CCMC CANADIAN CODE COMPLIANCE EVALUATION

CCMC EVALUATION

CCMC 14096-R

CCMC Canadian code compliance evaluation

CCMC number:	14096-R
Status:	Active
Issue date:	2018-04-26
Modified date:	2023-11-08
Evaluation holder:	**Elastochem Specialty Chemicals Inc.** 37 Easton Road Brantford ON N3P 1J4 Canada Website: www.elastochem-ca.com Telephone: 519-754-1678 Email: info@elastochem-ca.com
Product name:	Wrapsulate® Foam Jacket Air Barrier System
Compliance:	NBC 2015
Criteria:	CCMC-TG-072709.01-15B, "CCMC Technical Guide for Air Barrier Systems for Exterior Walls of Buildings"

In most jurisdictions this document is sufficient evidence for approval by Canadian authorities.
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Compliance opinion

It is the opinion of the Canadian Construction Materials Centre that the evaluated product, when used as an air barrier system for exterior walls of buildings in accordance with the conditions and limitations stated in this evaluation, complies with the following code:

National Building Code of Canada 2015

Code provision	Solution type
5.1.4.1. Structural and Environmental Loads	Acceptable
5.1.4.2. Resistance to Deterioration	Acceptable
5.2.2. Structural Loads and Design Procedures	Acceptable
5.4.1. Air Barrier Systems	Acceptable
9.25.3.1. Required Barrier to Air Leakage	Acceptable
9.25.3.2.(1) Air barrier systems shall possess the ch ...	Acceptable
9.25.3.2.(2) Where polyethylene sheet is used to prov ...	Alternative
9.25.3.3. Continuity of the Air Barrier System	Acceptable
9.27.4.2.(2)(b) Materials (ASTM C 920, “Elastomeric Joint Sealants”)	Acceptable
9.36.2.9.(1)(b) Airtightness (exterior walls only)	Acceptable

The above opinion(s) is/are based on the evaluation by the CCMC of technical evidence provided by the evaluation holder, and is bound by the stated conditions and limitations. For the benefit of the user, a summary of the technical information that forms the basis of this evaluation has been included.

Product information

Product name

Wrapsulate® Foam Jacket Air Barrier System

Product description

This Evaluation Report addresses the performance of the product as an air barrier system as specified by Elastochem Specialty Chemicals.

The product consists of the following components and accessories:

- Principal material in the plane of airtightness: Wrapsulate® Foam Jacket light density, semi-flexible, spray-applied polyurethane foam, with a primarily open cell structure installed on the exterior of the building;
- Accessories for continuity:
  - Blueskin SA, a modified bituminous membrane (i.e., peel-and-stick or thermally fused) manufactured by Henry® Company for use as a transition membrane over construction, control and expansion joints, at junctions between different assemblies and at penetrations;
  - 925 BES flexible polymeric moisture-cured sealant, manufactured by Henry® Company; and
- Component for wind load resistance: substrate such as concrete masonry block units (CMU) and exterior gypsum sheathing within a wall designed to withstand the anticipated loads.

If installed as part of the designated air barrier system, Wrapsulate® Foam Jacket light density, semi-flexible spray-applied polyurethane foam, with a primarily open cell structure, serves a dual function in the wall assembly:

- as the principal plane of airtightness of the designated air barrier system
- as exterior insulation; and
- as an exterior sheathing membrane.

The use of the product as insulation is covered under CCMC 14049-R and 14067-R.

The product consists of Wrapsulate® Foam Jacket Part A isocyanate and Wrapsulate® Foam Jacket Part B resin, which are mixed on site by a qualified installer using positive displacement equipment in a 1:1 fixed ratio.

The final cured product is yellow and has a density of 17 kg/m^3 (1.06 lb./$ft.^3$). At a thickness of 25.4 mm (1 in.), the thermal resistance is RSI 0.75 (m^2 ·°C/W) R-4.3 ($ft.^2$ ·°F·hr/BTU·in.).

Manufacturing plant

This evaluation is valid only for products produced at the following plant:

Product name	Manufacturing plant
	Brantford, ON, CA
Wrapsulate® Foam Jacket Air Barrier System	✓

✓ Indicates that the product from this manufacturing facility has been evaluated by the CCMC

Conditions and limitations

The CCMC's compliance opinion is bound by this product being used in accordance with the conditions and limitations set out below.

