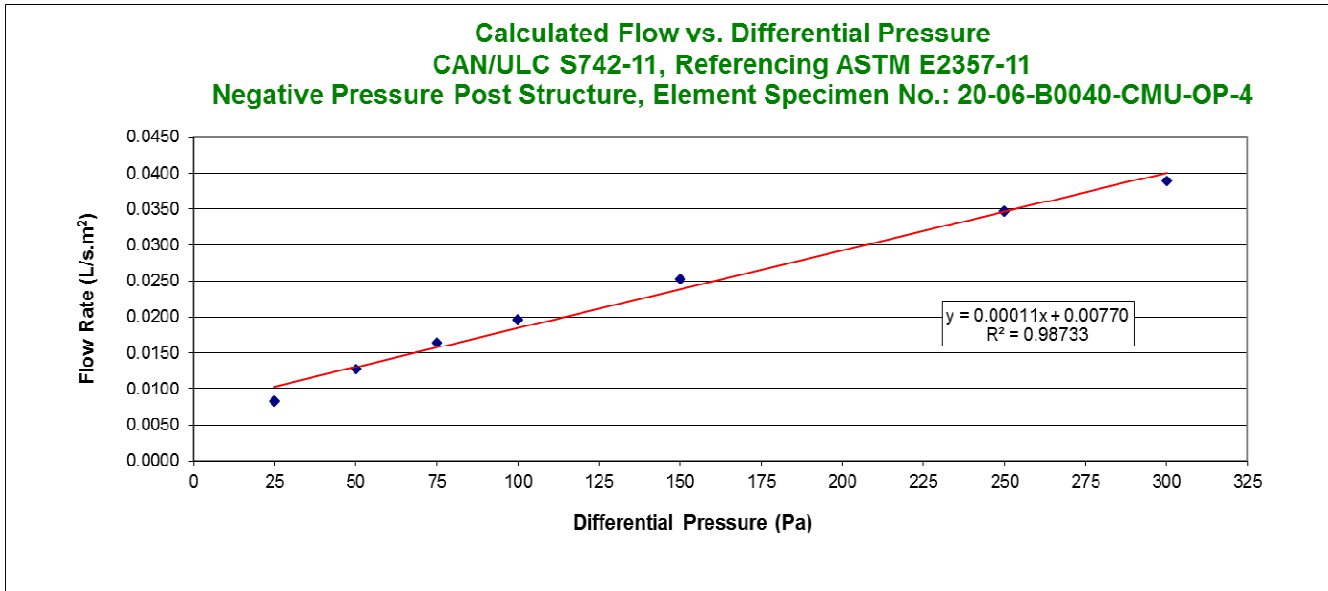


Figure 27 – Element Specimen No.: 20-06-B0040-CMU-OP-4 Exfiltration Air Leakage After Wind Conditioning (Ambient)

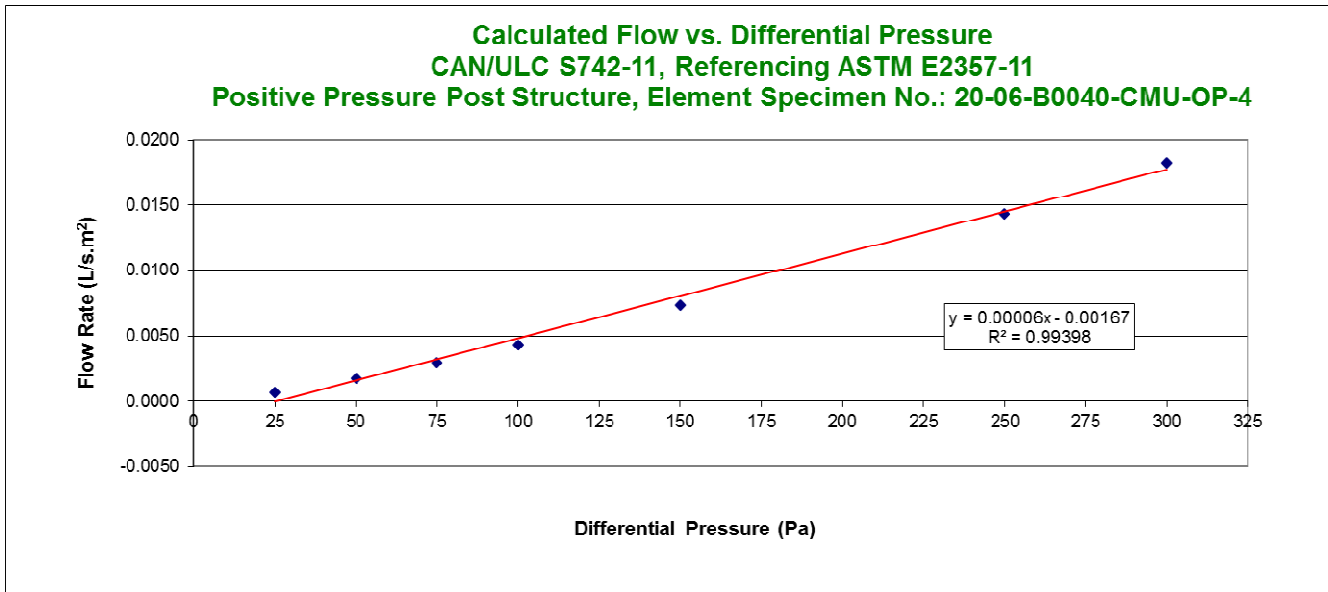


Figure 28 – Element Specimen No.: 20-06-B0040-CMU-OP-4 Infiltration Air Leakage After Wind Conditioning (Ambient)

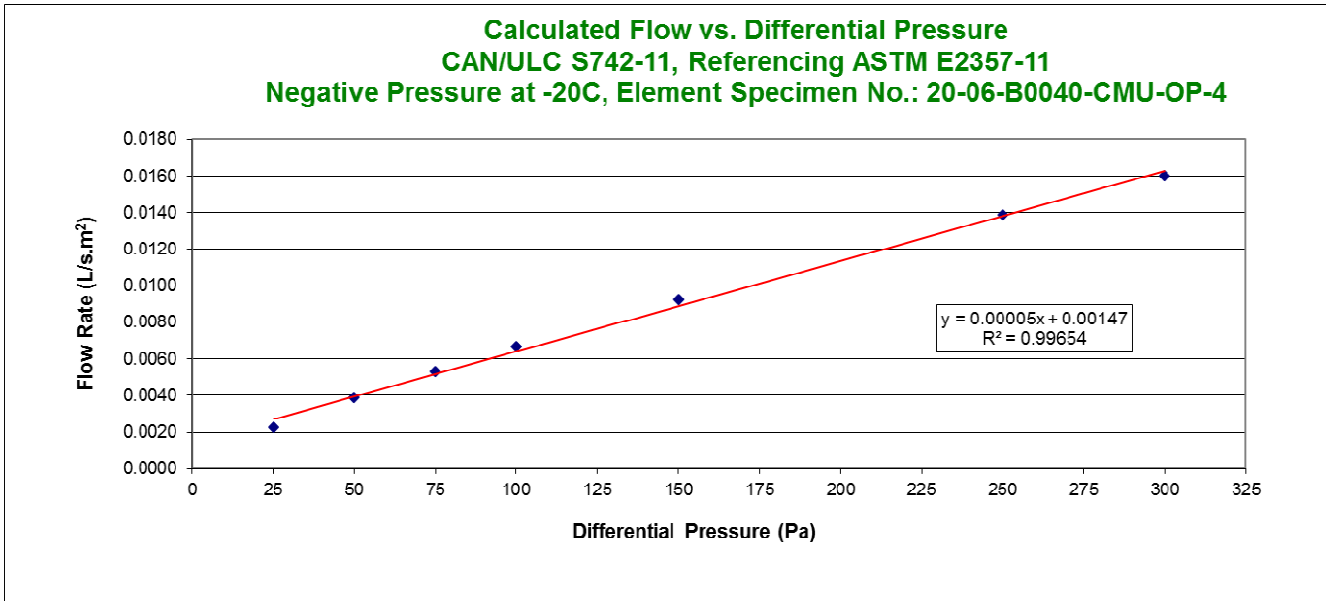


Figure 29 – Element Specimen No.: 20-06-B0040-CMU-OP-4 Exfiltration Air Leakage After Wind Conditioning (Cold)

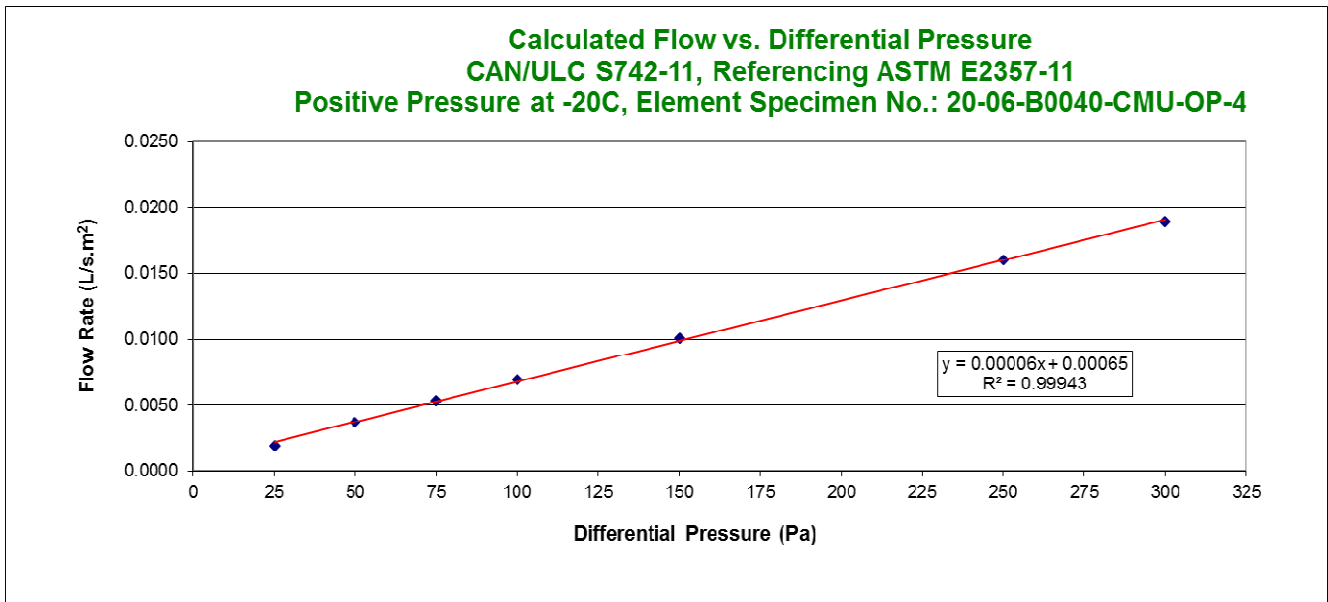


Figure 30 – Element Specimen No.: 20-06-B0040-CMU-OP-4 Infiltration Air Leakage After Wind Conditioning (Cold)

Table 25 – Wind Pressure Loading Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-CMU-OP-4								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Sustained Loads	100	0.33	0.04	0.06	0.11	0.04	0.00	0.20
	200	-0.63	-0.04	0.09	0.41	-0.11	0.04	-0.04
	300	0.74	-0.09	-0.37	-0.13	-0.19	-0.04	0.11
	400	0.39	0.04	0.02	-0.35	-0.04	0.02	-0.04
	500	0.28	-0.07	-0.09	-0.09	-0.17	-0.04	-0.30
	600	-0.84	-0.13	-0.37	-0.15	-0.26	-0.07	-0.20
	<b>650 (P<sub>1</sub>)</b>	0.61	-0.19	-0.54	-0.13	-0.15	-0.11	-0.30
	-100	0.26	0.13	-0.11	0.07	0.24	0.07	-0.04
	-200	0.04	0.20	-0.02	0.07	0.22	0.33	0.19
	-300	0.17	0.24	-0.20	0.20	0.11	0.13	0.00
	-400	0.15	0.20	-0.09	-0.32	0.11	0.19	0.37
	-500	0.54	0.17	0.17	0.30	0.09	0.28	0.20
	-600	0.67	0.13	0.26	0.33	0.32	0.26	0.45
	<b>-650 (P'<sub>1</sub>)</b>	-0.86	0.22	0.30	0.43	0.60	0.28	0.54
	Cyclic Loads	<b>0 to 950 (P<sub>2</sub>)</b>	-0.58	-0.32	-0.13	-0.54	-0.54	-0.37
<b>0 to -950 (P'<sub>2</sub>)</b>		0.80	0.35	0.86	0.65	0.56	0.80	0.80
Gust Loads	<b>0 to 1410 (P<sub>2</sub>)</b>	0.45	-0.65	-0.54	-0.67	-0.69	-0.65	0.52
	<b>0 to -1410 (P'<sub>2</sub>)</b>	-0.69	0.48	0.15	0.71	0.78	0.60	-0.52

Table 26 – Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-CMU-OP-4								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Wind Loading	0 to +1440	-0.28	-0.99	-0.65	-0.82	-0.61	-0.47	0.48
	0 to -1440	0.67	0.63	1.10	1.21	1.06	0.73	0.60

Note: The locations for each gauge number are located in Figure 31.

Table 27 – Wind Pressure Loading Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-CMU-OP-4								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Sustained Loads	2.09	0.013	0.002	0.002	0.004	0.002	0.000	0.008
	4.18	-0.025	-0.002	0.004	0.016	-0.004	0.002	-0.002
	6.27	0.029	-0.004	-0.015	-0.005	-0.007	-0.002	0.004
	8.35	0.015	0.002	0.001	-0.014	-0.002	0.001	-0.002
	10.44	0.011	-0.003	-0.004	-0.004	-0.007	-0.002	-0.012
	12.53	-0.033	-0.005	-0.015	-0.006	-0.010	-0.003	-0.008
	13.58 (P <sub>1</sub> )	0.024	-0.007	-0.021	-0.005	-0.006	-0.004	-0.012
	-2.09	0.010	0.005	-0.004	0.003	0.009	0.003	-0.002
	-4.18	0.002	0.008	-0.001	0.003	0.009	0.013	0.007
	-6.27	0.007	0.009	-0.008	0.008	0.004	0.005	0.000
	-8.35	0.006	0.008	-0.004	-0.013	0.004	0.007	0.015
	-10.44	0.021	0.007	0.007	0.012	0.004	0.011	0.008
	-12.53	0.026	0.005	0.010	0.013	0.013	0.010	0.018
	-13.58 (P' <sub>1</sub> )	-0.034	0.009	0.012	0.017	0.024	0.011	0.021
Cyclic Loads	0 to 19.84 (P <sub>2</sub> )	-0.023	-0.013	-0.005	-0.021	-0.021	-0.015	-0.028
	0 to -19.84 (P' <sub>2</sub> )	0.031	0.014	0.034	0.026	0.022	0.031	0.031
Gust Loads	0 to 29.45 (P <sub>2</sub> )	0.018	-0.026	-0.021	-0.026	-0.027	-0.026	0.020
	0 to -29.45 (P' <sub>2</sub> )	-0.027	0.019	0.006	0.028	0.031	0.024	-0.020

Table 28 – Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-CMU-OP-4								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Wind Loading	0 to +30.08	-0.011	-0.039	-0.026	-0.032	-0.024	-0.019	0.019
	0 to -30.08	0.026	0.025	0.043	0.048	0.042	0.029	0.024

Note: The locations for each gauge number are located in Figure 31.

**Wall Section Observations During Structural Wind Loading**

During the wind loading schedule as shown in Tables 25 and 26, there were no visible signs of Element Specimen No. 20-06-B0040-CMU-OP-4 tearing, cracking or peeling from the wall section.

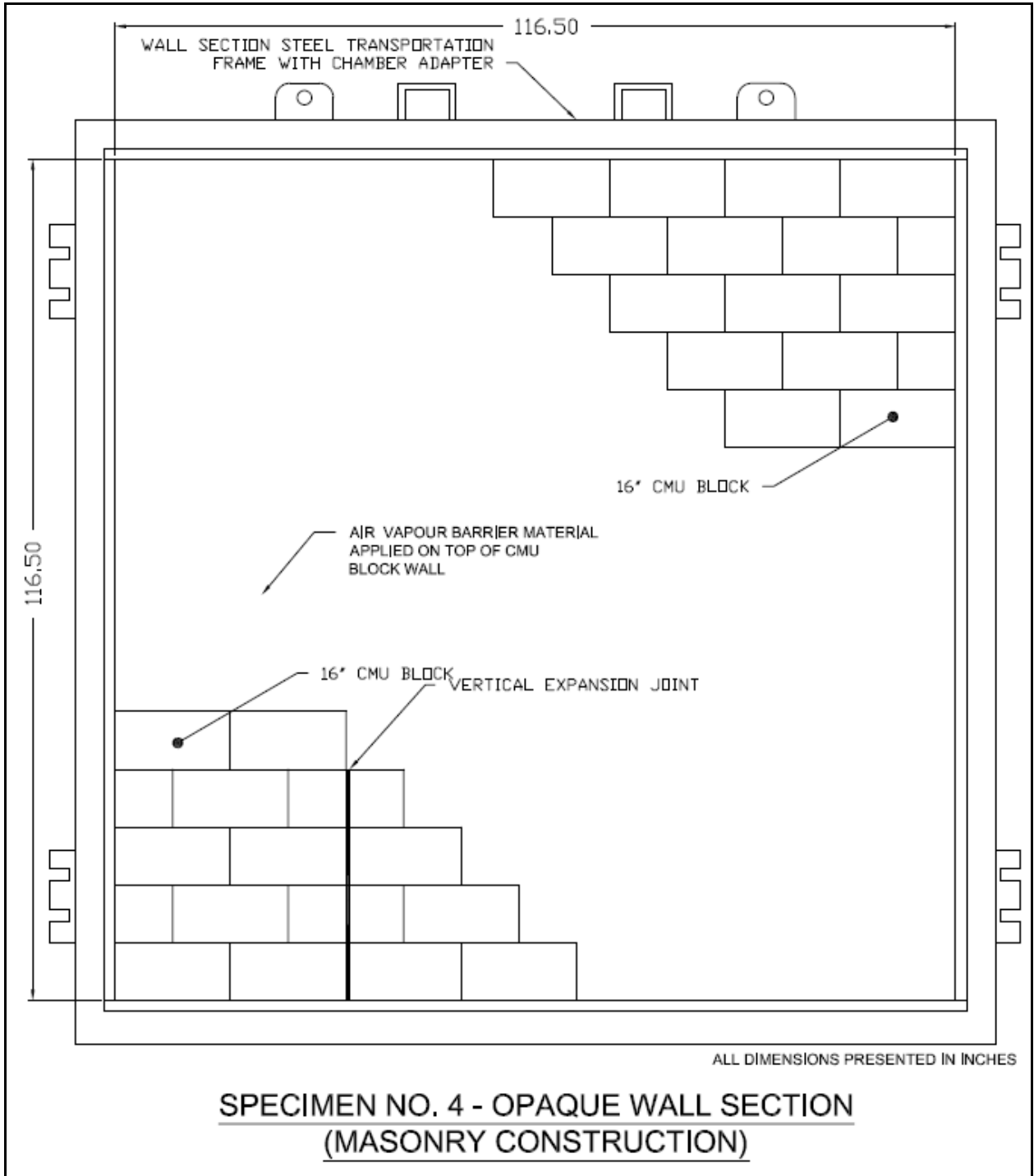


Figure 31 – Element Specimen 20-06-B0040-CMU-OP-4 Gauge Locations

5.2 Detailed Element Specimen No. 20-06-B0040-CMU-PT-5 Results

Table 29 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-CMU-PT-5 (Exfiltration '-')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0002	0.0000	0.0003	0.0001	0.0172	0.0035
50 (1.04)	0.0005	0.0001	0.0007	0.0001	0.0211	0.0042
<b>75 (1.57)</b>	<b>0.0008</b>	<b>0.0002</b>	<b>0.0011</b>	<b>0.0002</b>	<b>0.0237</b>	<b>0.0048</b>
100 (2.09)	0.0010	0.0002	0.0016	0.0003	0.0257	0.0052
150 (3.13)	0.0017	0.0003	0.0026	0.0005	0.0290	0.0058
250 (5.22)	0.0030	0.0006	0.0048	0.0010	0.0336	0.0067
300 (6.24)	0.0036	0.0007	0.0060	0.0012	0.0354	0.0071

Table 30 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-CMU-PT-5 (Infiltration '+')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0006	0.0001	0.0030	0.0006	0.0013	0.0003
50 (1.04)	0.0014	0.0003	0.0046	0.0009	0.0032	0.0006
<b>75 (1.57)</b>	<b>0.0023</b>	<b>0.0005</b>	<b>0.0059</b>	<b>0.0012</b>	<b>0.0053</b>	<b>0.0011</b>
100 (2.09)	0.0034	0.0007	0.0071	0.0014	0.0076	0.0015
150 (3.13)	0.0057	0.0011	0.0091	0.0018	0.0126	0.0025
250 (5.22)	0.0109	0.0022	0.0125	0.0025	0.0239	0.0048
300 (6.24)	0.0137	0.0028	0.0140	0.0028	0.0301	0.0060

\* As per ASTM E2357-11, logarithmic graphs for each air leakage test (infiltration/exfiltration) displaying the linear regression (r<sup>2</sup>) value are located in Appendix D.