- The product, with a minimum 38 mm–50 mm thickness (1.5 in.–2 in.) of Wrapsulate® Foam Jacket spray urethane at a 17 kg/m^3 density, has demonstrated sufficiently low air permeance with an air leakage rating of A1 (less than 0.05 L/s·m^2·Pa at 75 Pa reference ΔP) when tested in accordance with CAN/ULC-S742-11, "Air Barrier Assemblies – Specification." This air leakage conforms to the permissible air leakage rate in the table "Results of testing the air leakage rate of the product" of this Report for as the outermost layer of the exterior wall assembly. The WVP of this product at a 50 mm thickness is approximately 745 ng/(Pa·s·m^2).
- The product has demonstrated sufficient strength to resist wind loads so it can be used in low-rise buildings in geographical locations where:
  - the wind pressure Q_{50} at ± 650 Pa (1-in-50-year wind pressure return period found in Appendix C of the NBC 2015), for a maximum building height of 12 m above grade (i.e., 4–5 storeys);
  - the CAN/ULC S742 reporting classification is Class A1 for the assembly having been tested to Q_{50} at ± 650 Pa for a 12 m high building and obtaining an air leakage rate less than 0.05 L/s·m^2·Pa (see criteria in table "Results of testing the air leakage rate of the product"); and
  - The maximum deflection recorded for the metal stud wall was 17.3 mm and for the CMU it was 10.3 mm for a gust wind load of ±1 440 Pa.
- To provide the air leakage control and strength in the field, the product must be installed conforming to the limits above and installed in the field by Urethane Foam Contractors (UFC)-certified installers/contractors according to the Wrapsulate® Air Barrier Insulation Specification, dated June 1, 2015, which contains detailed construction drawings that must be followed. UFC must conduct the necessary follow-up inspections to ensure that UFC-certified contractors are performing the necessary field quality control (for example, transition membrane application, membrane adhesion/pull testing before spraying, sealant application before spraying, spray foam as per CAN/ULC S705.2-05, "Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Application"). All results must be recorded on the UFC daily worksheet for the Wrapsulate® Foam Jacket Air Barrier System.
- A copy of the installation instructions must be available on the job site at all times during the installation for review by building officials. All installers must present their UFC identification card upon request by the building official.
- The product must be identified with the manufacturer's name or logo and the phrase "CCMC 14096-R."

Technical information

This evaluation is based on demonstrated conformance with the following criteria:

Criteria number	Criteria name
CCMC-TG-072709.01-15B	CCMC Technical Guide for Air Barrier Systems for Exterior Walls of Buildings

The Report Holder has submitted technical documentation for the CCMC's evaluation. Testing was conducted at laboratories recognized by the CCMC. The corresponding technical evidence for this product is summarized below.

Performance requirements

Testing of the product was conducted on four representative specimens. The results are summarized in the tables below. The performance resulting from these tests has been deemed applicable to Wrapsulate® Foam Jacket Air Barrier System based on equivalency testing.

The performance of the product has been tested in accordance with the CCMC Technical Guide for qualification for use as an air barrier system.

To qualify, a conforming air barrier system must:

i. have an acceptable low air leakage rate;
ii. be continuous;
iii. be durable;
iv. have sufficient strength to resist the anticipated air pressure load; and
v. be buildable in the field.

Air leakage rate

Table 1. Results of testing the air leakage rate of the product

Type of wall tested	Requirement (1)	Air leakage rate after wind loading (2) at 75 Pa ΔP	Air leakage rate After wind loading at –20°C and at 75 Pa ΔP^2
Exterior gypsum/metal stud walls	A1 (≤ 0.05 L/s·m^2·Pa)	0.023 L/(s·m^2) (3)	0.014 L/(s·m^2) (3)
Concrete masonry units		0.016 L/(s·m^2) (3)	0.011 L/(s·m^2) (3)

Notes

1 The air leakage rate requirement is based on the “Table for rate of permissible air leakage” developed by CCMC/NRC with input from an industry consortium. Information in the table below is deemed to meet the intent of the NBC 2015 with regard to air barrier system performance.

Table for rate of permissible air leakage

Water vapour permeance (WVP) of outermost layer of wall assembly (ng/(Pa·s·m^2))	Maximum permissible air leakage rate (L/s·m^2) @ 75 Pa ΔP
15 < WVP ≤ 60	0.05
60 < WVP ≤ 170	0.10
170 < WVP ≤ 800	0.15
> 800	0.20

For more information on the CCMC Technical Guide requirements and how they relate to the NBC 2015 requirements, please see the IRC publication, “Air Barrier Systems for Walls of Low-Rise Buildings: Performance and Assessment.”

2 The air leakage rate of the specimens was determined after structural aging of the air barrier system. Aging of the air barrier system was conducted to qualify it for various Q_{50} design structural wind loads. The air barrier system was subjected to a loading schedule involving 1-hour sustained positive and negative pressure set at 650 Pa, 2 000 cycles of positive and negative pressure set at 950 Pa, wind gust of positive and negative pressure set at 1 410 Pa, and deflection loading at ±1 440 Pa for 10 seconds.

3 The air leakage rate was determined in accordance with ASTM E 1424, “Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure and Temperature Differences Across the Specimen,” at an air temperature of –20°C to verify any deformation causing leakage at low temperatures.

Durability of air barrier system components

Table 2. Results of testing of durability of components in the product

Component	Requirement	Result
Wrapsulate® Foam Jacket polyurethane insulation	Air permeance before and after aging (NRC method): < 10% increase	Passed
	Thermal resistance after heat aging and weathering: 90% retention	Passed
Transition membrane: Blueskin SA by Henry® Company	Physical properties testing (1)	Passed
Sealant at membrane/foundation junctions: 925 BES sealant by Henry® Company	ASTM C 920, Type S, Grade NS, Class 35 (2)	Passed
Membrane adhesion to DensGlass® sheathing	ASTM D 3330-04	Determined tension/peel strength values for field quality control

Notes

1 Blueskin SA has been tested to validate several physical properties such as elongation, WVP, puncture resistance, watertightness and crack bridging with a minor durability assessment. However, Blueskin® WP 200 (CCMC 13297-R) has been evaluated by the CCMC for durability and is the same membrane technology as Blueskin SA, which is thinner. As the membrane will be protected and insulated by the product, the durability of Blueskin SA was deemed a pass for this application for low rise, 12 m high buildings.

2 The sealant manufacturer has tested to ASTM C 920, “Standard Specification for Elastomeric Joint Sealants,” as specified in Article 5.9.1.1., Compliance with Applicable Standards, and Sentence 9.27.4.2.(2), Materials, of Division B of the NBC 2015.

Appendix A

Specimens tested for qualifying system details

The following figures outline the original full-scale specimens tested, which represent typical construction details to be reproduced in the field as part of the installation of Elastochem Specialty Chemical’s current proprietary Wrapsulate® Foam Jacket Air Barrier System. The representative specimens tested also contained defects (e.g., mortar missing, missing primer gap, etc.) to verify the sensitivity of the air barrier system to these possible field defects and allow for tolerances.

Exterior steel stud wall (no penetrations)

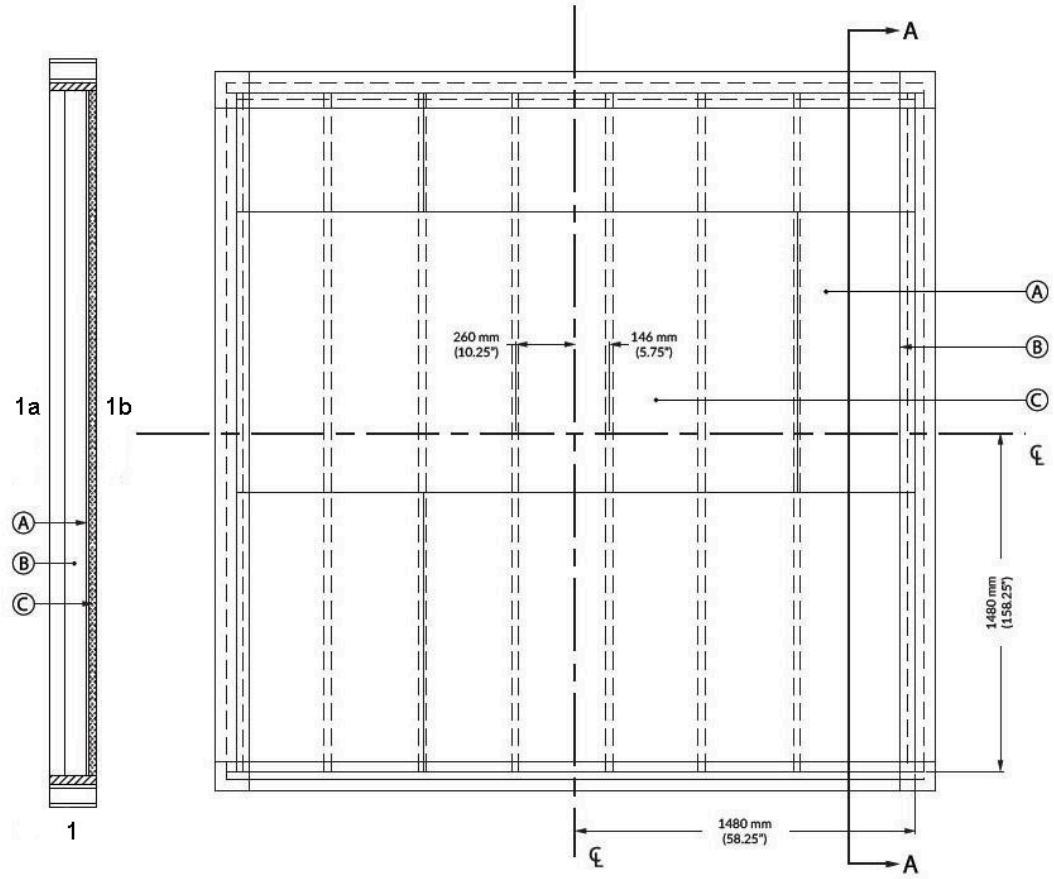

Figure 1. Exterior steel stud wall (no penetrations)