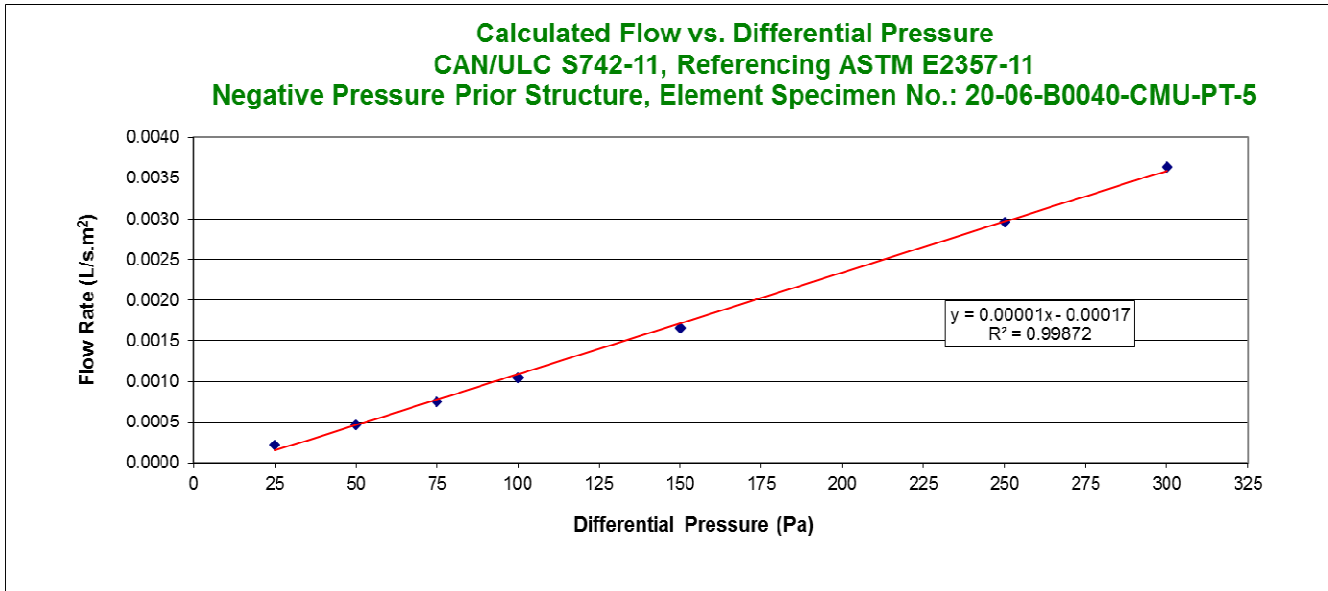


Figure 32 – Element Specimen No.: 20-06-B0040-CMU-PT-5 Exfiltration Air Leakage Prior to Wind Conditioning

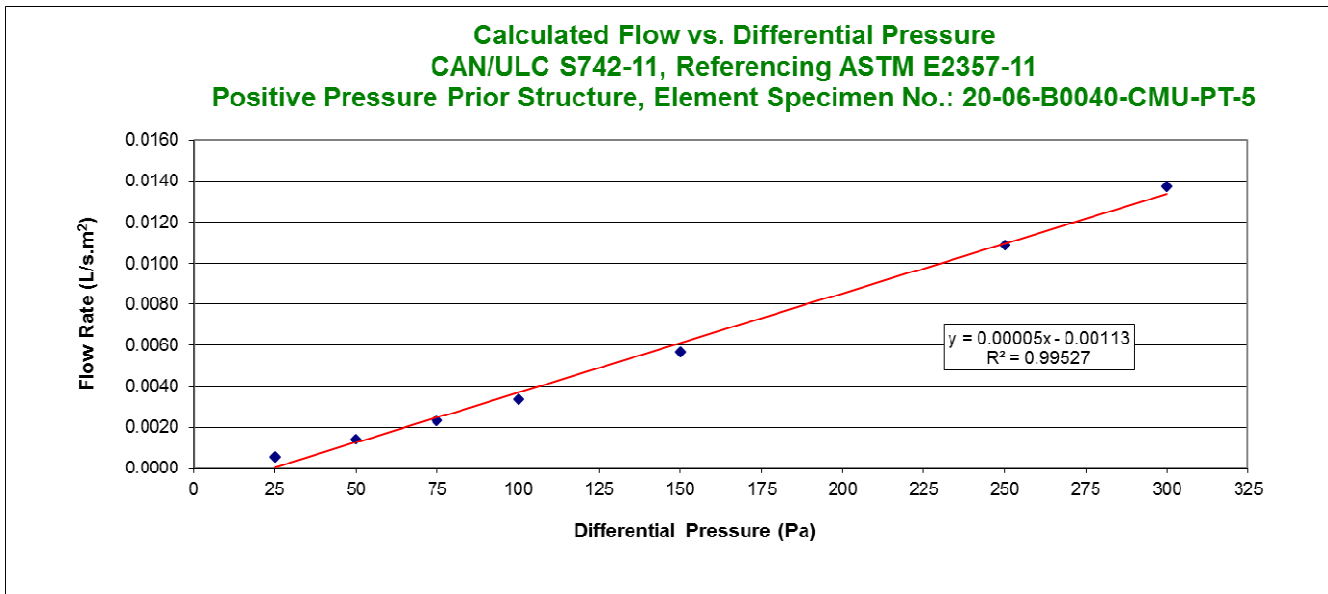


Figure 33 – Element Specimen No.: 20-06-B0040-CMU-PT-5 Infiltration Air Leakage Prior to Wind Conditioning

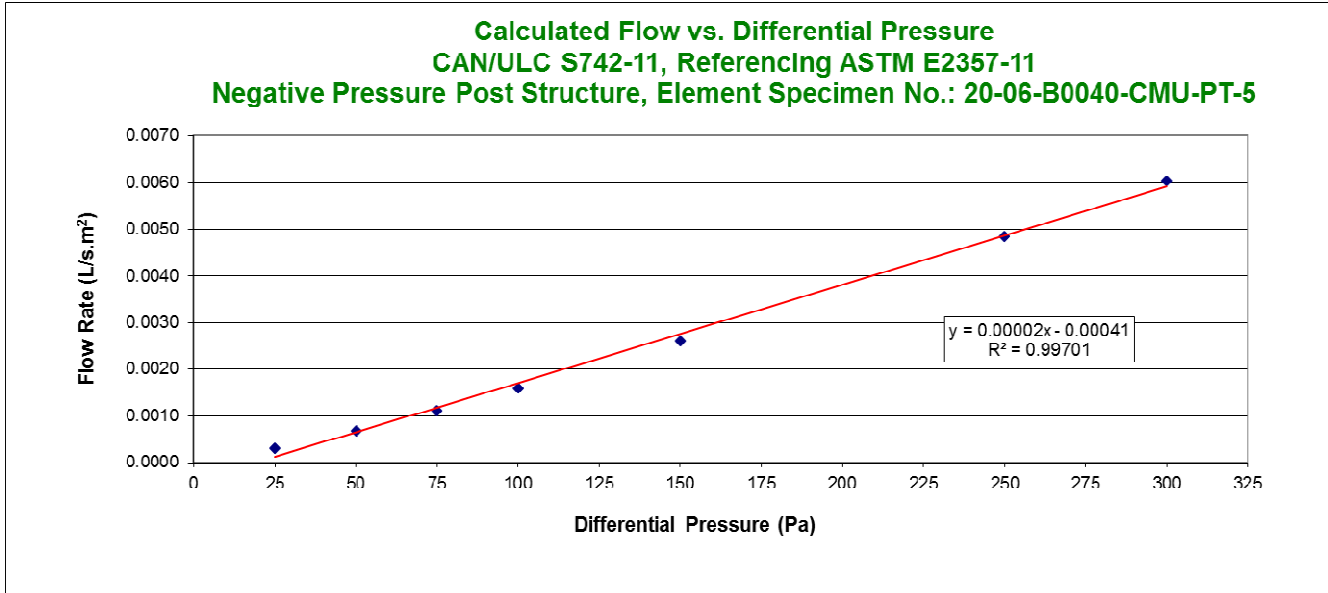


Figure 34 – Element Specimen No.: 20-06-B0040-CMU-PT-5 Exfiltration Air Leakage After Wind Conditioning (Ambient)

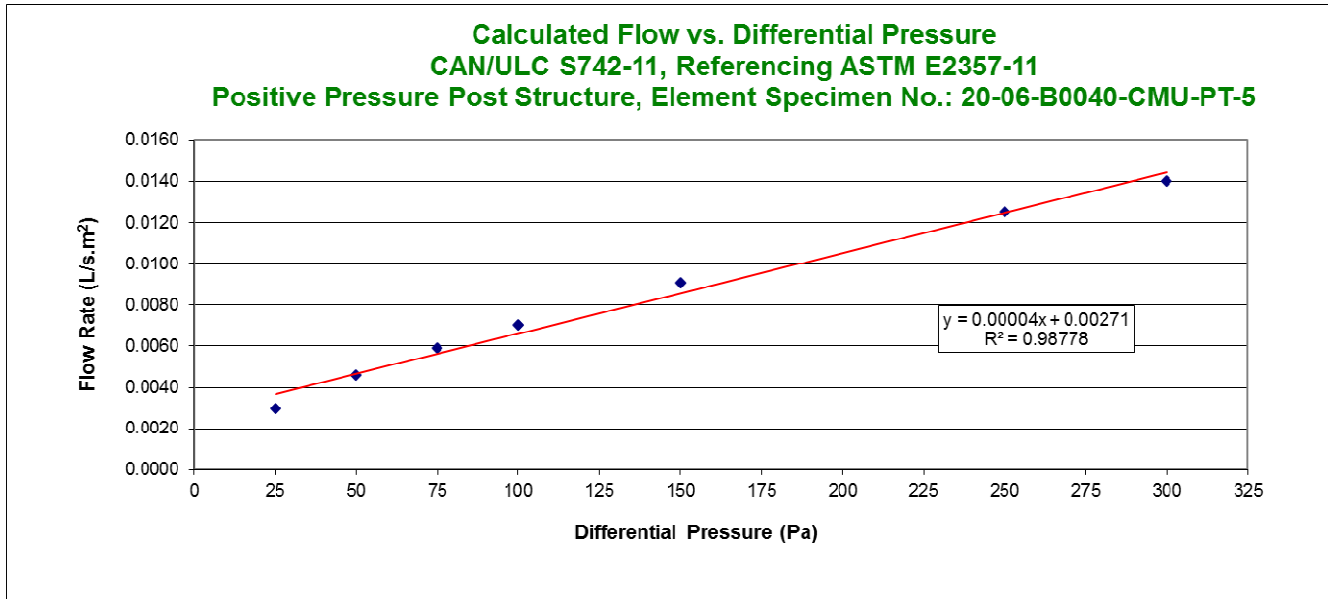


Figure 35 – Element Specimen No.: 20-06-B0040-CMU-PT-5 Infiltration Air Leakage After Wind Conditioning (Ambient)



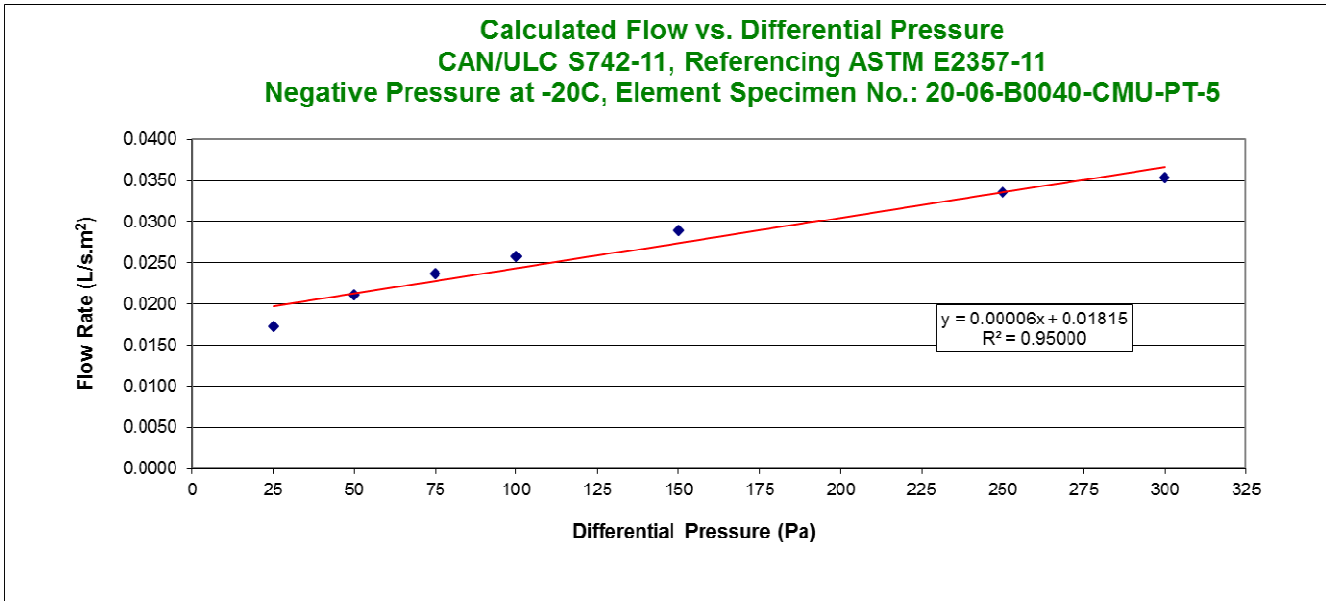


Figure 36 – Element Specimen No.: 20-06-B0040-CMU-PT-5 Exfiltration Air Leakage After Wind Conditioning (Cold)

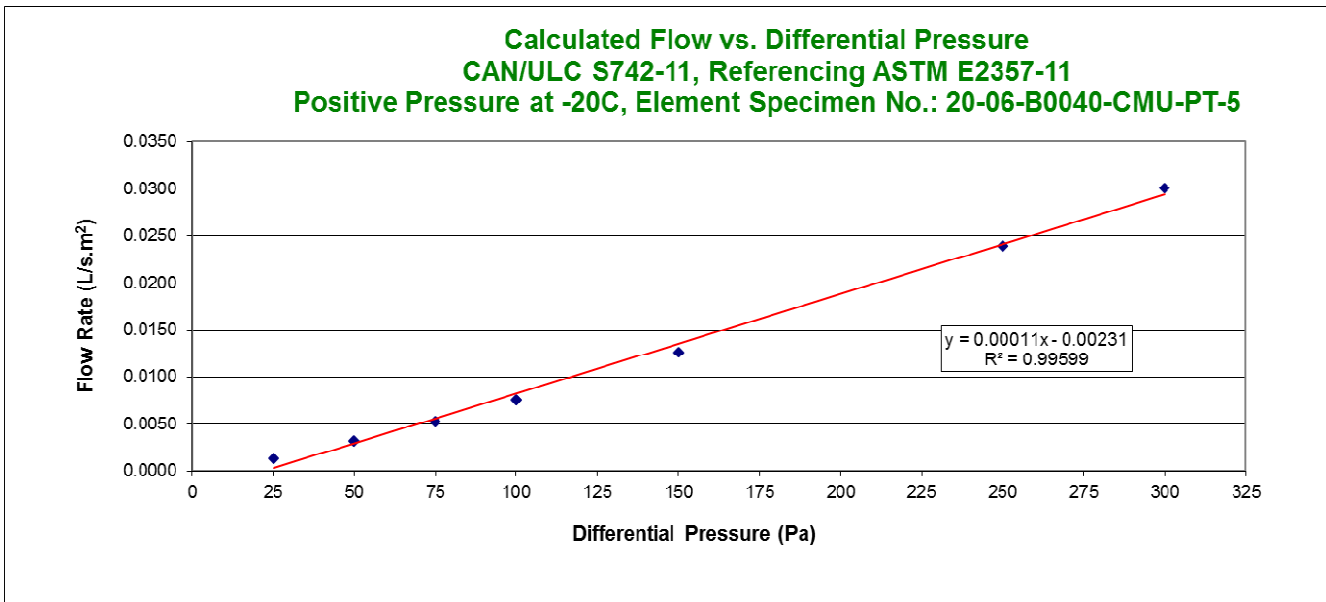


Figure 37 – Element Specimen No.: 20-06-B0040-CMU-PT-5 Infiltration Air Leakage After Wind Conditioning (Cold)

Table 31 – Wind Pressure Loading Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-CMU-PT-5								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Sustained Loads	100	0.11	0.04	-0.48	-0.04	-0.22	0.07	0.20
	200	0.47	-0.04	0.15	-0.06	-0.20	-0.06	-0.04
	300	-0.89	-0.09	-0.73	-0.41	-0.32	-0.07	0.11
	400	-0.52	0.04	0.09	-0.15	-0.30	-0.20	-0.04
	500	-0.07	-0.07	-0.37	-0.17	-0.39	-0.26	-0.30
	600	-0.76	-0.13	-0.37	-0.15	-0.26	-0.07	-0.20
	650 (P <sub>1</sub> )	0.61	-0.19	-0.22	-0.30	-0.35	-0.39	-0.30
	-100	0.60	0.13	0.26	-0.09	0.26	0.19	-0.04
	-200	0.58	0.20	0.60	-0.65	0.22	0.09	0.19
	-300	0.37	0.24	0.43	0.19	0.22	0.17	0.00
	-400	0.47	0.20	0.63	-0.43	0.47	0.32	0.37
	-500	0.43	0.17	0.54	0.19	0.58	0.15	0.20
	-600	0.54	0.13	-0.93	0.30	0.63	0.52	0.45
	-650 (P' <sub>1</sub> )	0.61	0.22	0.95	0.48	0.87	0.43	0.54
	Cyclic Loads	0 to 950 (P <sub>2</sub> )	-1.88	-0.32	-0.37	-0.63	-0.45	-0.86
0 to -950 (P' <sub>2</sub> )		1.40	0.35	0.50	0.28	1.06	0.33	0.80
Gust Loads	0 to 1410 (P <sub>2</sub> )	0.22	-0.65	-0.65	-0.95	-1.08	-0.80	0.52
	0 to -1410 (P' <sub>2</sub> )	1.19	0.48	1.66	1.66	1.58	1.40	-0.52

Table 32 – Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-CMU-PT-5								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Wind Loading	0 to +1440	-0.17	-0.99	-1.12	-1.34	-1.23	-1.02	0.48
	0 to -1440	0.71	0.63	1.71	1.54	2.27	1.58	0.60

Note: The locations for each gauge number are located on the following page in Figure 38.

Table 33 – Wind Pressure Loading Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-CMU-PT-5								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Sustained Loads	2.09	0.004	0.002	-0.019	-0.002	-0.009	0.003	0.008
	4.18	0.019	-0.002	0.006	-0.002	-0.008	-0.002	-0.002
	6.27	-0.035	-0.004	-0.029	-0.016	-0.013	-0.003	0.004
	8.35	-0.020	0.002	0.004	-0.006	-0.012	-0.008	-0.002
	10.44	-0.003	-0.003	-0.015	-0.007	-0.015	-0.010	-0.012
	12.53	-0.030	-0.005	-0.015	-0.006	-0.010	-0.003	-0.008
	<b>13.58 (P<sub>1</sub>)</b>	0.024	-0.007	-0.009	-0.012	-0.014	-0.015	-0.012
	-2.09	0.024	0.005	0.010	-0.004	0.010	0.007	-0.002
	-4.18	0.023	0.008	0.024	-0.026	0.009	0.004	0.007
	-6.27	0.015	0.009	0.017	0.007	0.009	0.007	0.000
	-8.35	0.019	0.008	0.025	-0.017	0.019	0.013	0.015
	-10.44	0.017	0.007	0.021	0.007	0.023	0.006	0.008
	-12.53	0.021	0.005	-0.037	0.012	0.025	0.020	0.018
	<b>-13.58 (P'<sub>1</sub>)</b>	0.024	0.009	0.037	0.019	0.034	0.017	0.021
Cyclic Loads	<b>0 to 19.84 (P<sub>2</sub>)</b>	-0.074	-0.013	-0.015	-0.025	-0.018	-0.034	-0.028
	<b>0 to -19.84 (P'<sub>2</sub>)</b>	0.055	0.014	0.020	0.011	0.042	0.013	0.031
Gust Loads	<b>0 to 29.45 (P<sub>2</sub>)</b>	0.009	-0.026	-0.026	-0.037	-0.043	-0.031	0.020
	<b>0 to -29.45 (P'<sub>2</sub>)</b>	0.047	0.019	0.065	0.065	0.062	0.055	-0.020

Table 34 – Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-CMU-PT-5								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Wind Loading	0 to +30.08	-0.007	-0.039	-0.044	-0.053	-0.048	-0.040	0.019
	0 to -30.08	0.028	0.025	0.067	0.061	0.089	0.062	0.024

Note: The locations for each gauge number are located on the following page in Figure 38.



5.3 Detailed Element Specimen No. 20-06-B0040-CMU-CB-6 Results

Table 35 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-CMU-CB-6 (Exfiltration '-')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0027	0.0005	0.0035	0.0007	0.0046	0.0009
50 (1.04)	0.0033	0.0007	0.0040	0.0008	0.0070	0.0014
<b>75 (1.57)</b>	<b>0.0037</b>	<b>0.0007</b>	<b>0.0044</b>	<b>0.0009</b>	<b>0.0088</b>	<b>0.0018</b>
100 (2.09)	0.0040	0.0008	0.0047	0.0009	0.0104	0.0021
150 (3.13)	0.0045	0.0009	0.0051	0.0010	0.0132	0.0027
250 (5.22)	0.0053	0.0011	0.0057	0.0011	0.0179	0.0036
300 (6.24)	0.0056	0.0011	0.0059	0.0012	0.0199	0.0040

Table 36 – Summarized Air Leakage Results in Accordance with ASTM E2357-11 - Section 9.1, Air Leakage Testing Element Specimen No.: 20-06-B0040-CMU-CB-6 (Infiltration '+')						
Differential Pressure Pa (psf)	Optional		Ambient		Cold [-20°C (-4°F)]	
	Calculated Air Leakage Prior to Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning		Calculated Air Leakage After Wind Pressure Conditioning	
	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>	L/s·m <sup>2</sup>	cfm/ft <sup>2</sup>
25 (0.52)	0.0031	0.0006	0.0068	0.0014	0.0040	0.0008
50 (1.04)	0.0057	0.0012	0.0107	0.0021	0.0075	0.0015
<b>75 (1.57)</b>	<b>0.0083</b>	<b>0.0017</b>	<b>0.0139</b>	<b>0.0028</b>	<b>0.0107</b>	<b>0.0021</b>
100 (2.09)	0.0108	0.0022	0.0168	0.0034	0.0138	0.0028
150 (3.13)	0.0155	0.0031	0.0219	0.0044	0.0198	0.0040
250 (5.22)	0.0246	0.0049	0.0306	0.0061	0.0312	0.0063
300 (6.24)	0.0290	0.0058	0.0344	0.0069	0.0368	0.0074

\* As per ASTM E2357-11, logarithmic graphs for each air leakage test (infiltration/exfiltration) displaying the linear regression (r<sup>2</sup>) value are located in Appendix C.

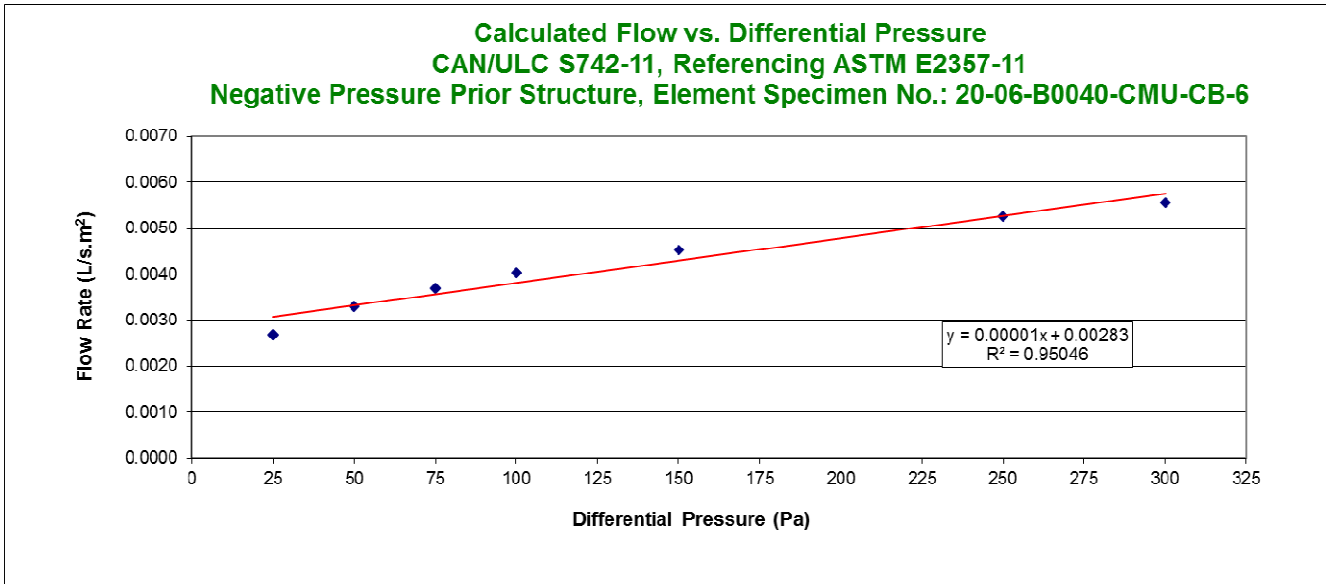


Figure 39 – Element Specimen No.: 20-06-B0040-CMU-CB-6 Exfiltration Air Leakage Prior to Wind Conditioning

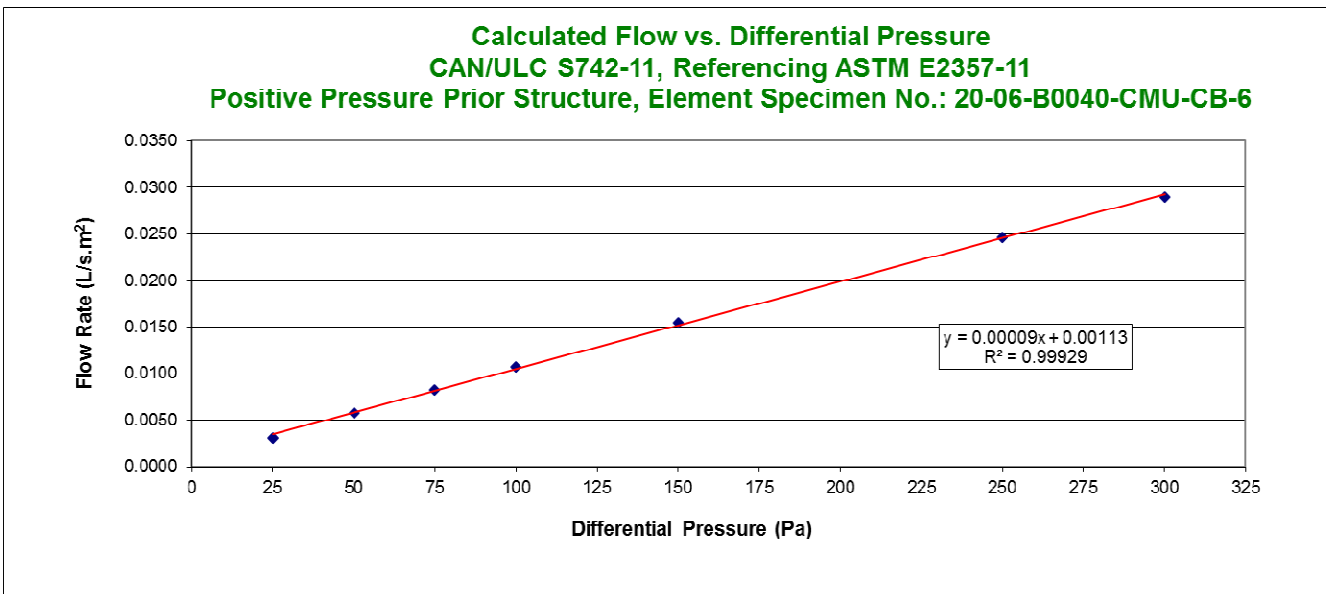


Figure 40 – Element Specimen No.: 20-06-B0040-CMU-CB-6 Infiltration Air Leakage Prior to Wind Conditioning

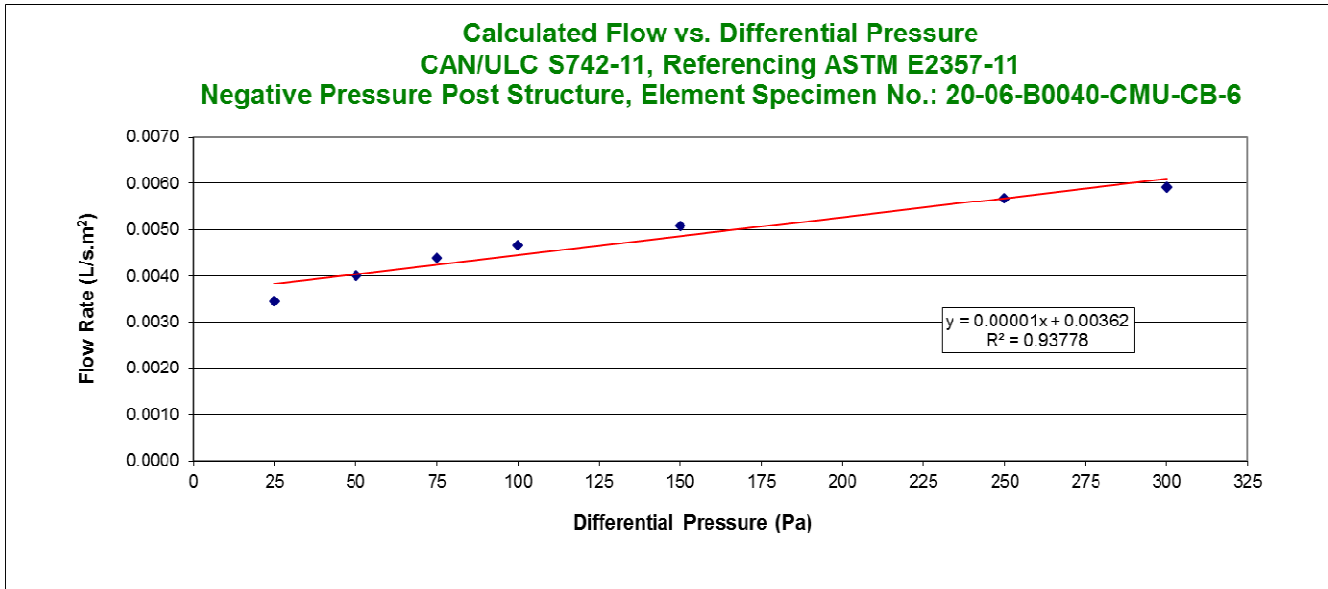


Figure 41 – Element Specimen No.: 20-06-B0040-CMU-CB-6 Exfiltration Air Leakage After Wind Conditioning (Ambient)

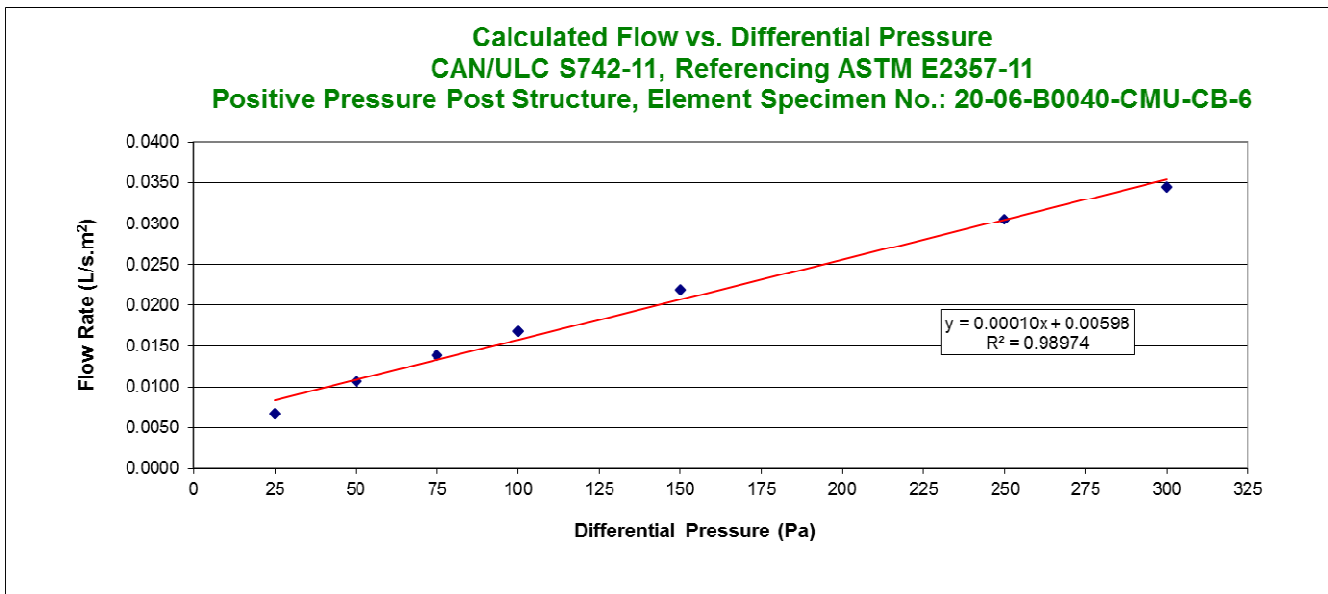


Figure 42 – Element Specimen No.: 20-06-B0040-CMU-CB-6 Infiltration Air Leakage After Wind Conditioning (Ambient)

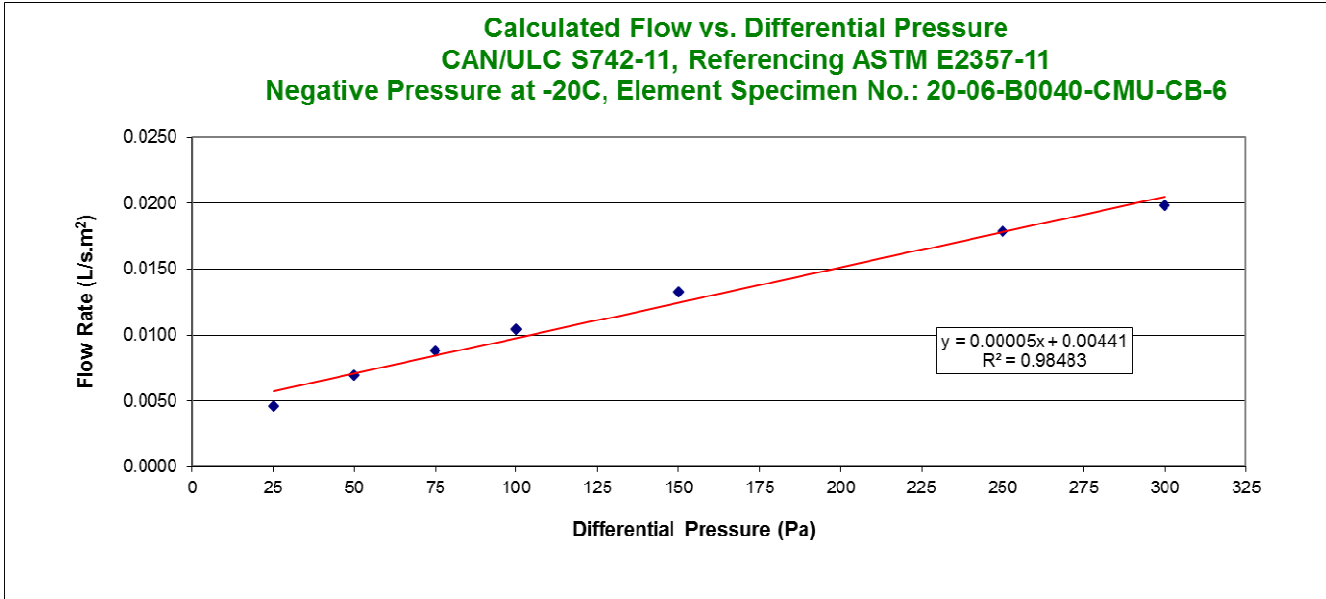


Figure 43 – Element Specimen No.: 20-06-B0040-CMU-CB-6 Exfiltration Air Leakage After Wind Conditioning (Cold)

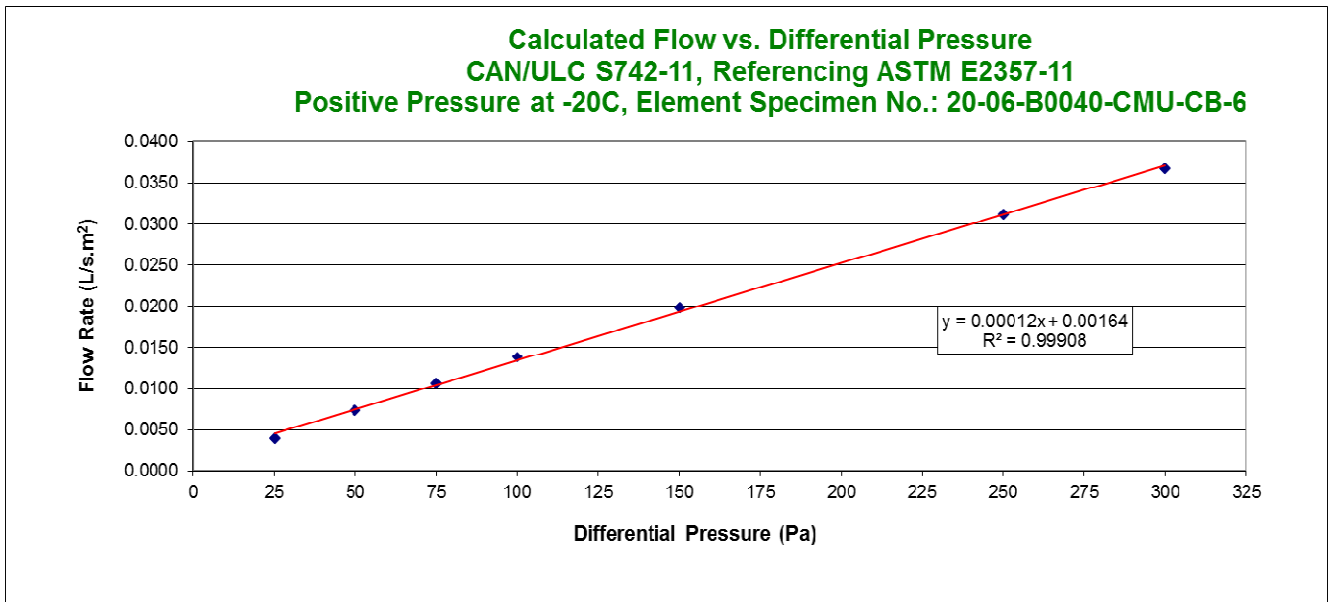


Figure 44 – Element Specimen No.: 20-06-B0040-CMU-CB-6 Infiltration Air Leakage After Wind Conditioning (Cold)



Table 37 – Wind Pressure Loading Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-CMU-CB-6								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Sustained Loads	100	-0.64	-0.69	0.04	0.00	0.06	0.02	0.73
	200	-0.35	0.78	0.02	0.19	0.17	-0.09	0.00
	300	-0.48	0.60	0.13	-0.06	0.07	-0.06	0.47
	400	-0.41	0.37	0.06	0.63	-0.02	-0.13	-0.60
	500	-0.61	0.47	0.04	-0.09	-0.37	-0.28	0.86
	600	-0.80	0.35	-0.22	-0.47	-0.19	-0.33	-0.50
	<b>650 (P<sub>1</sub>)</b>	0.52	0.30	-0.43	-0.33	-0.43	-0.33	0.99
	-100	0.13	-0.73	0.22	-0.07	0.09	0.07	3.31
	-200	0.37	-0.80	0.35	0.20	-0.04	0.20	-0.71
	-300	-0.54	0.33	0.28	-0.09	-0.07	0.26	0.47
	-400	-0.35	0.67	0.56	0.17	0.20	0.20	0.69
	-500	0.67	-0.54	0.48	0.20	0.24	0.28	0.87
	-600	-0.35	0.06	0.52	0.39	0.41	-0.11	0.56
	<b>-650 (P'<sub>1</sub>)</b>	-0.92	0.32	0.80	0.74	0.69	0.60	-0.26
Cyclic Loads	<b>0 to 950 (P<sub>2</sub>)</b>	0.63	-0.85	-0.93	-0.87	-0.41	-0.45	0.38
	<b>0 to -950 (P'<sub>2</sub>)</b>	0.44	0.63	0.82	0.97	0.87	0.61	0.48
Gust Loads	<b>0 to 1410 (P<sub>2</sub>)</b>	-0.45	-1.04	-1.28	-1.21	-1.15	-0.80	-0.89
	<b>0 to -1410 (P'<sub>2</sub>)</b>	0.02	1.12	1.56	1.34	1.30	0.86	1.06

Table 38 – Deflection Results (Metric Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-CMU-CB-6								
Cycle	Pressure (Pa) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (mm)						
		1	2	3	4	5	6	7
Wind Loading	0 to +1440	-0.71	-1.56	-1.25	-0.95	-1.13	-0.74	1.08
	0 to -1440	-0.84	1.17	1.56	1.86	1.43	0.71	-1.13

Note: The locations for each gauge number are located in Figure 45.

Table 39 – Wind Pressure Loading Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.3 Element Specimen No.: 20-06-B0040-CMU-CB-6								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.20 kPa	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Sustained Loads	2.09	-0.025	-0.027	0.002	0.000	0.002	0.001	0.029
	4.18	-0.014	0.031	0.001	0.007	0.007	-0.004	0.000
	6.27	-0.019	0.024	0.005	-0.002	0.003	-0.002	0.019
	8.35	-0.016	0.015	0.002	0.025	-0.001	-0.005	-0.024
	10.44	-0.024	0.019	0.002	-0.004	-0.015	-0.011	0.034
	12.53	-0.031	0.014	-0.009	-0.019	-0.007	-0.013	-0.020
	13.58 (P <sub>1</sub> )	0.020	0.012	-0.017	-0.013	-0.017	-0.013	0.039
	-2.09	0.005	-0.029	0.009	-0.003	0.004	0.003	0.130
	-4.18	0.015	-0.031	0.014	0.008	-0.002	0.008	-0.028
	-6.27	-0.021	0.013	0.011	-0.004	-0.003	0.010	0.019
	-8.35	-0.014	0.026	0.022	0.007	0.008	0.008	0.027
	-10.44	0.026	-0.021	0.019	0.008	0.009	0.011	0.034
	-12.53	-0.014	0.002	0.020	0.015	0.016	-0.004	0.022
	-13.58 (P' <sub>1</sub> )	-0.036	0.013	0.031	0.029	0.027	0.024	-0.010
Cyclic Loads	0 to 19.84 (P <sub>2</sub> )	0.025	-0.033	-0.037	-0.034	-0.016	-0.018	0.015
	0 to -19.84 (P' <sub>2</sub> )	0.017	0.025	0.032	0.038	0.034	0.024	0.019
Gust Loads	0 to 29.45 (P <sub>2</sub> )	-0.018	-0.041	-0.050	-0.048	-0.045	-0.031	-0.035
	0 to -29.45 (P' <sub>2</sub> )	0.001	0.044	0.061	0.053	0.051	0.034	0.042

Table 40 – Deflection Results (Imperial Units) in Accordance with CAN/ULC-S742-11, Section 6.3.4 (Pressure exceeds that of ASTM E2357-11) Element Specimen No.: 20-06-B0040-CMU-CB-6								
Cycle	Pressure (PSF) Q <sub>10</sub> > 0.40 kPa / D <sub>0.60</sub>	Gauge Numbers (Locations) & Maximum Deflections (inches)						
		1	2	3	4	5	6	7
Wind Loading	0 to +30.08	-0.028	-0.061	-0.049	-0.037	-0.044	-0.029	0.043
	0 to -30.08	-0.033	0.046	0.061	0.073	0.056	0.028	-0.044

Note: The locations for each gauge number are located in Figure 45.

**Wall Section Observations During Structural Wind Loading**

During the wind loading schedule as shown in Tables 37 and 38, there were no visible signs of Element Specimen No. 20-06-B0040-CMU-CB-6 tearing, cracking or peeling from the wall section.

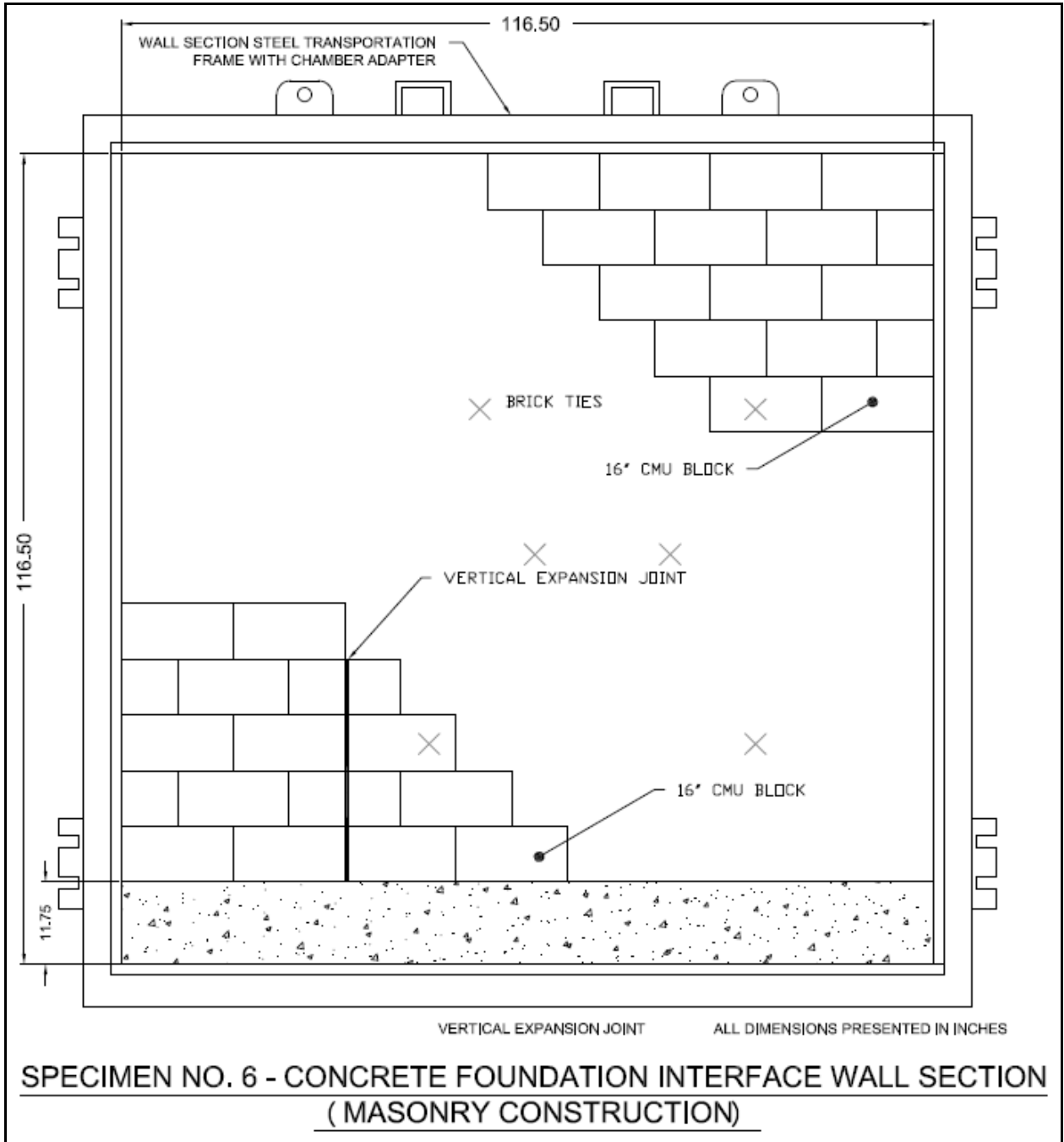


Figure 45 – Element Specimen 20-06-B0040-CMU-CB-6 Gauge Locations

5.4 Client requested test – Water penetration resistance

Table 41 – ASTM E331-00 (2016) - Water Penetration Resistance Element Specimen No.: 20-06-B0040-CMU-PT-5			
Requested Test Pressure Pa (psf)	Requirements	Results	Comments
137 (2.86) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing and sheathing joints.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets Client's Requirement</b>
300 (6.27) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing and sheathing joints.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets Client's Requirement</b>

Table 42 – ASTM E331-00 (2016) - Water Penetration Resistance Element Specimen No.: 20-06-B0040-CMU-CB-6			
Requested Test Pressure Pa (psf)	Requirements	Results	Comments
137 (2.86) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing, sheathing joints, PVC and metal pipe, electrical junction boxes, square metal duct, brick ties, roof and foundation interface, and around the window rough opening.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets Client's Requirement</b>
300 (6.27) (15-Minutes)	As per client request, the opaque wall assembly shall not have water penetration through the wall assembly at the requested test pressure for 15-minutes.  No water shall be observed from the interior side such as the sheathing, sheathing joints, PVC and metal pipe, electrical junction boxes, square metal duct, brick ties, roof and foundation interface, and around the window rough opening.	No water penetration was observed at the interior side of the wall assembly at the conclusion of the test	<b>Meets Client's Requirement</b>

**6.0 CONCLUSION**

The Genyk, “Boreal Nature Elite” air barrier assemblies encompassed in Element Specimens: 20-06-B0040-SS-OP-1, PT-2, & CB-3, comply with the air leakage requirements of CAN/ULC-S742-11 utilizing various wall section configurations and achieved an “A1” air leakage rate classification at a 1 in 50 hourly wind pressure difference of 650 Pa (13.58 psf) at 12 meters (39.4 feet) above grade.

The summarized test results are located in the tables below:

<b>Table 43 – Summarized Air Leakage Results at 75 Pa (1.57 psf) in Accordance with CAN/ULC-S742-11, Section 6.3.2.1 (A), referencing ASTM E2357-11 – Section 9.1, Air Leakage Testing</b>					
Element Specimen No.:	Airflow Direction	<u>Optional</u>	<u>Ambient</u>	<u>Cold</u>	Air Leakage Rate Classification
		Calculated Air Leakage at 75 Pa (1.57 psf) Prior to Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	
20-06-B0040-SS-OP-1 <i>(Opaque Wall)</i>	- EXF	0.0037 (0.0007)	0.0044 (0.0009)	0.0099 (0.0020)	<b>A1</b>
	+ INF	0.0083 (0.0017)	<b>0.0139</b> <b>(0.0028)</b>	0.0132 (0.0027)	
20-06-B0040-SS-PT-2 <i>(Penetration Wall)</i>	- EXF	0.0462 (0.0093)	0.0500 (0.0100)	0.0245 (0.0049)	
	+ INF	0.0474 (0.0095)	<b>0.0503</b> <b>(0.0101)</b>	0.0354 (0.0071)	
20-06-B0040-SS-PT-3 <i>(Opaque Wall with Foundation Interface)</i>	- EXF	0.0440 (0.0088)	<b>0.0469</b> <b>(0.0094)</b>	0.0183 (0.0037)	
	+ INF	0.0473 (0.0095)	0.0434 (0.0087)	0.0212 (0.0043)	

Notes: '-' denotes exfiltration airflow direction (simulated negative wind loading)  
'+' denotes infiltration airflow direction (simulated positive wind loading)

The Genyk, “Boreal Nature Elite” air barrier assemblies encompassed in Element Specimens: 20-06-B0040-CMU-OP-4, PT-5, & CB-6, comply with the air leakage requirements of CAN/ULC-S742-11 utilizing various wall section configurations and achieved an “A1” air leakage rate classification at a 1 in 50 hourly wind pressure difference of 650 Pa (13.58 psf) at 12 meters (39.4 feet) above grade.

The summarized test results are located in the tables below:

<b>Table 44 – Summarized Air Leakage Results at 75 Pa (1.57 psf) in Accordance with CAN/ULC-S742-11, Section 6.3.2.1 (A), referencing ASTM E2357-11 – Section 9.1, Air Leakage Testing</b>					
Element Specimen No.:	Airflow Direction	Optional	Ambient	Cold	Air Leakage Rate Classification
		Calculated Air Leakage at 75 Pa (1.57 psf) Prior to Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	Calculated Air Leakage at 75 Pa (1.57 psf) After Wind Pressure Conditioning L/s·m <sup>2</sup> (cfm/ft <sup>2</sup> )	
20-06-B0040-CMU-OP-4 (Opaque Wall)	- EXF	0.0083 (0.0017)	0.0165 <sup>(1)</sup> (0.0033)	0.0053 (0.0011)	<b>A1</b>
	+ INF	0.0009 (0.0002)	0.0030 (0.0006)	0.0053 (0.0011)	
20-06-B0040-CMU-PT-5 (Penetration Wall)	- EXF	0.0008 (0.0002)	0.0011 (0.0002)	0.0237 <sup>(1)</sup> (0.0048)	
	+ INF	0.0023 (0.0005)	0.0059 (0.0012)	0.0053 (0.0011)	
20-06-B0040-CMU-CB-6 (Opaque Wall with Foundation Interface)	- EXF	0.0037 (0.0007)	0.0044 (0.0009)	0.0088 (0.0018)	
	+ INF	0.0083 (0.0017)	0.0139 <sup>(1)</sup> (0.0028)	0.0107 (0.0021)	

Notes: '-' denotes exfiltration airflow direction (simulated negative wind loading)  
'+' denotes infiltration airflow direction (simulated positive wind loading)


**7.0 REPORT REVISION SUMMARY**

**Revision No.:**  
Original


**Date:**  
November 6, 2020

**Description of Revisions:**  
Original Document

***Reviewed by:***

  
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Ops. Manager, Building Science & Fire Testing  
Technical Manager, Building Systems  
Building Science Division

***Reported & Authorized by:***

  
Allan Lawrence, Ext. 11212  
Supervisor, Building Science  
Building Science Division

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**APPENDIX A**

Logarithmic Air Leakage Graphs  
Element Specimen No.: 20-06-B0040-SS-OP-1  
(Opaque Wall Section)

(3 Pages)



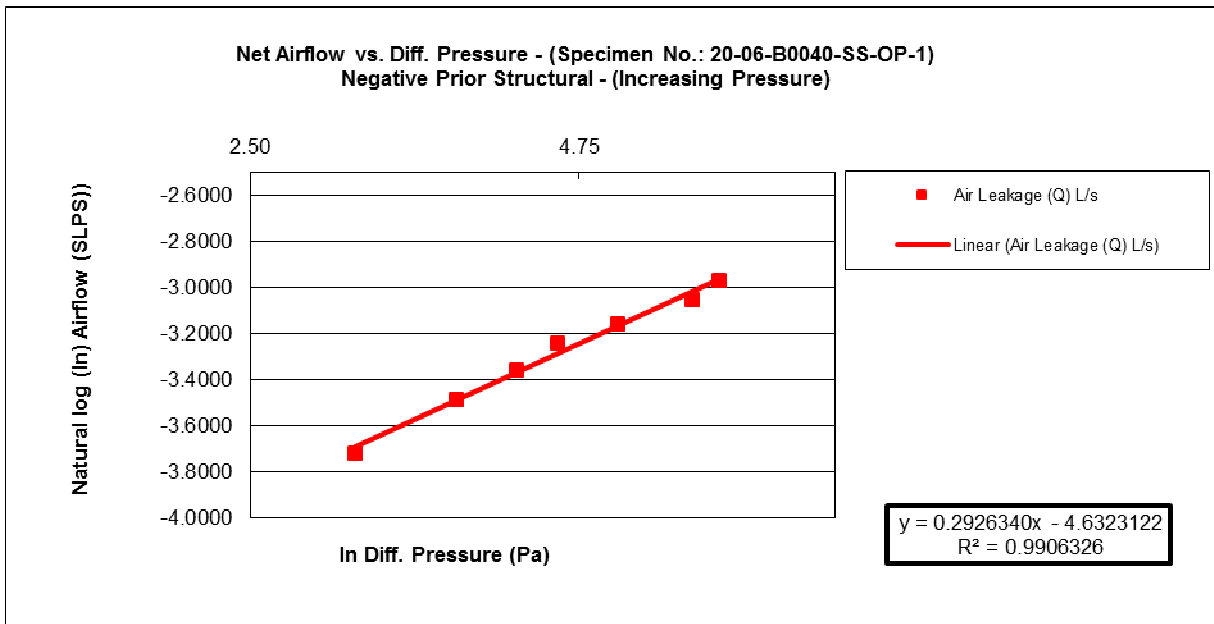


Figure A1 – Element Specimen 20-06-B0040-SS-OP-1 Exfiltration Log/Log Graph Prior to Wind Conditioning

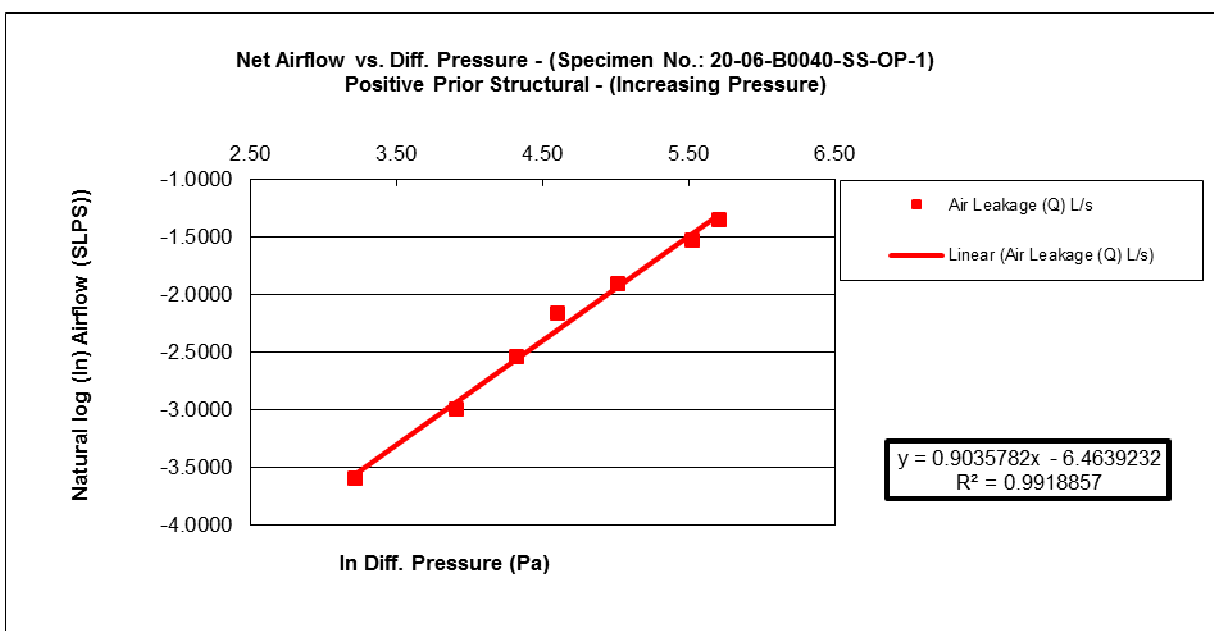


Figure A2 – Element Specimen 20-06-B0040-SS-OP-1 Infiltration Log/Log Graph Prior to Wind Conditioning

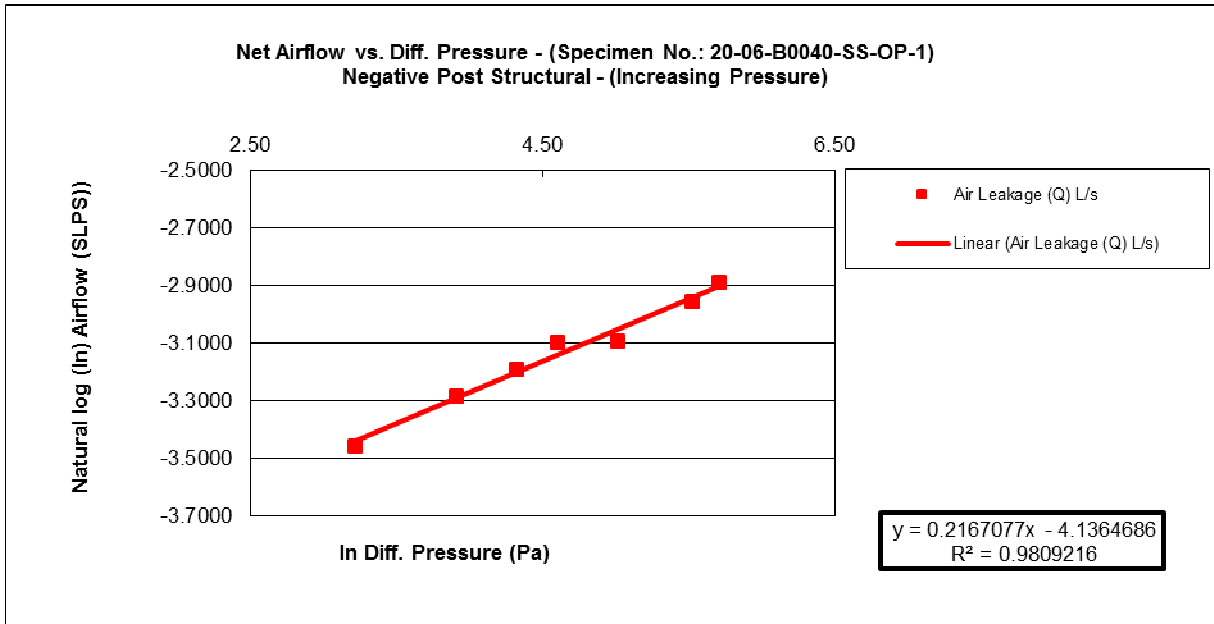


Figure A3 – Element Specimen 20-06-B0040-SS-OP-1 Exfiltration Log/Log Graph Post Wind Conditioning

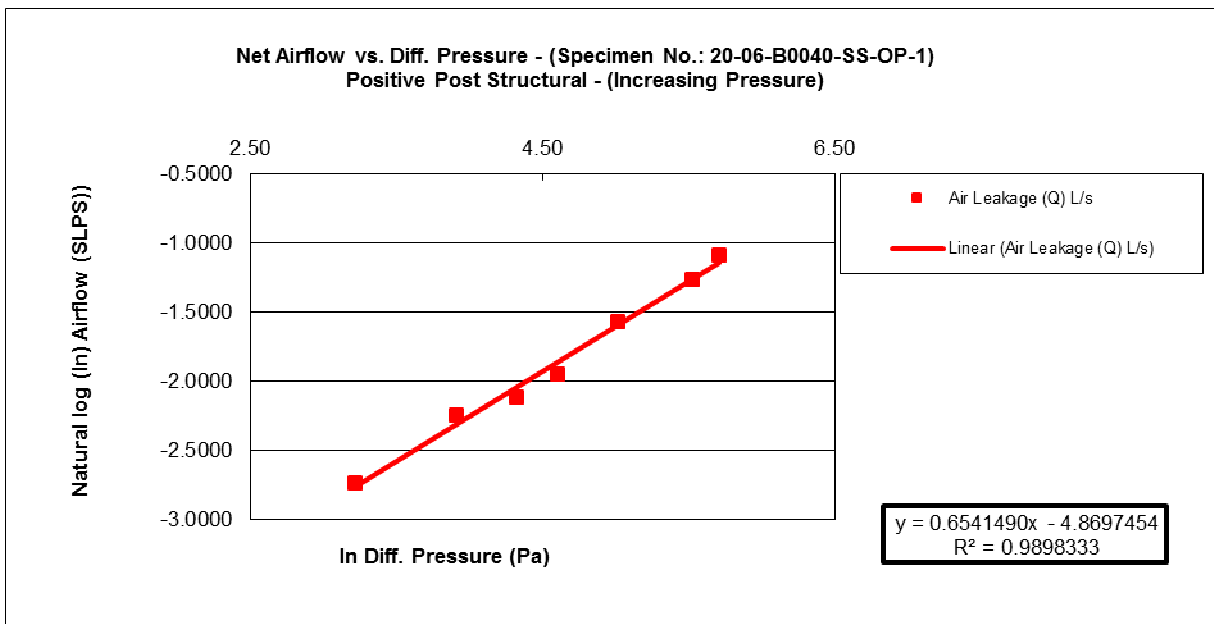


Figure A4 – Element Specimen 20-06-B0040-SS-OP-1 Infiltration Log/Log Graph Post Wind Conditioning

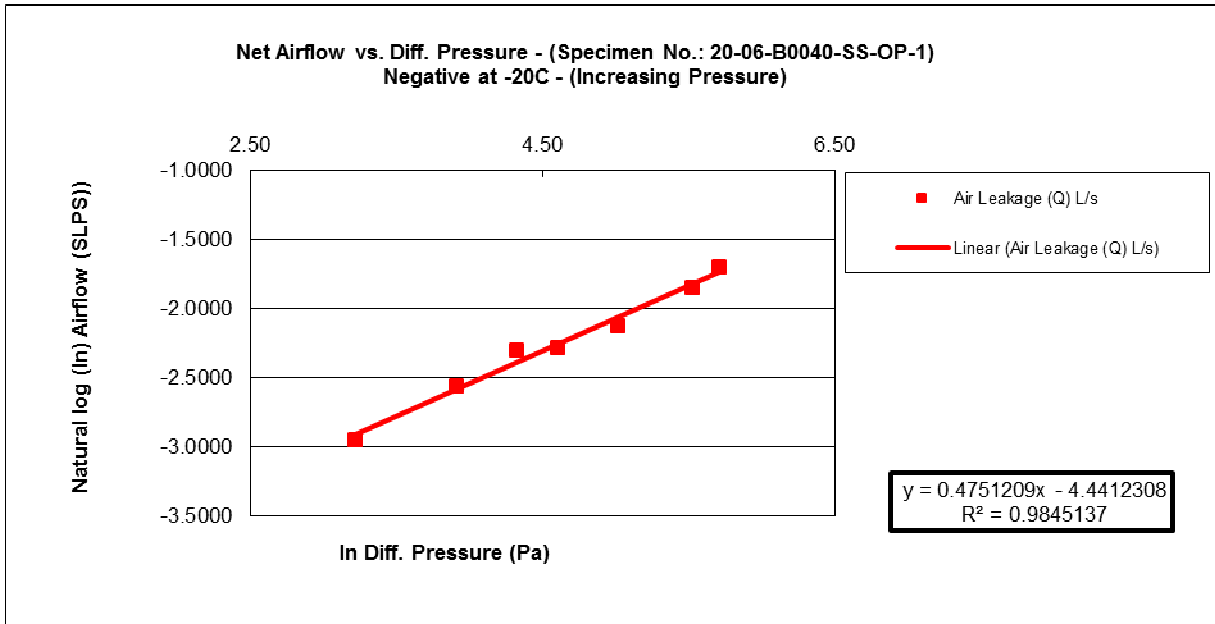


Figure A5 – Element Specimen 20-06-B0040-SS-OP-1 Exfiltration Log/Log Graph Post Wind Conditioning (-20°C)

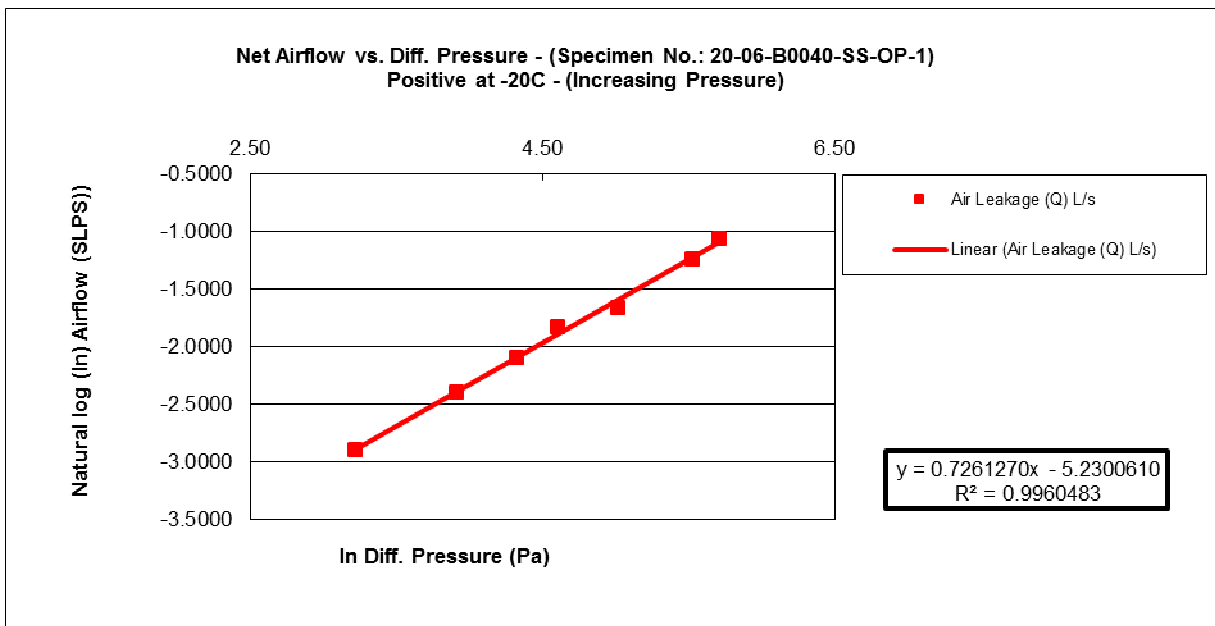


Figure A6 – Element Specimen 20-06-B0040-SS-OP-1 Infiltration Log/Log Graph Post Wind Conditioning (-20°C)

**APPENDIX B**

Logarithmic Air Leakage Graphs  
Element Specimen No.: 20-06-B0040-SS-PT-2  
(Penetrations Wall Section)

(3 Pages)

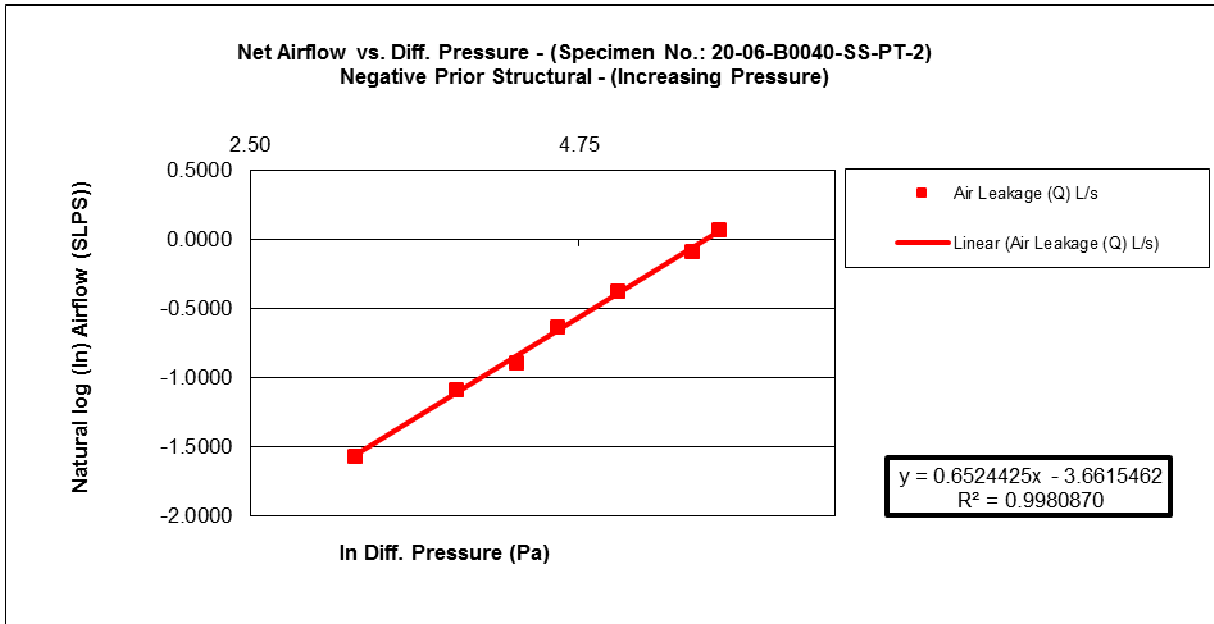


Figure B1 – Element Specimen 20-06-B0040-SS-PT-2 Exfiltration Log/Log Graph Prior to Wind Conditioning

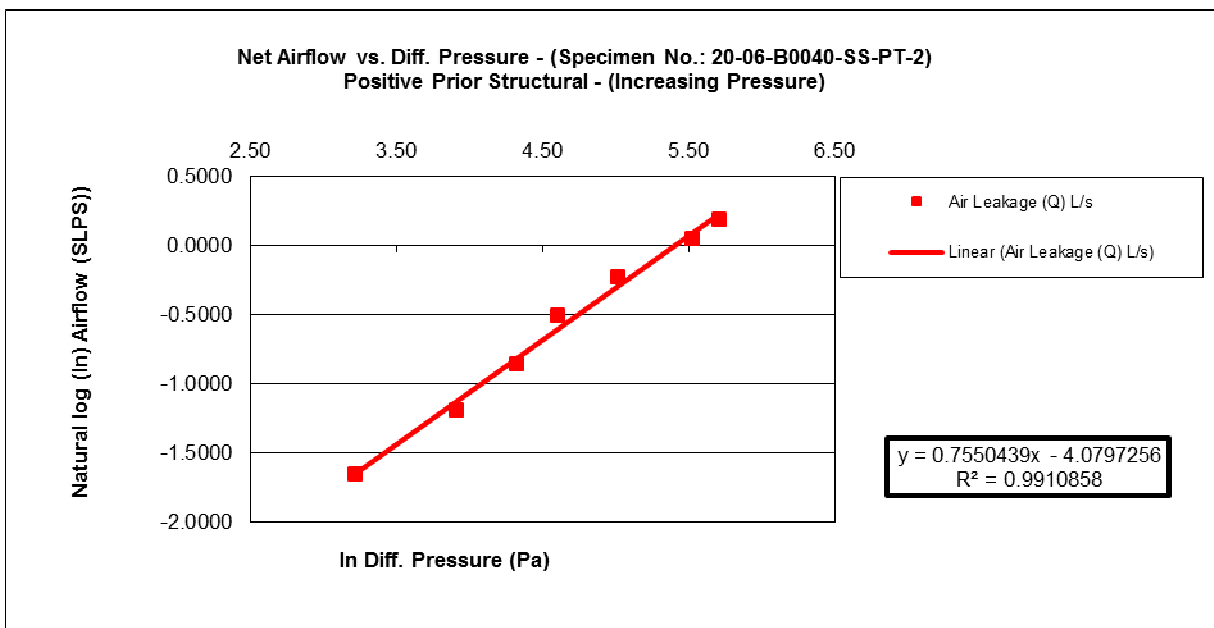


Figure B2 – Element Specimen 20-06-B0040-SS-PT-2 Infiltration Log/Log Graph Prior to Wind Conditioning

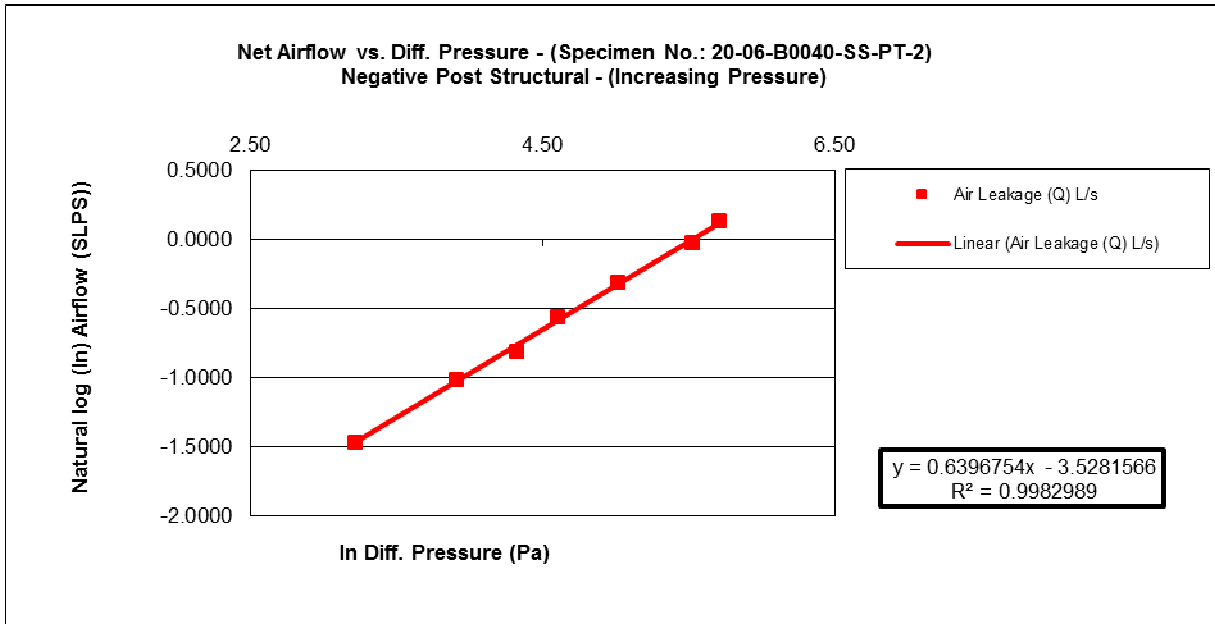


Figure B3 – Element Specimen 20-06-B0040-SS-PT-2 Exfiltration Log/Log Graph Post Wind Conditioning

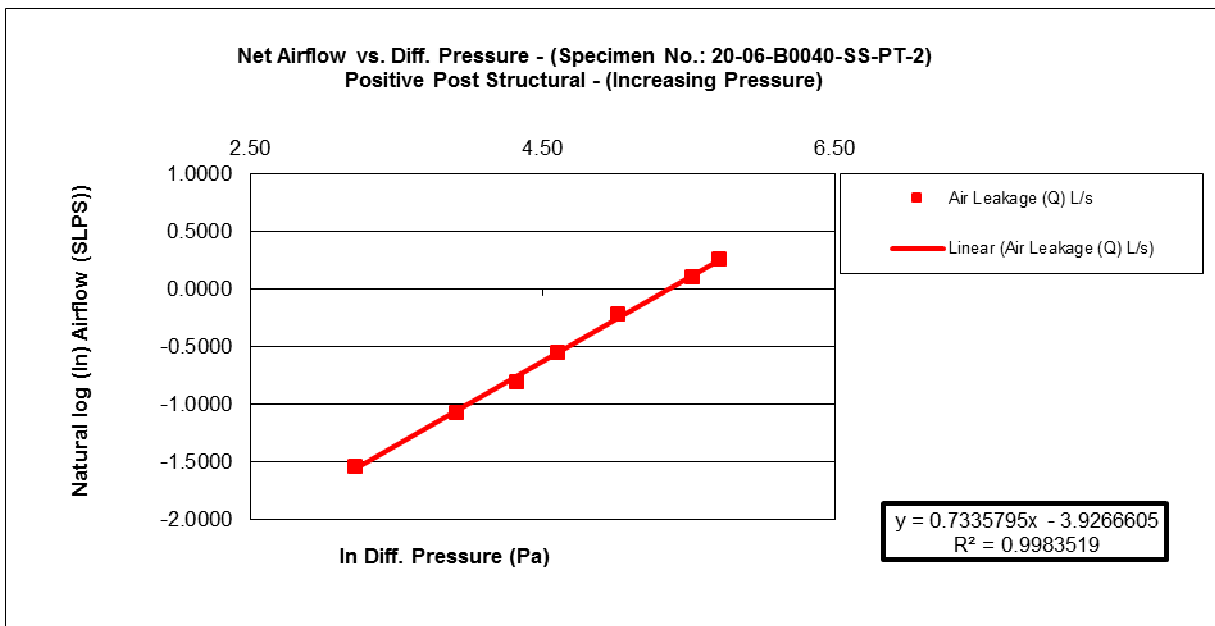


Figure B4 – Element Specimen 20-06-B0040-SS-PT-2 Infiltration Log/Log Graph Post Wind Conditioning

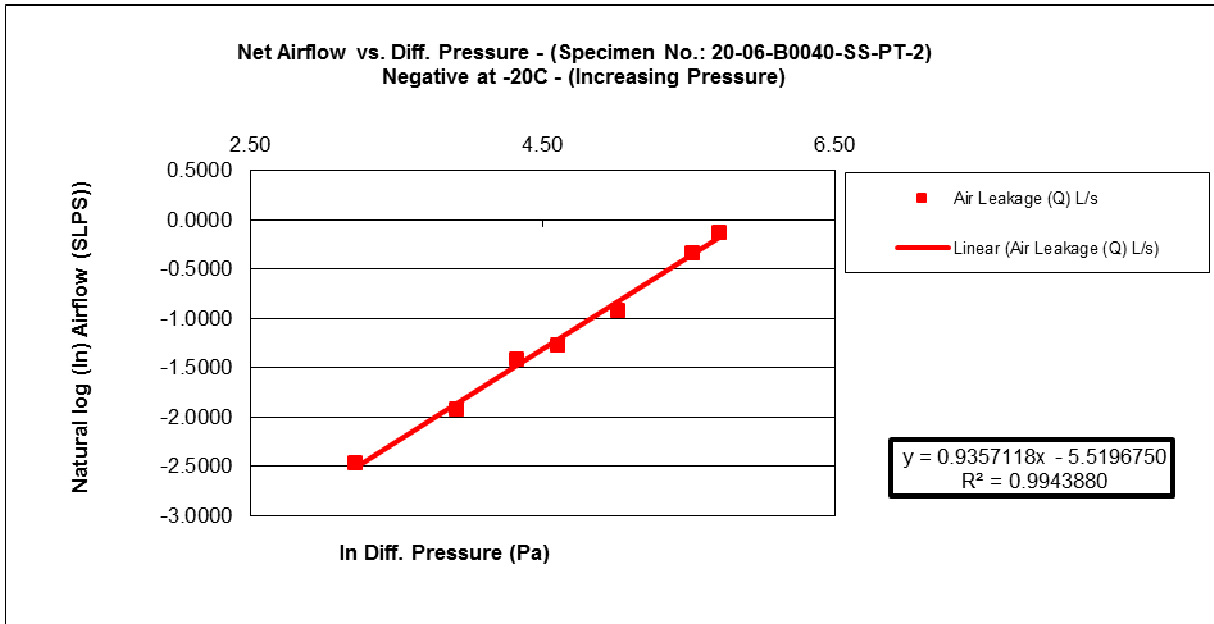


Figure B5 – Element Specimen 20-06-B0040-SS-PT-2 Exfiltration Log/Log Graph Post Wind Conditioning (-20°C)

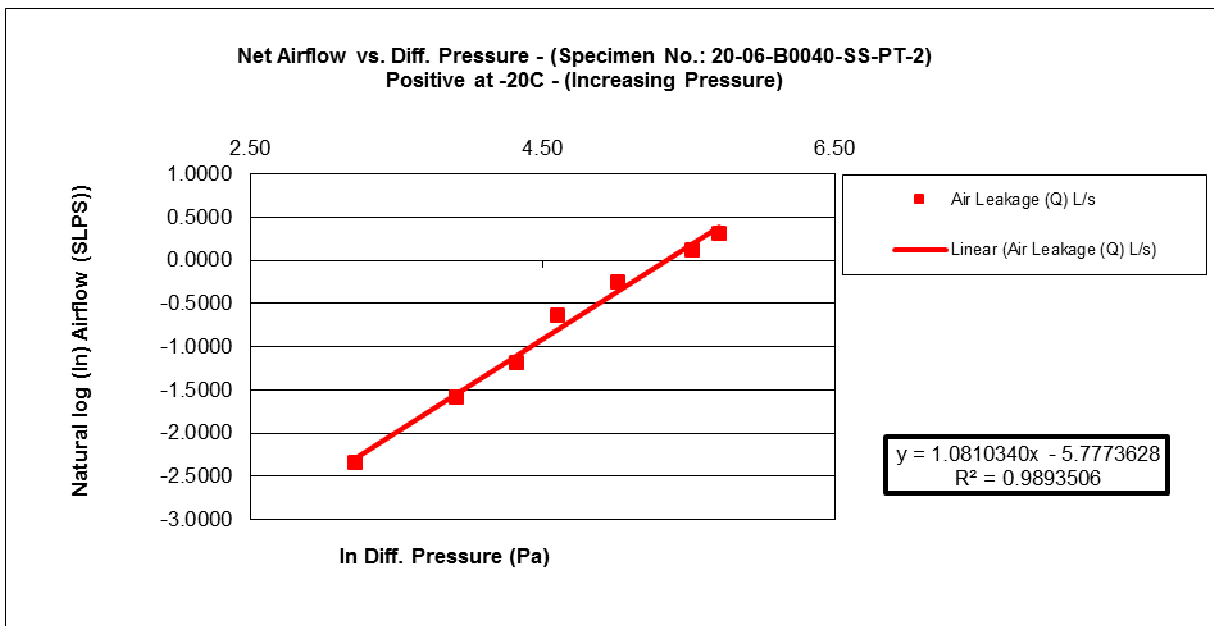


Figure B6 – Element Specimen 20-06-B0040-SS-PT-2 Infiltration Log/Log Graph Post Wind Conditioning (-20°C)

**APPENDIX C**

Logarithmic Air Leakage Graphs  
Element Specimen No.: 20-06-B0040-SS-CB-3  
(Opaque Foundation Wall Section)

(3 Pages)



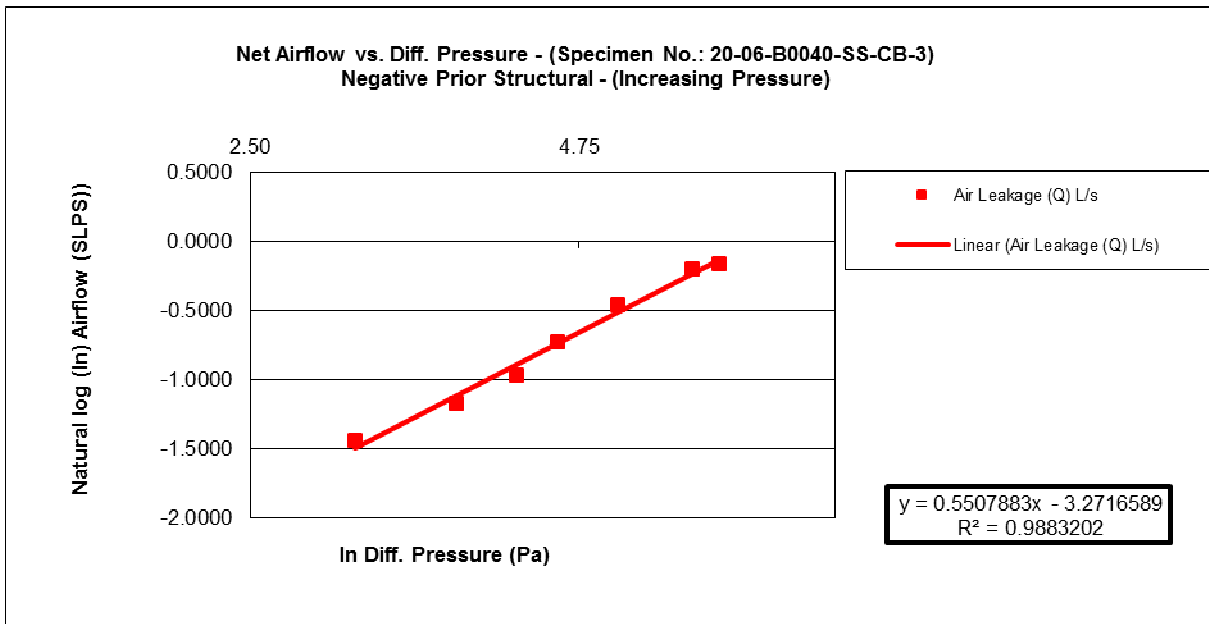


Figure C1 – Element Specimen 20-06-B0040-SS-PT-2 Exfiltration Log/Log Graph Prior to Wind Conditioning

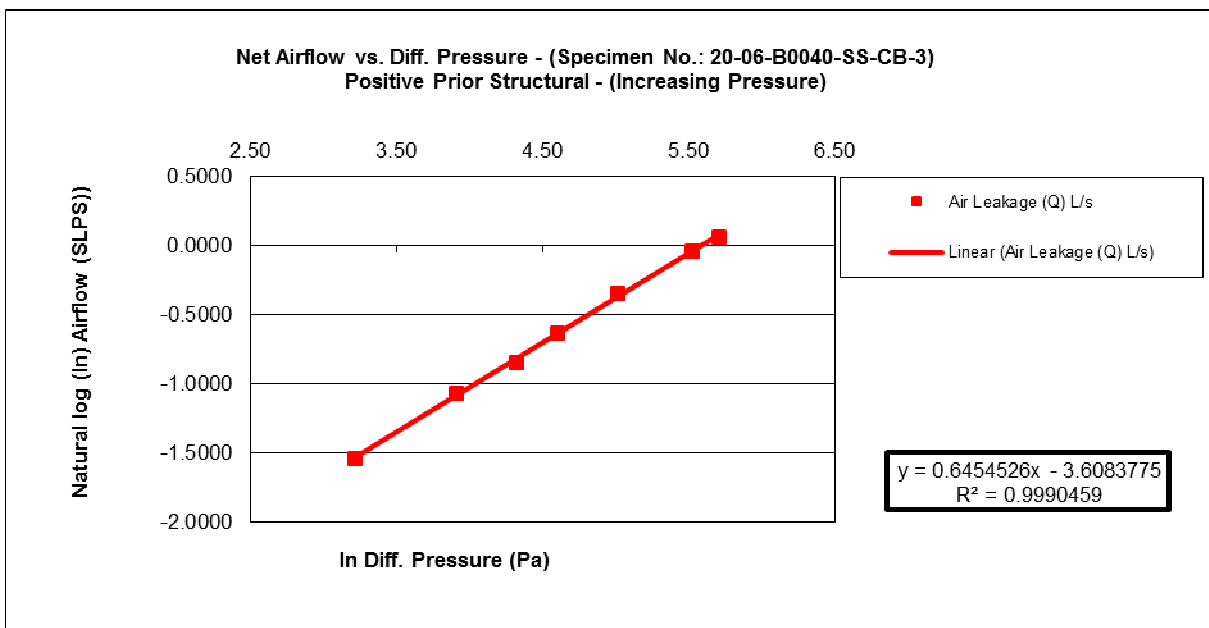


Figure C2 – Element Specimen 20-06-B0040-SS-PT-2 Infiltration Log/Log Graph Prior to Wind Conditioning

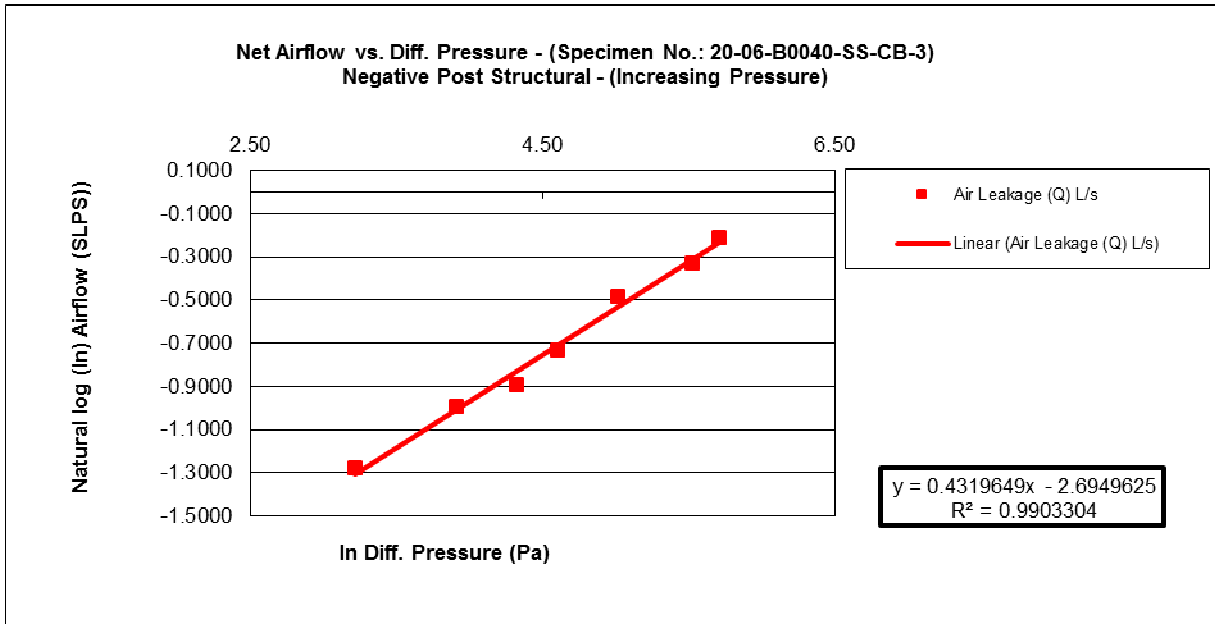


Figure C3 – Element Specimen 20-06-B0040-SS-PT-2 Exfiltration Log/Log Graph Post Wind Conditioning

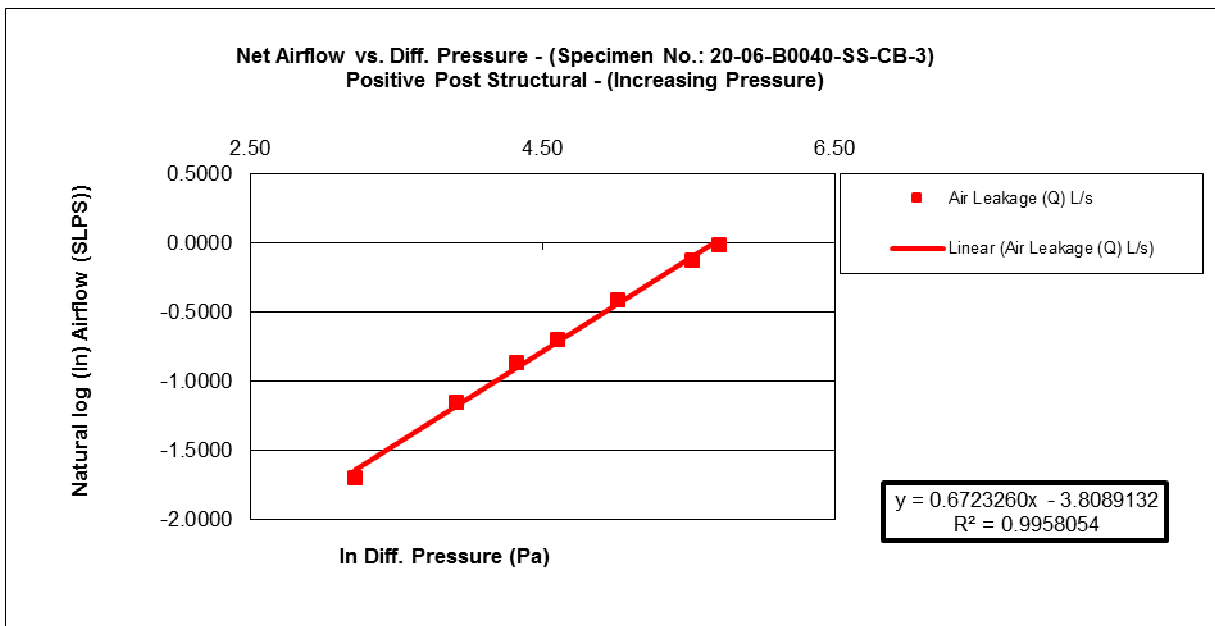


Figure C4 – Element Specimen 20-06-B0040-SS-PT-2 Infiltration Log/Log Graph Post Wind Conditioning

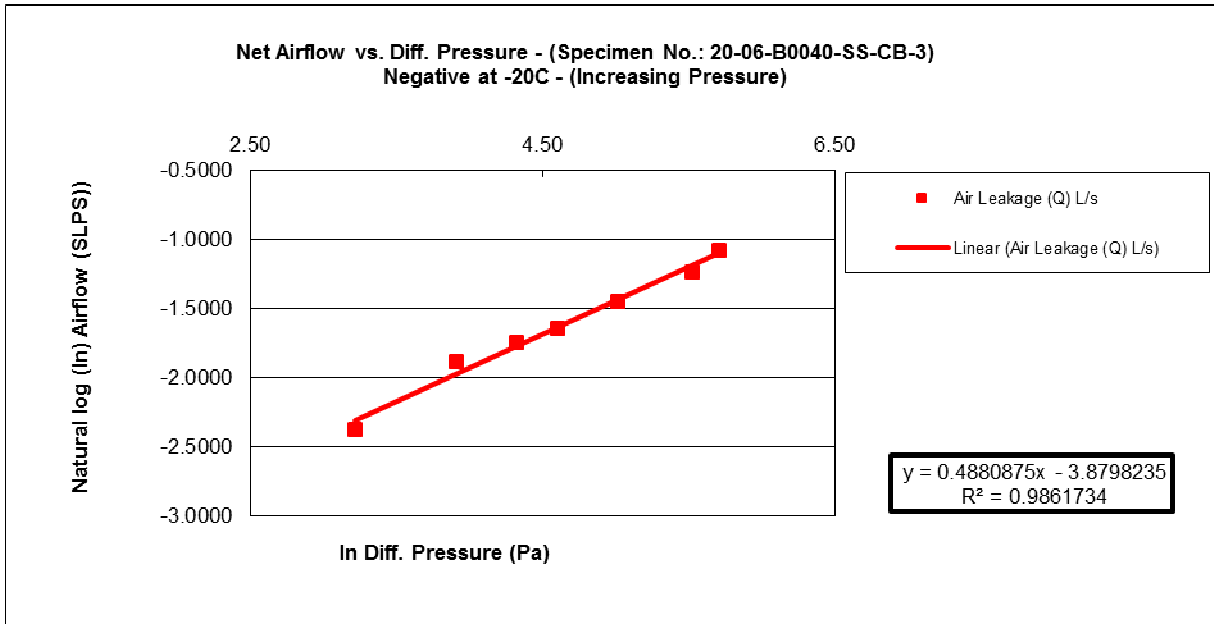


Figure C5 – Element Specimen 20-06-B0040-SS-PT-2 Exfiltration Log/Log Graph Post Wind Conditioning (-20°C)

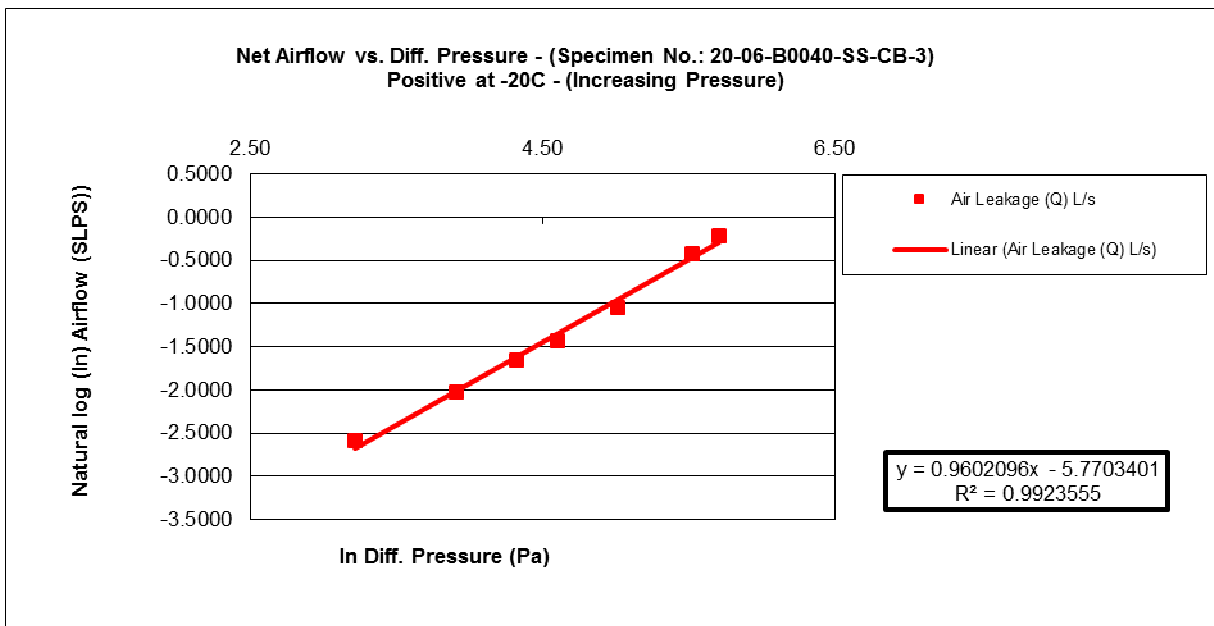


Figure C6 – Element Specimen 20-06-B0040-SS-PT-2 Infiltration Log/Log Graph Post Wind Conditioning (-20°C)

**APPENDIX D**

Logarithmic Air Leakage Graphs  
Element Specimen No.: 20-06-B0040-CMU-OP-4  
(Opaque Wall Section)

(3 Pages)

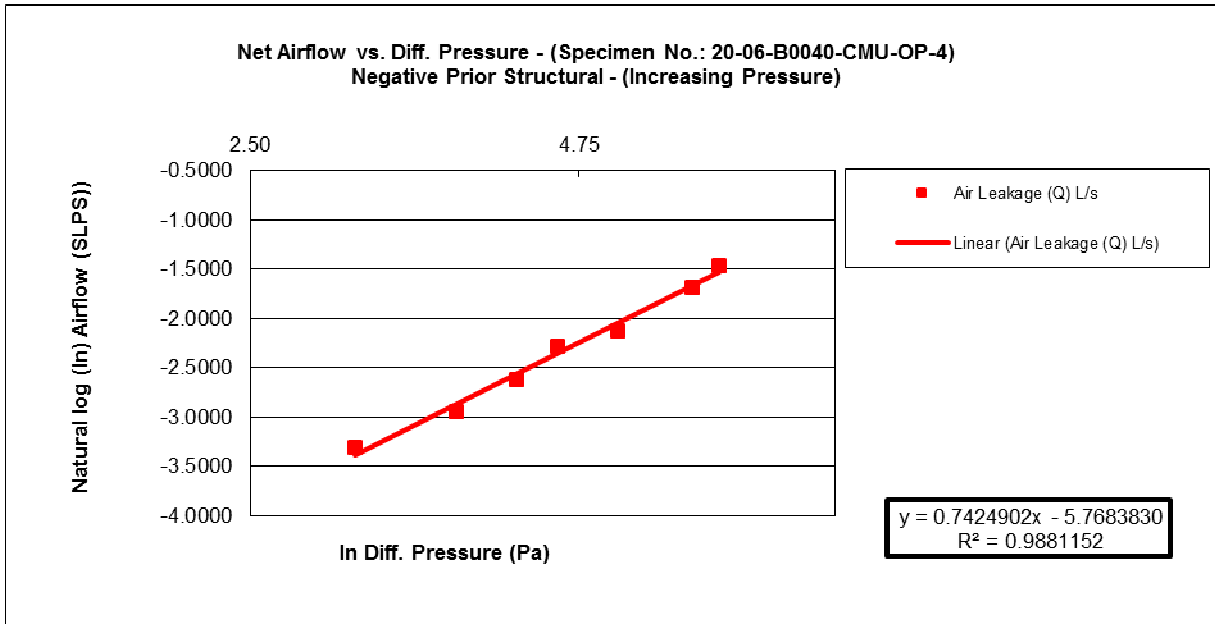


Figure D1 – Element Specimen 20-06-B0040-CMU-OP-4 Exfiltration Log/Log Graph Prior to Wind Conditioning

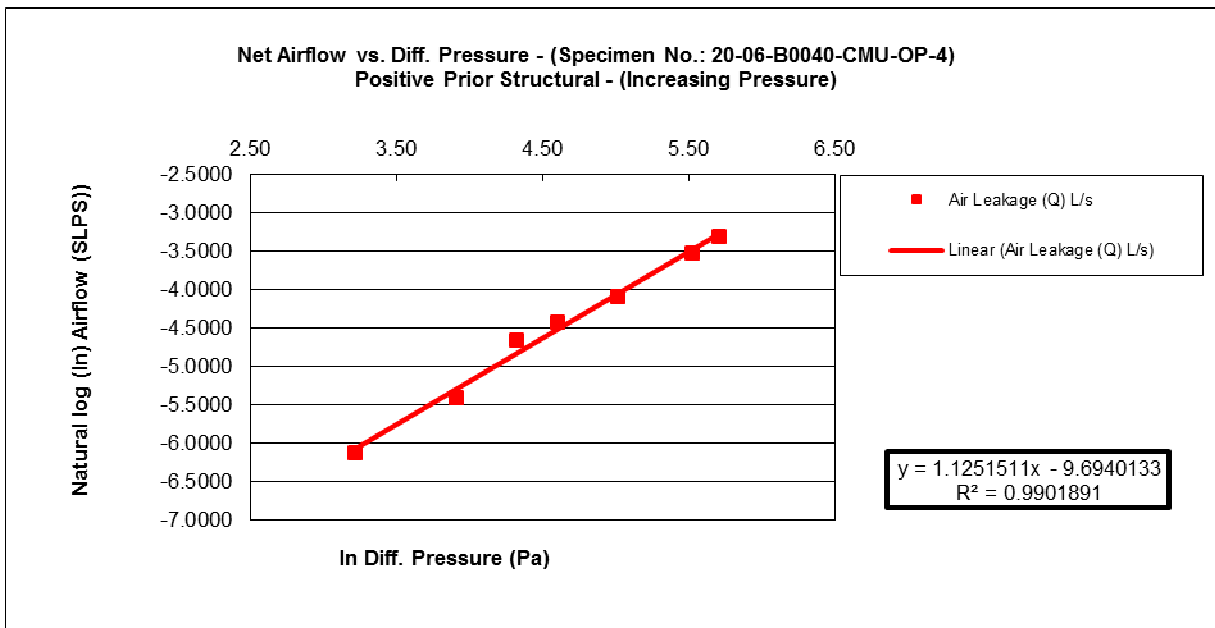


Figure D2 – Element Specimen 20-06-B0040-CMU-OP-4 Infiltration Log/Log Graph Prior to Wind Conditioning

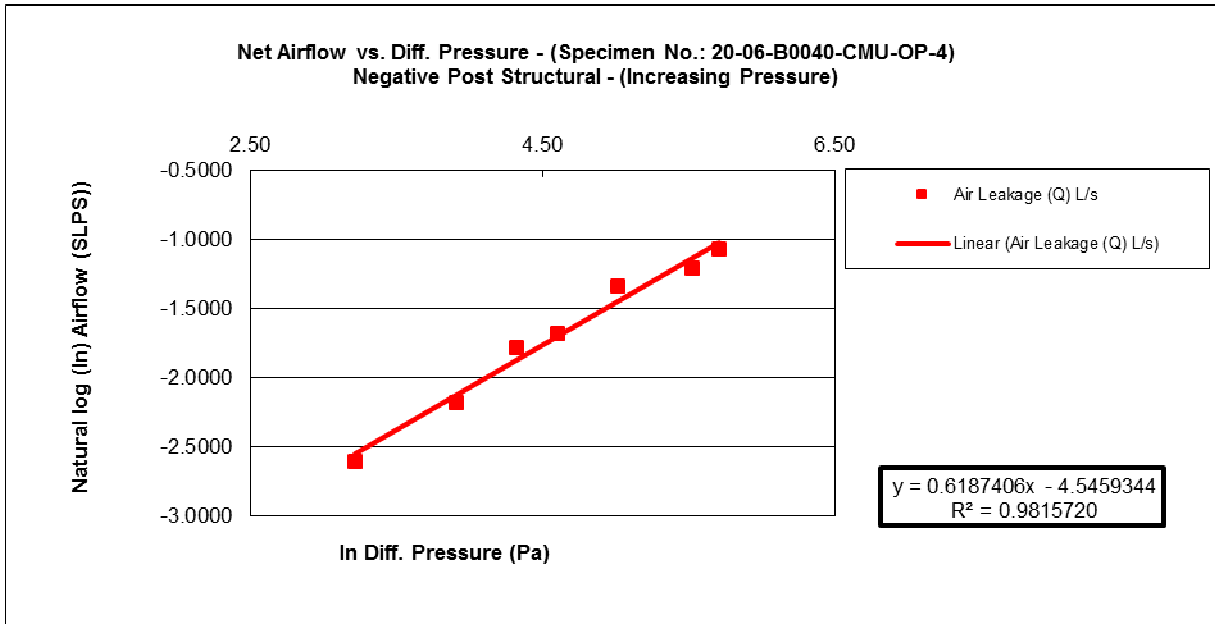


Figure D3 – Element Specimen 20-06-B0040-CMU-OP-4 Exfiltration Log/Log Graph Post Wind Conditioning

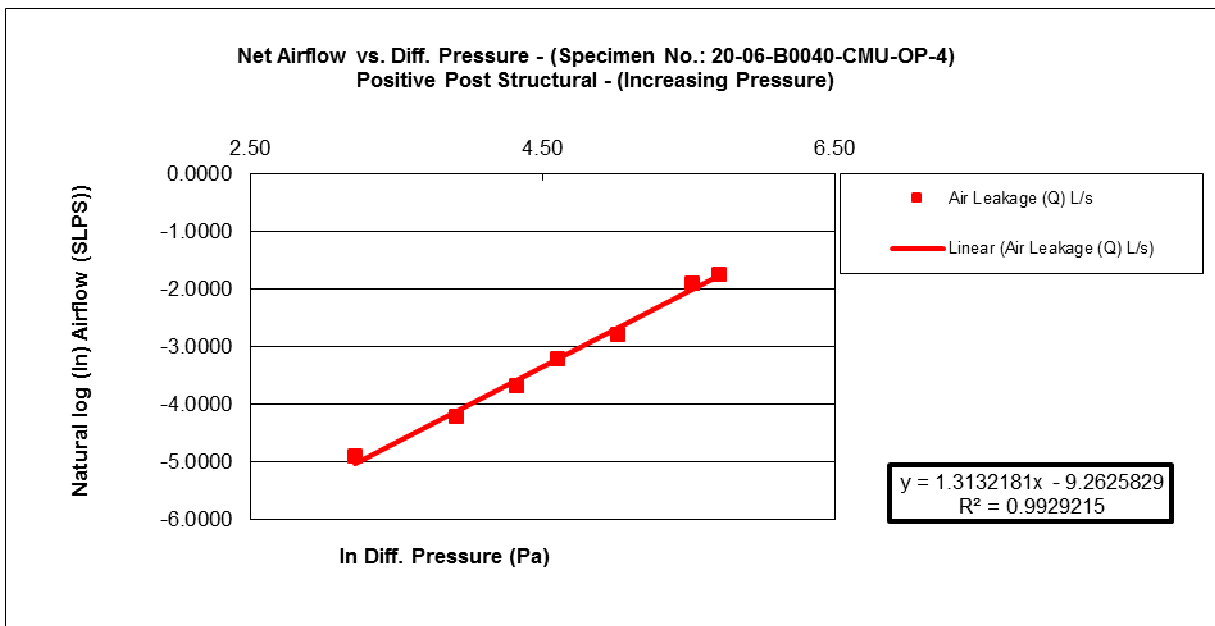


Figure D4 – Element Specimen 20-06-B0040-CMU-OP-4 Infiltration Log/Log Graph Post Wind Conditioning

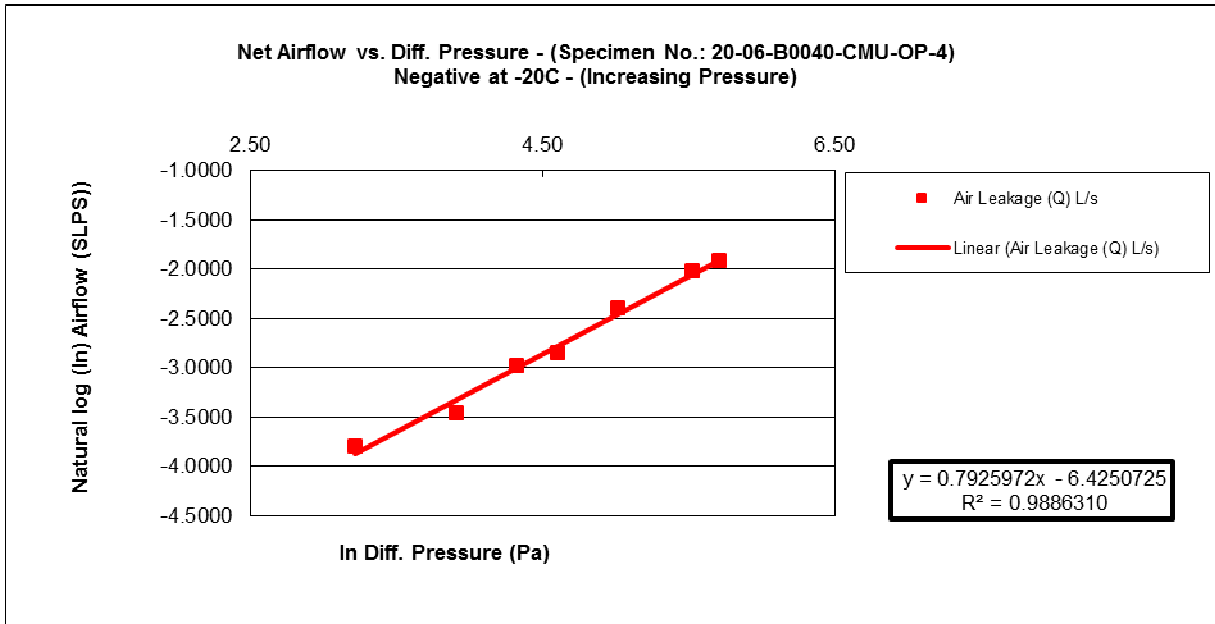


Figure D5 – Element Specimen 20-06-B0040-CMU-OP-4 Exfiltration Log/Log Graph Post Wind Conditioning (-20°C)

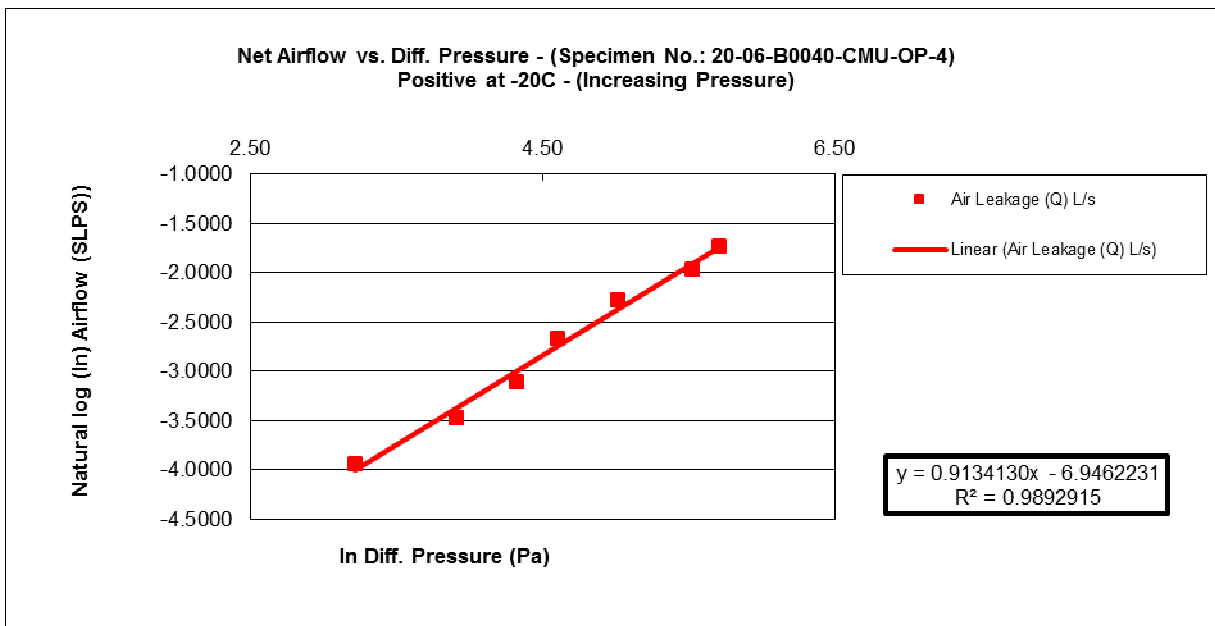


Figure D6 – Element Specimen 20-06-B0040-CMU-OP-4 Infiltration Log/Log Graph Post Wind Conditioning (-20°C)

**APPENDIX E**

Logarithmic Air Leakage Graphs  
Element Specimen No.: 20-06-B0040-CMU-PT-5  
(Opaque Wall Section)

(3 Pages)



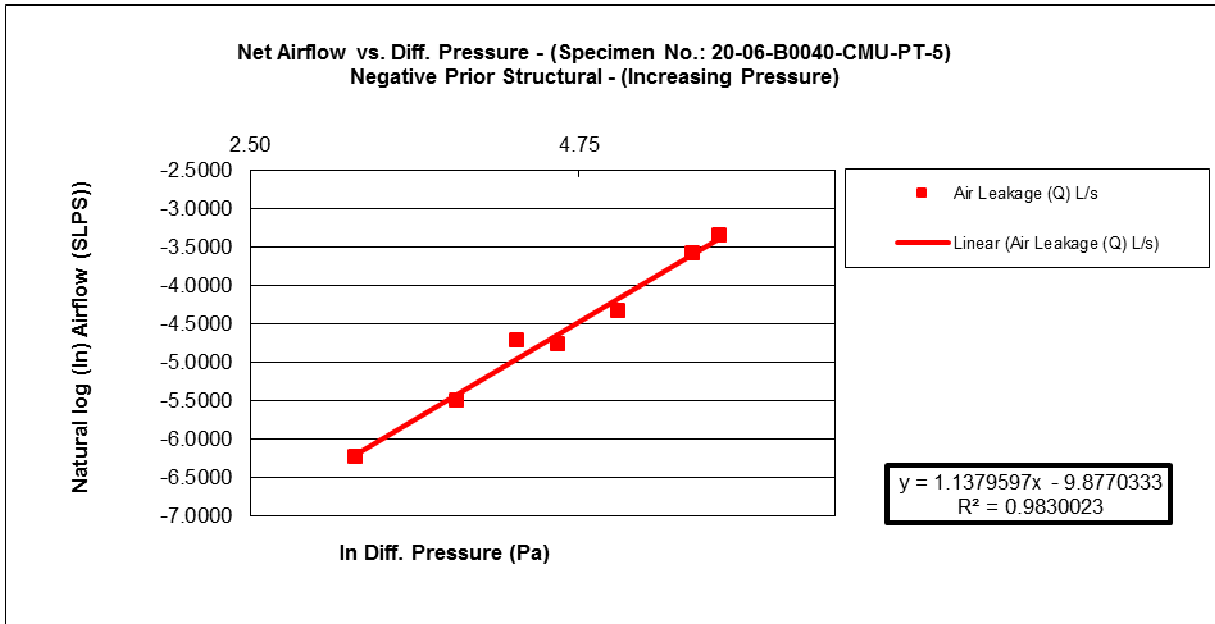


Figure E1 – Element Specimen 20-06-B0040-CMU-PT-5 Exfiltration Log/Log Graph Prior to Wind Conditioning

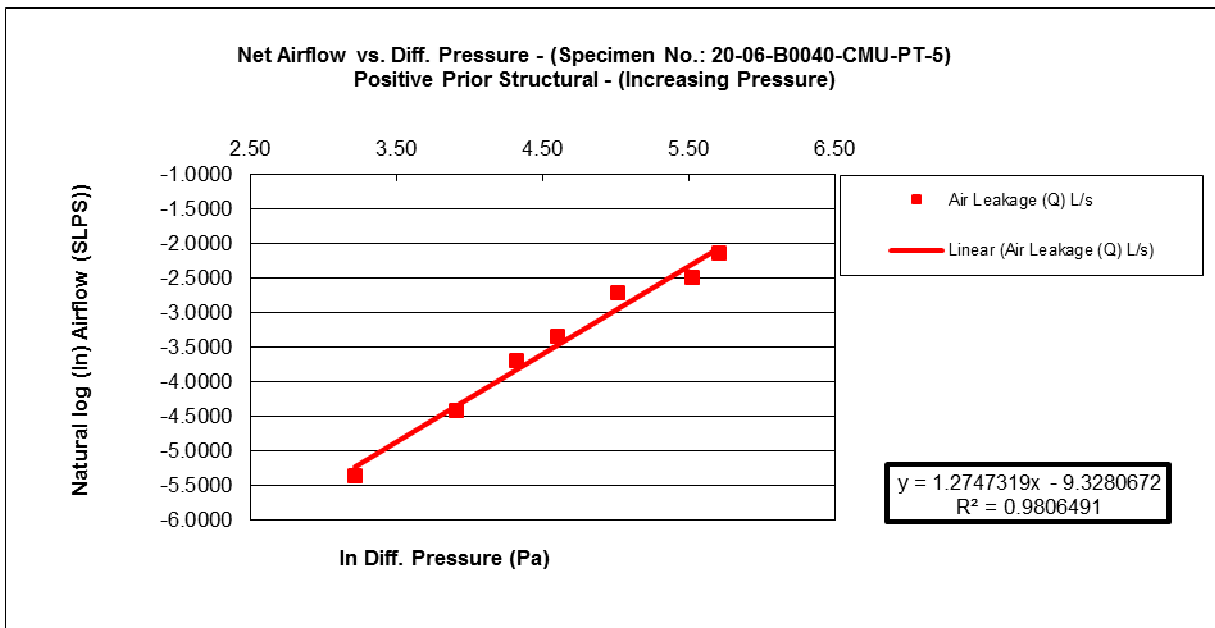


Figure E2 – Element Specimen 20-06-B0040-CMU-PT-5 Infiltration Log/Log Graph Prior to Wind Conditioning

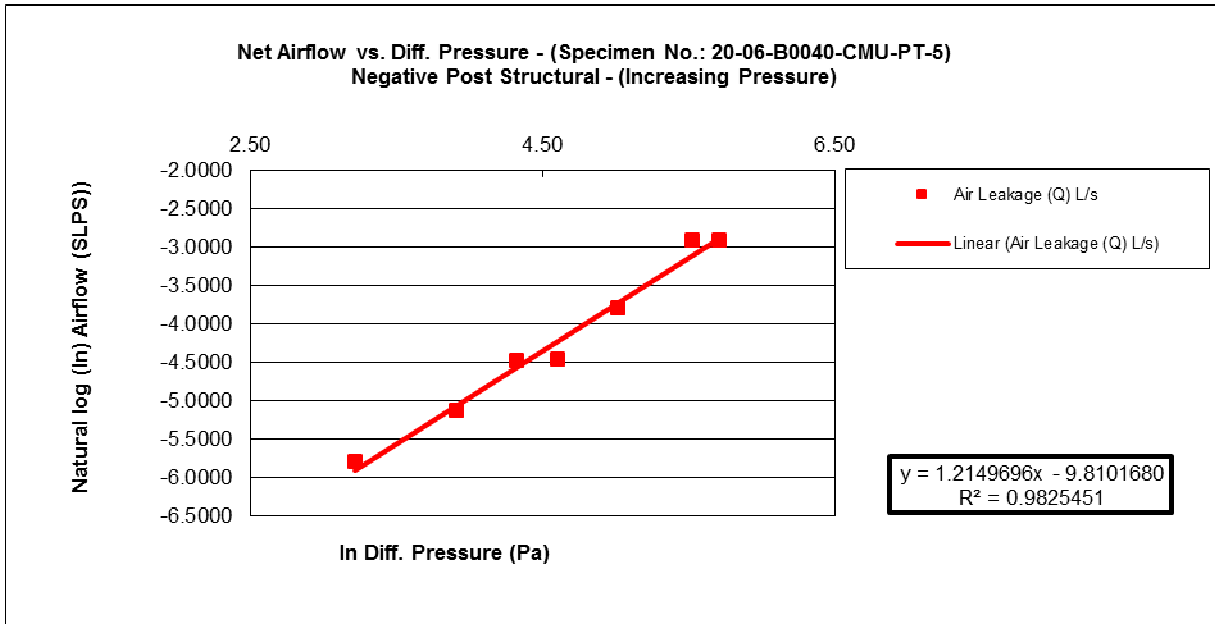


Figure E3 – Element Specimen 20-06-B0040-CMU-PT-5 Exfiltration Log/Log Graph Post Wind Conditioning

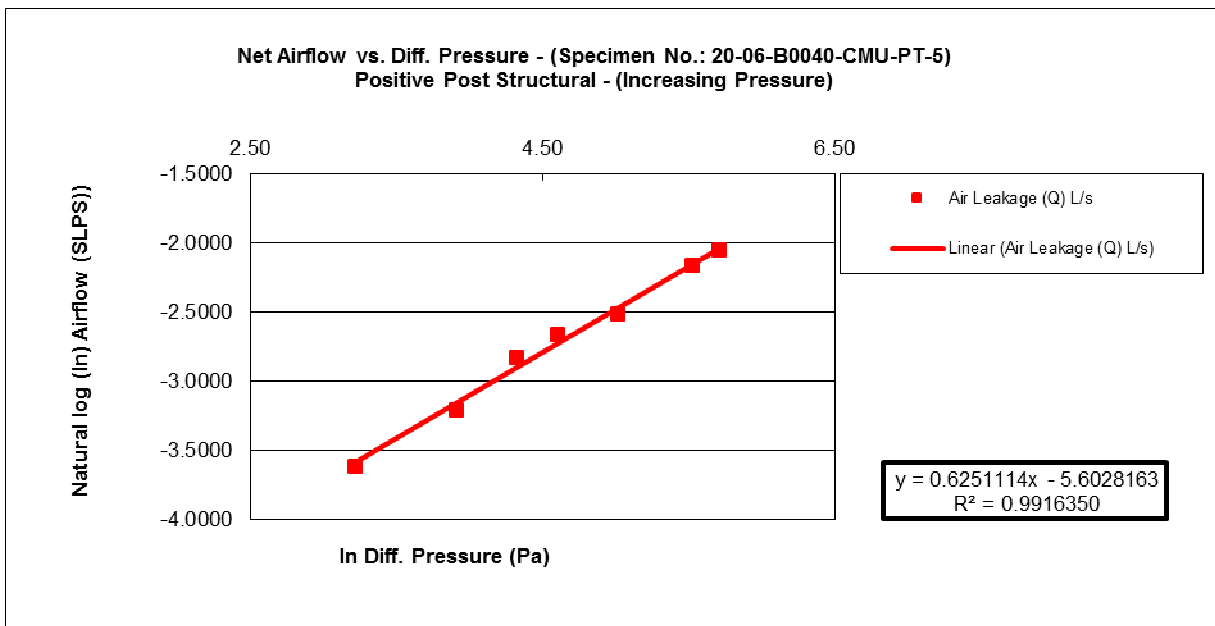


Figure E4 – Element Specimen 20-06-B0040-CMU-PT-5 Infiltration Log/Log Graph Post Wind Conditioning

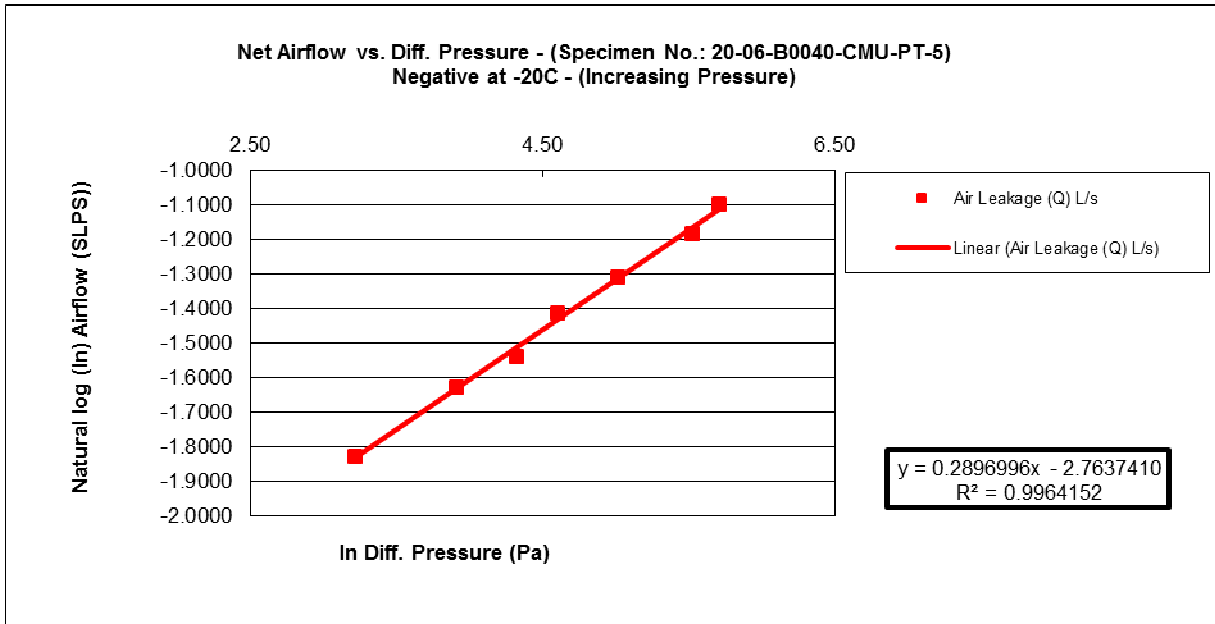


Figure E5 – Element Specimen 20-06-B0040-CMU-PT-5 Exfiltration Log/Log Graph Post Wind Conditioning (-20°C)

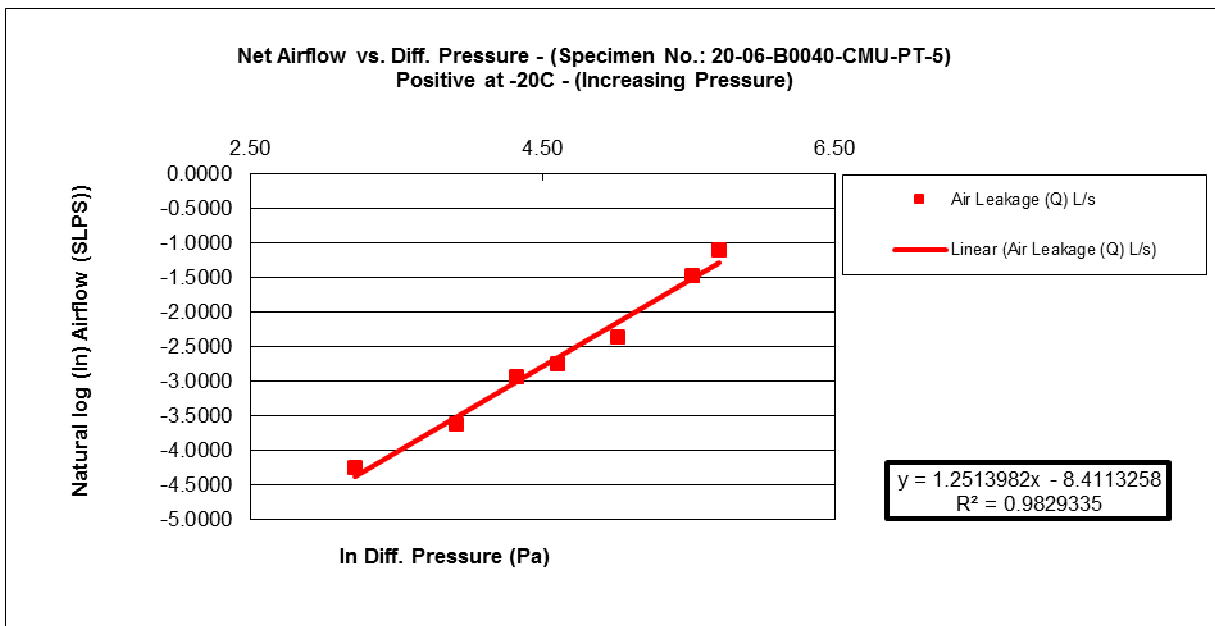


Figure E6 – Element Specimen 20-06-B0040-CMU-PT-5 Infiltration Log/Log Graph Post Wind Conditioning (-20°C)

**APPENDIX F**

Logarithmic Air Leakage Graphs  
Element Specimen No.: 20-06-B0040-CMU-CB-6  
(Opaque Wall Section)

(3 Pages)

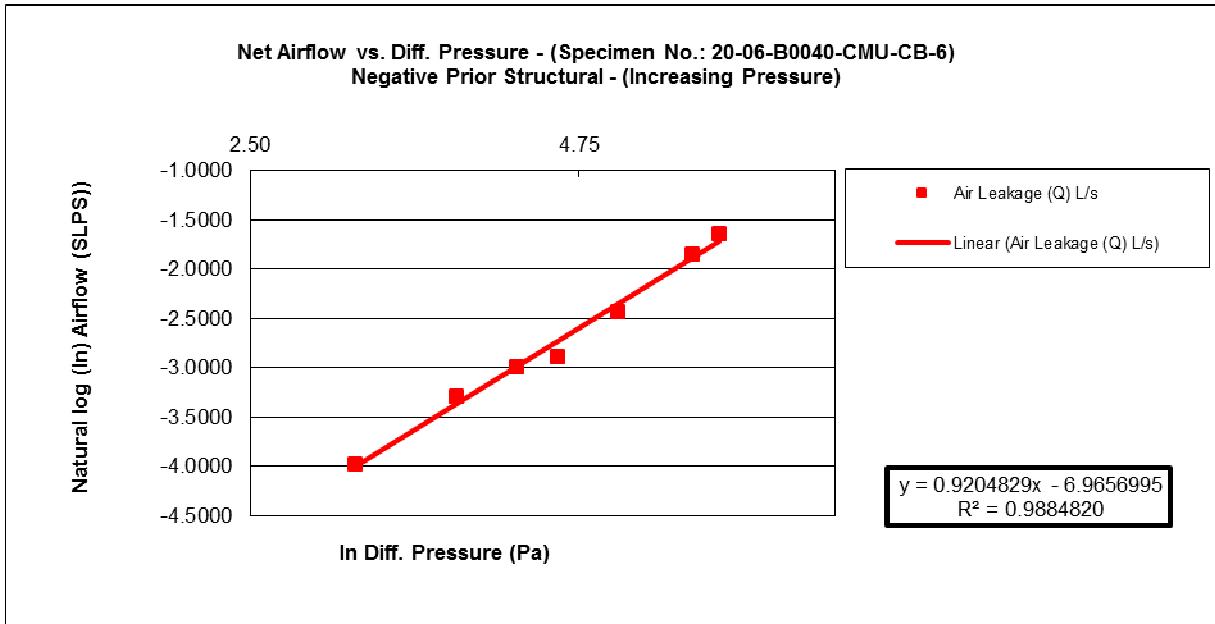


Figure F1 – Element Specimen 20-06-B0040-CMU-CB-6 Exfiltration Log/Log Graph Prior to Wind Conditioning

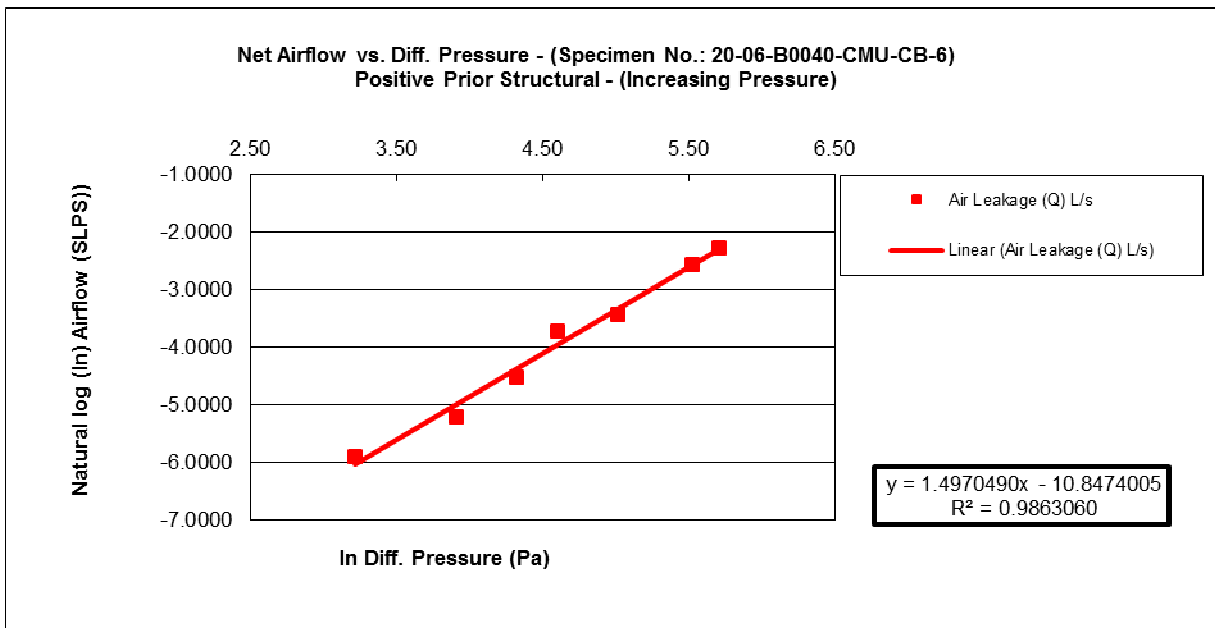


Figure F2 – Element Specimen 20-06-B0040-CMU-CB-6 Infiltration Log/Log Graph Prior to Wind Conditioning

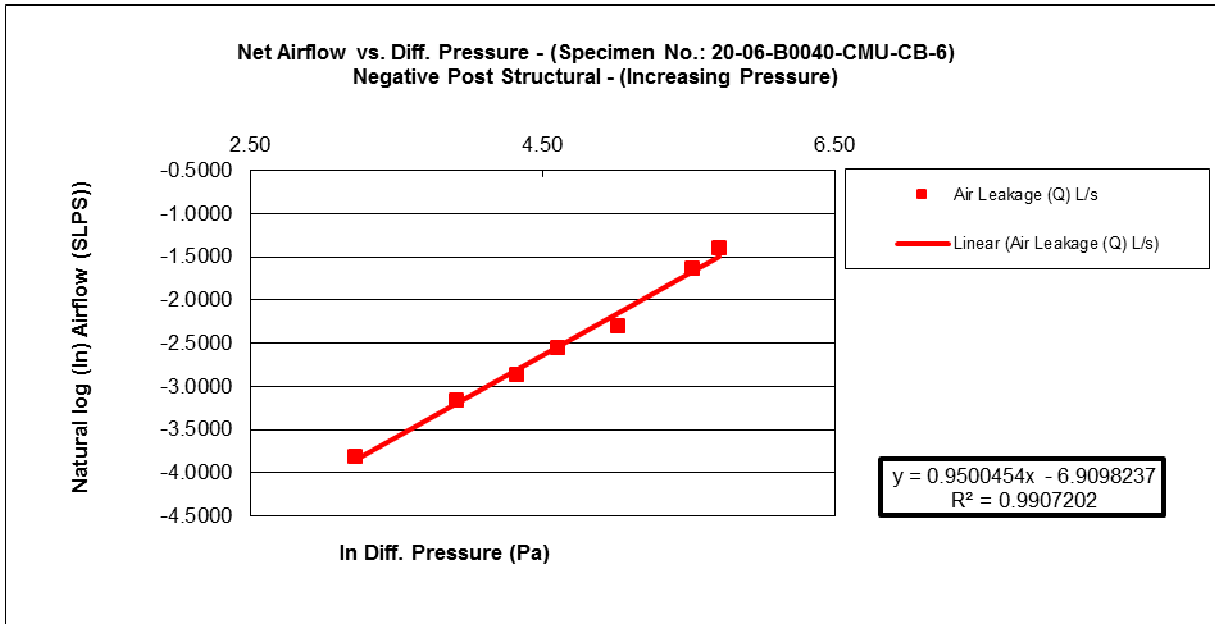


Figure F3 – Element Specimen 20-06-B0040-CMU-CB-6 Exfiltration Log/Log Graph Post Wind Conditioning

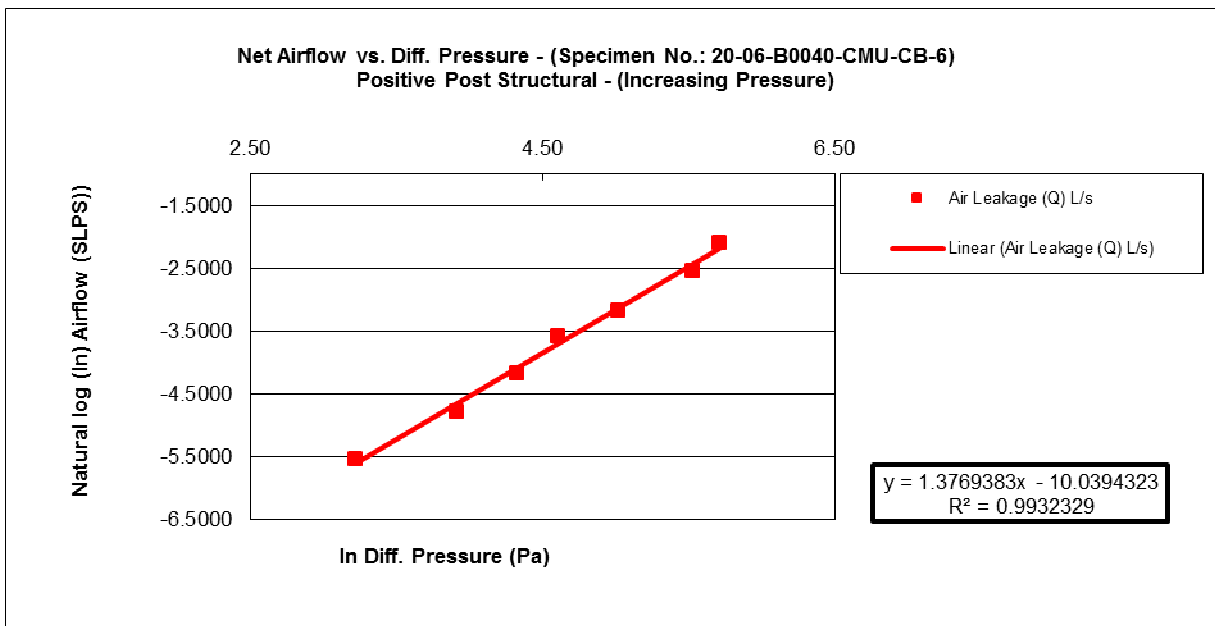


Figure F4 – Element Specimen 20-06-B0040-CMU-CB-6 Infiltration Log/Log Graph Post Wind Conditioning

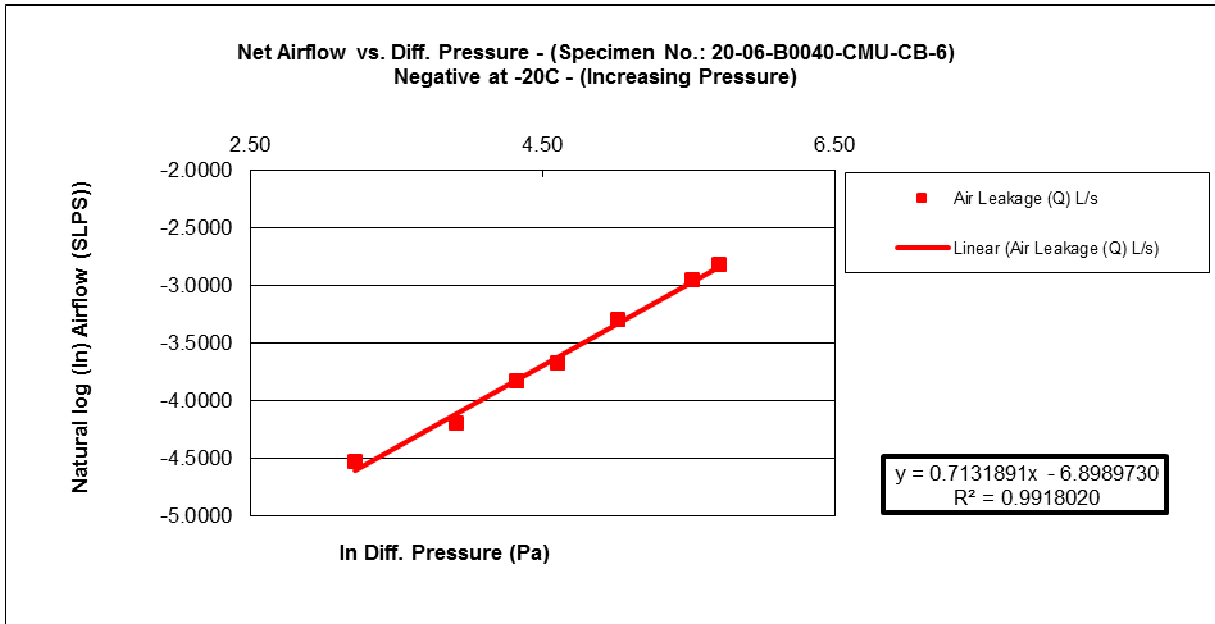


Figure F5 – Element Specimen 20-06-B0040-CMU-CB-6 Exfiltration Log/Log Graph Post Wind Conditioning (-20°C)

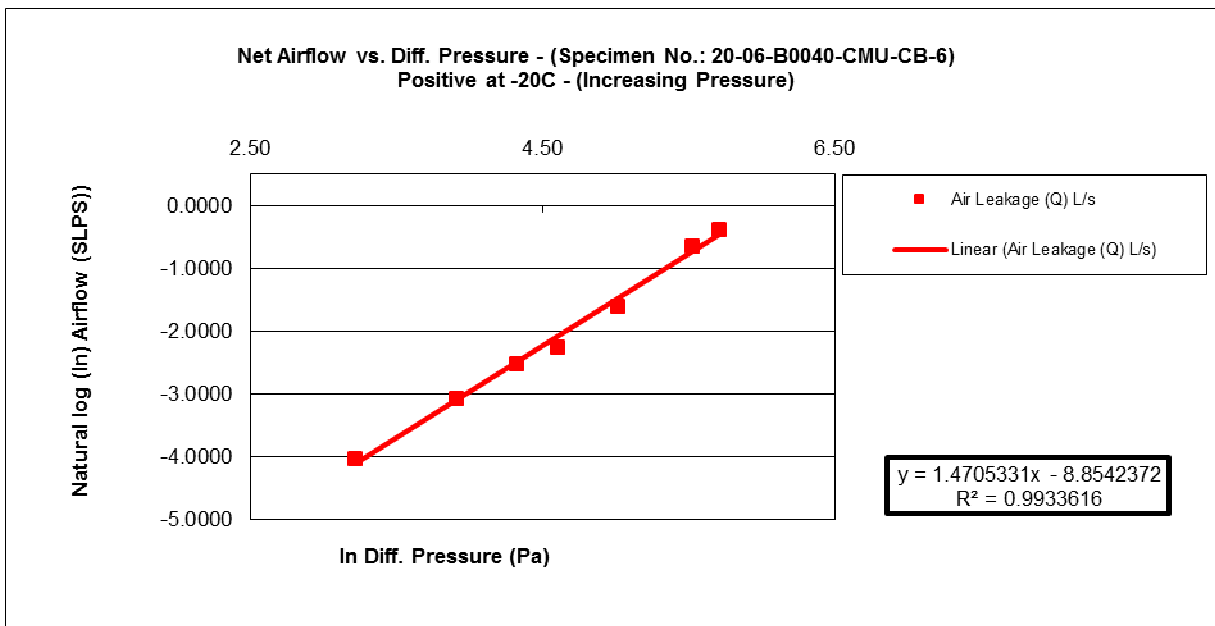


Figure F6 – Element Specimen 20-06-B0040-CMU-CB-6 Infiltration Log/Log Graph Post Wind Conditioning (-20°C)

**APPENDIX G**

Application Photographs

Element Specimen No.:20-06-B0040-SS-OP-1  
(Steel Stud with Exterior Gypsum – Opaque Wall Section)

(2 Pages)





Photo G1 – Opaque steel stud wall section prior to product application



Photo G2 – Air barrier applied onto sheathed wall

## **APPENDIX H**

### Application Photographs

Element Specimen No.: 20-06-B0040-SS-PT-2  
(Steel Stud with Exterior Gypsum – Penetrations Wall Section)

(4 Pages)





Photo H1 – Penetrations wall section; wall perimeter and window rough open prepared with membrane and penetrations sealed with sealant prior to product application

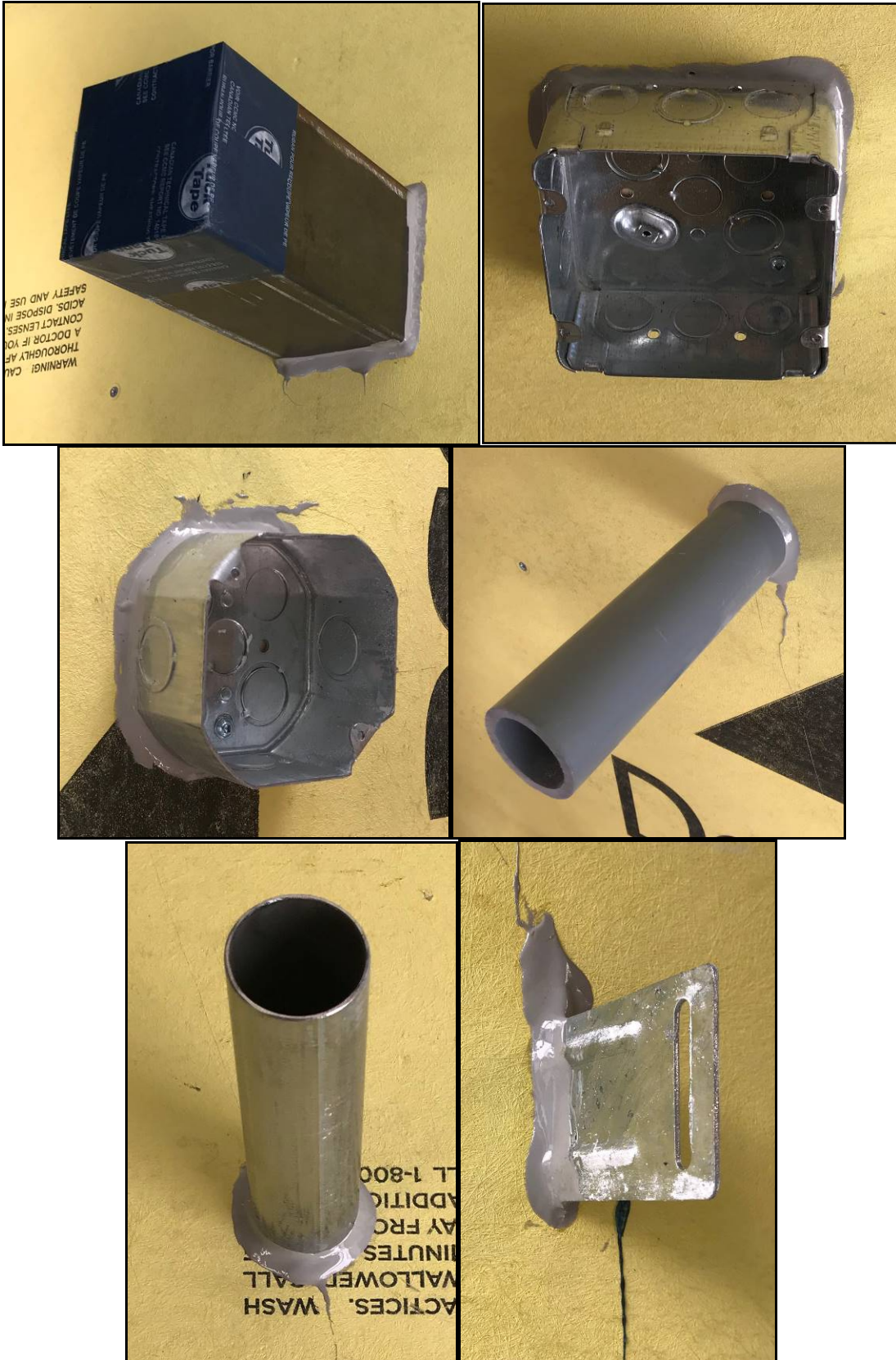


Photo H2 – Penetrations sealed with sealant





Photo H3 – Air barrier sprayed around wall perimeter and window perimeter





Photo H3 – Air barrier applied onto sheathed wall

**APPENDIX I**

Application Photographs

Element Specimen No.:20-06-B0040-SS-CB-3  
(Steel Stud with Exterior Gypsum – Opaque Foundation Interface Wall Section)

(2 Pages)



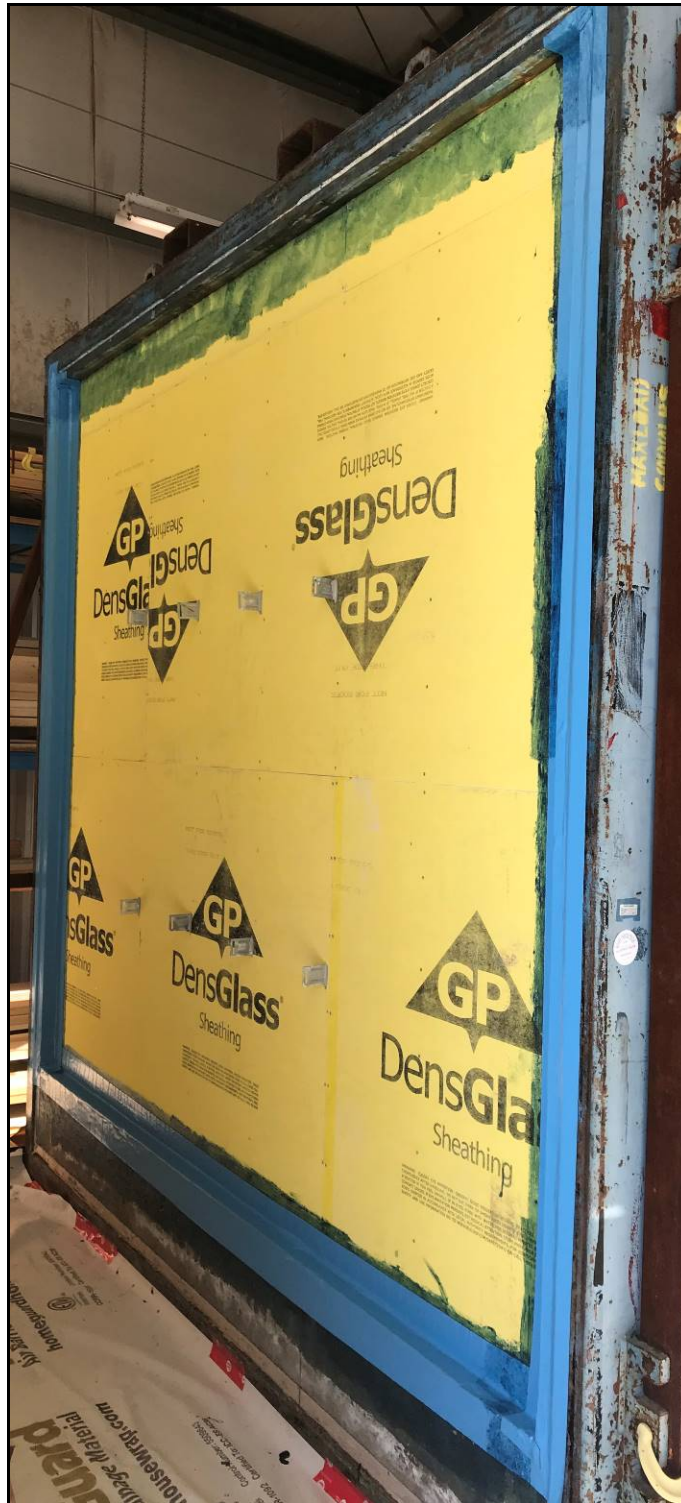


Photo I1 – Opaque steel stud with foundation interface wall section; wall perimeter prepared with membrane and brick ties sealed with sealant prior to product application



Photo I2 – Air barrier applied onto CMU wall (typical wall and not actual representation)

**APPENDIX J**

Application Photographs

Element Specimen No.: 20-06-B0040-CMU-OP-4  
(Masonry Block – Opaque Wall Section)

(2 Pages)





Photo J1 – Opaque CMU wall section prior to product application



Photo J2 – Air barrier applied onto CMU wall

**APPENDIX K**

Application Photographs

Element Specimen No.: 20-06-B0040-CMU-PT-5  
(Masonry Block – Penetration Wall Section)

(4 Pages)





Photo K1 – Opaque CMU wall section prior to product application

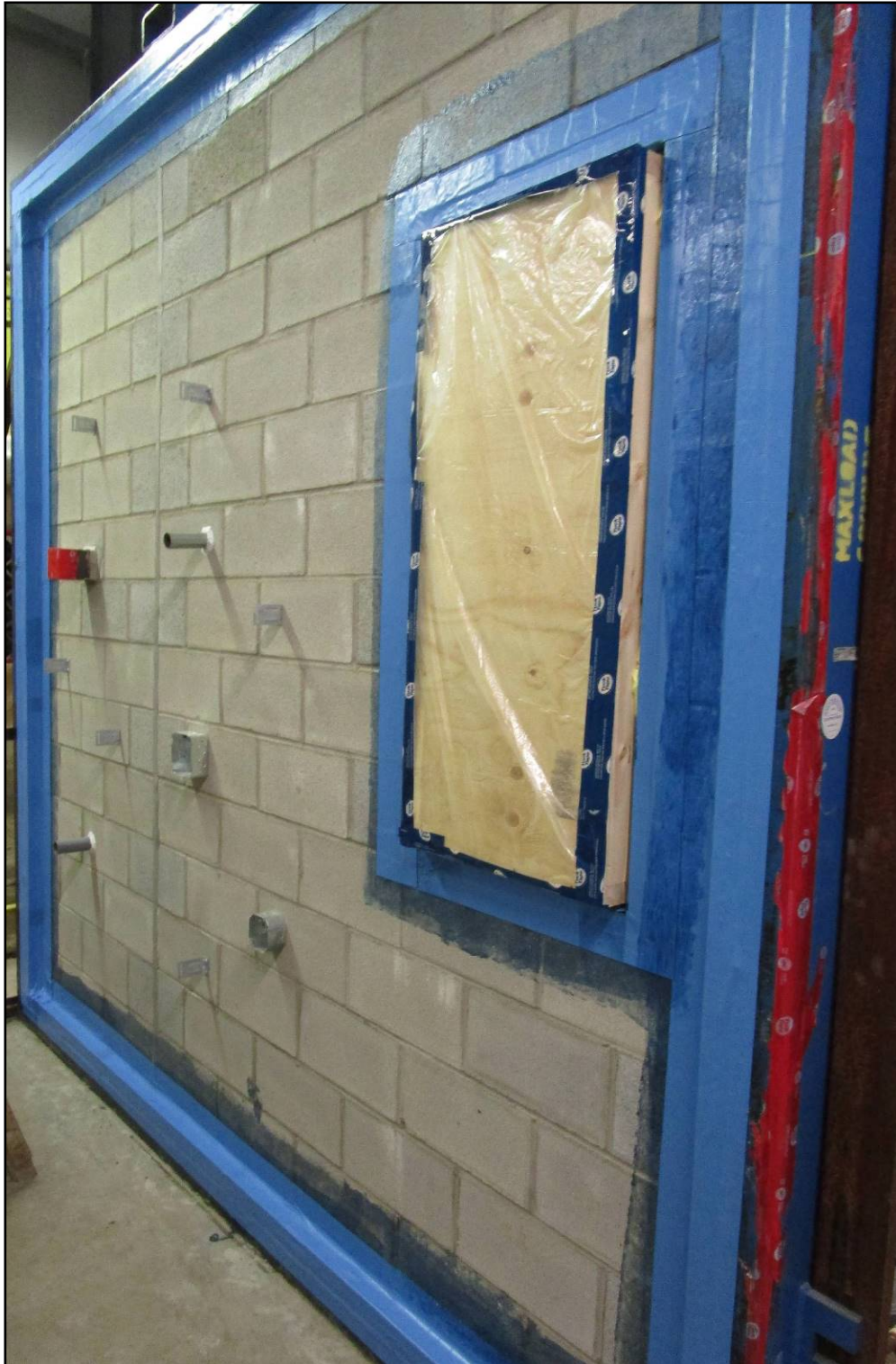


Photo K2 – Penetrations wall section; wall perimeter and window rough open prepared with membrane and penetrations sealed with sealant prior to product application





Photo K3 – Penetrations sealed with sealant



Photo K4 – Air barrier applied onto CMU wall

**APPENDIX L**

Application Photographs

Element Specimen No.: 20-06-B0040-CMU-CB-6  
(Masonry Block – Opaque Foundation Interface Wall Section)

(2 Pages)





Photo L1 – Penetrations wall section; wall perimeter and foundation interface prepared with membrane and prior to product application

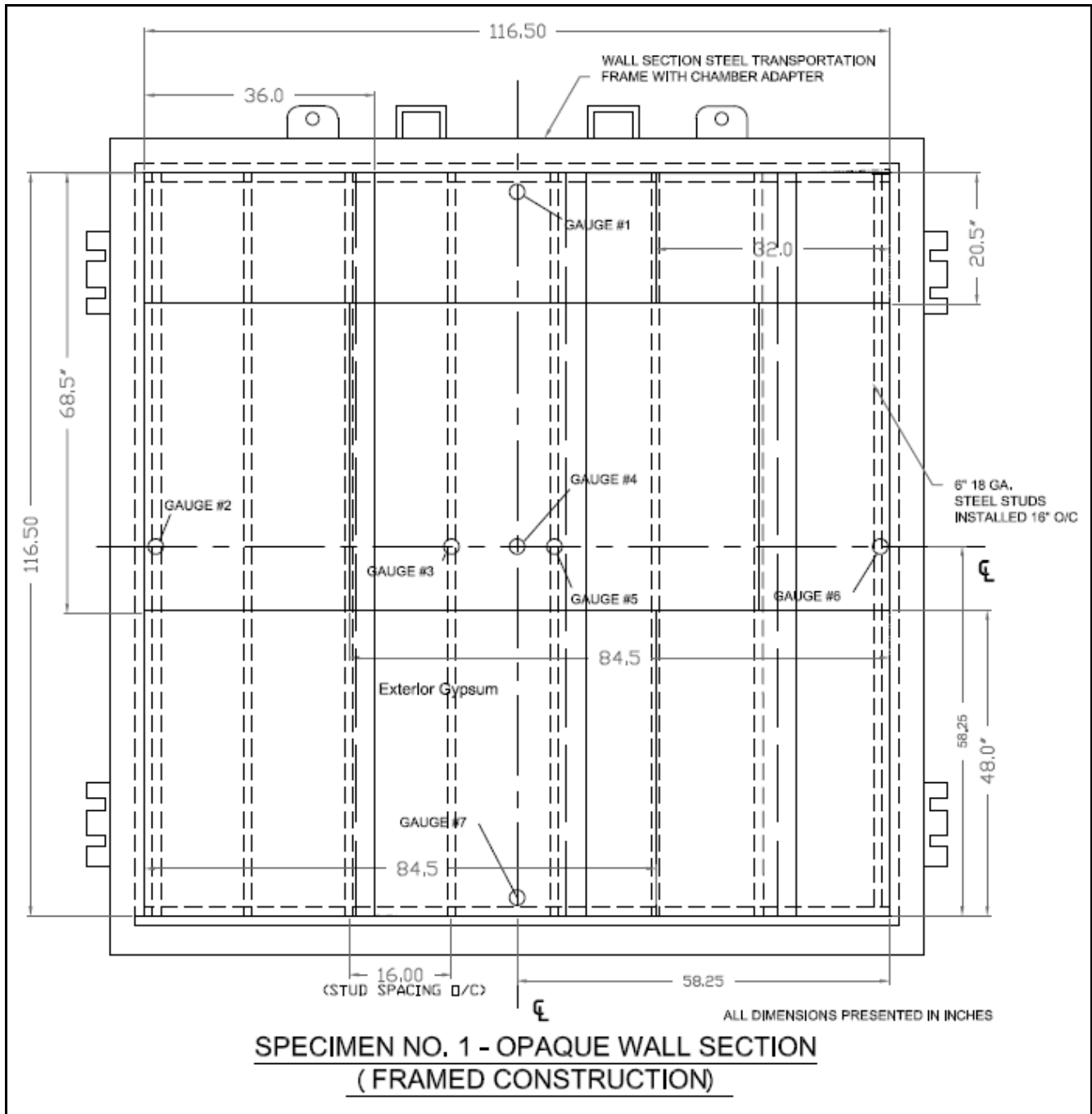


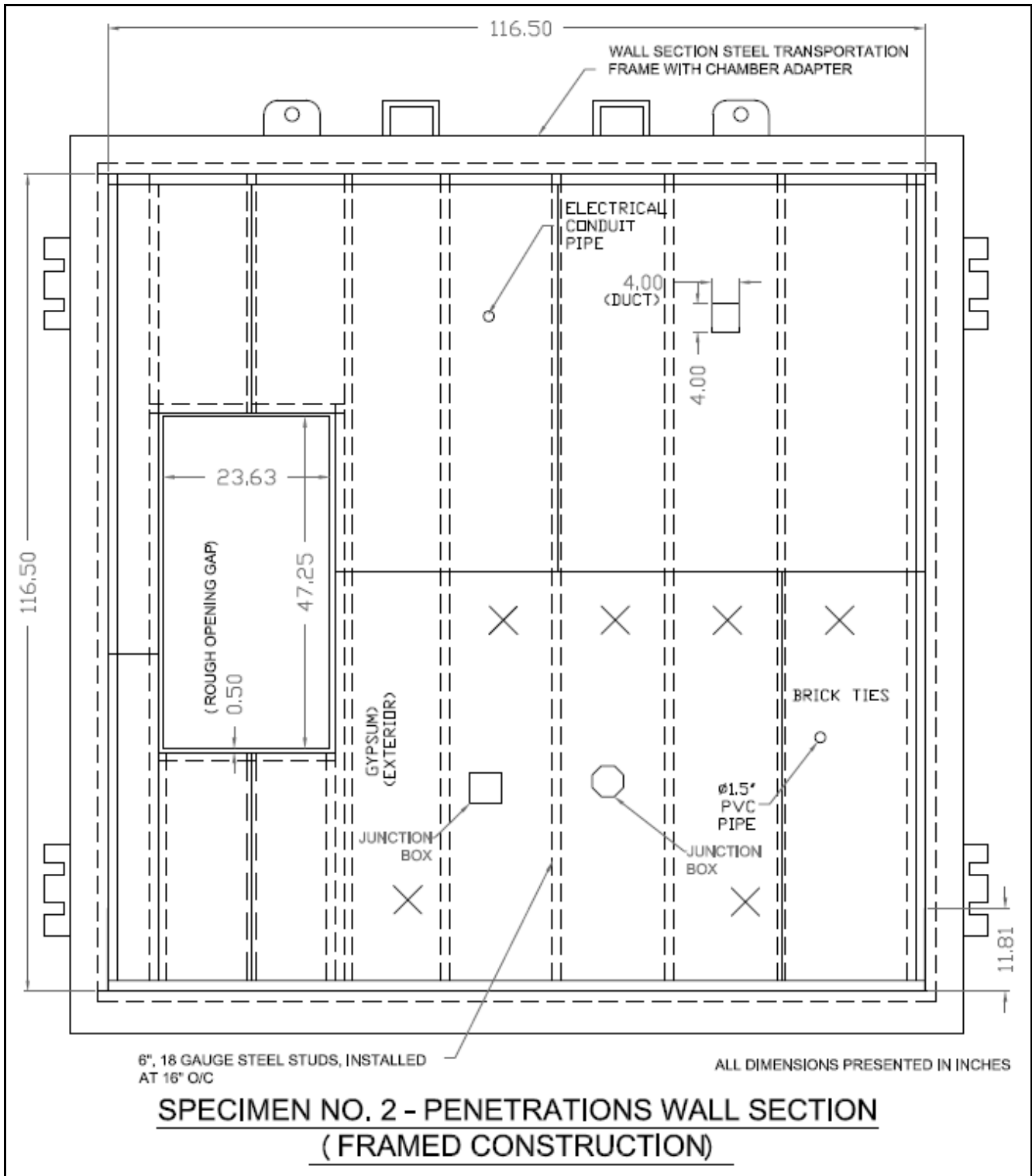
Photo L2 – Air barrier applied onto CMU wall

**APPENDIX M**

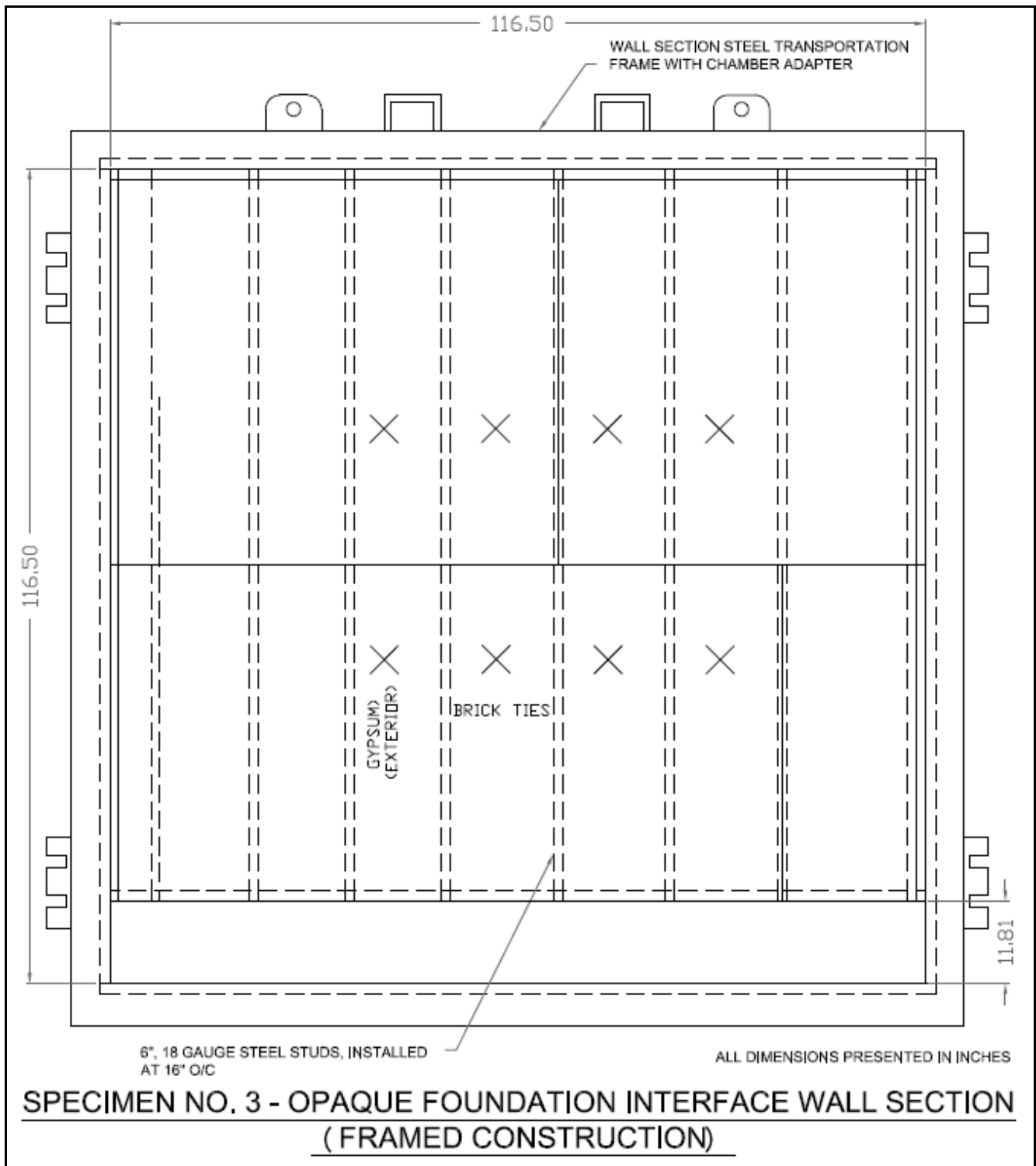
General Wall Construction Detail Drawings  
(Exterior Gypsum Sheathing Wall Specimens)

(3 Pages)









**APPENDIX N**

General Wall Construction Detail Drawings  
(Masonry Block Wall Specimens)

(3 Pages)