A. Exterior DensGlass® sheathing 13 mm (1/2 in.) thickness fastened to steel studs with 32 mm (1 1/4 in.) SF steel drill screws (corrosion-resistant) installed 102 mm (8 in.) apart
B. 92 mm (3 5/8 in.) 20 ga. steel studs installed 406 mm (16 in.) on centre (o.c.)
C. Wrapsulate® Foam Jacket spray foam air barrier material

1. Section A-A
    a. Interior side
    b. Exterior side

Exterior concrete wall (no penetrations)

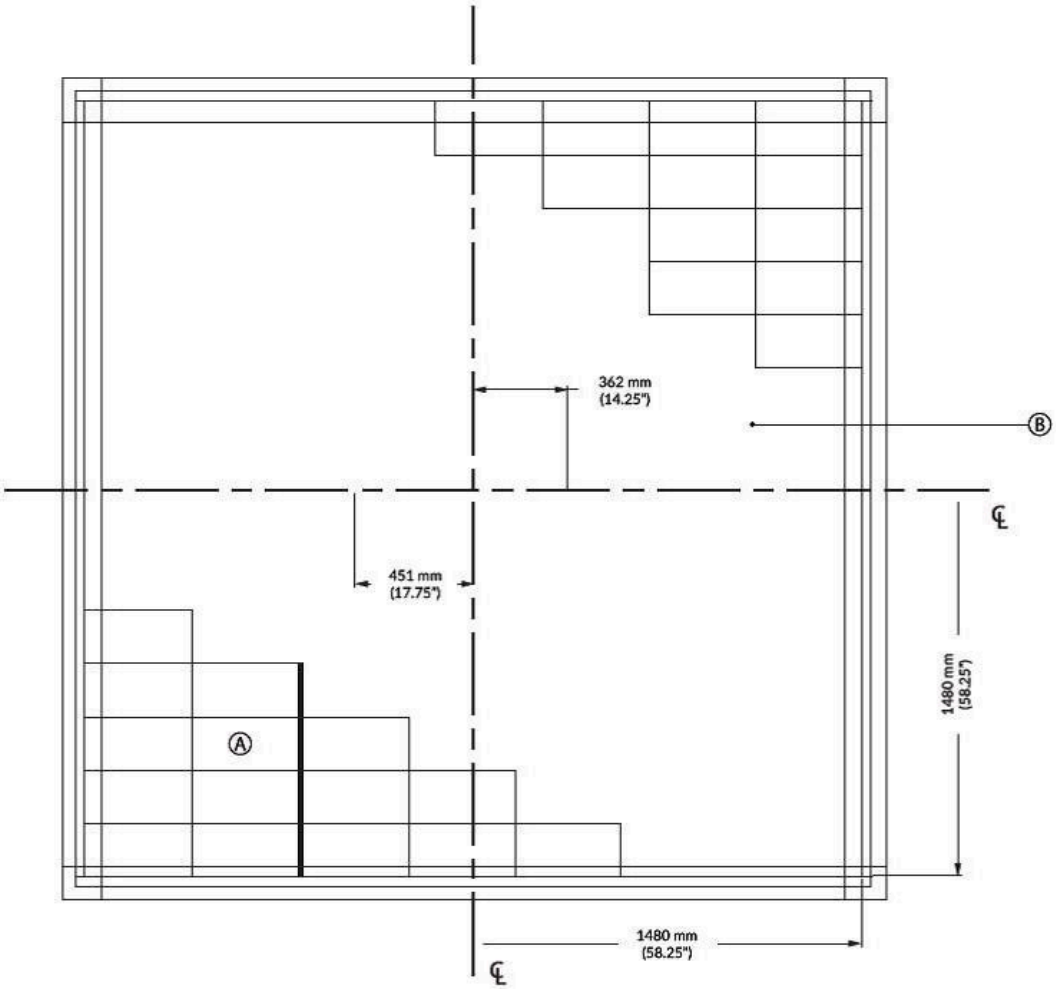

Figure 2. Exterior concrete wall (no penetrations)

A. 200 mm × 400 mm × 203 mm (8 in. × 16 in. × 8 in.) CMU block
B. Elastochem Wrapsulate® Foam Jacket SPF application; target thickness 38 mm–50 mm (1.5 in.–2.0 in.)

Exterior steel stud wall with penetrations

All construction, control, expansion joints or penetrations in an exterior wall assembly must be bridged by a transition membrane as part of the Wrapsulate® Foam Jacket Air Barrier System.

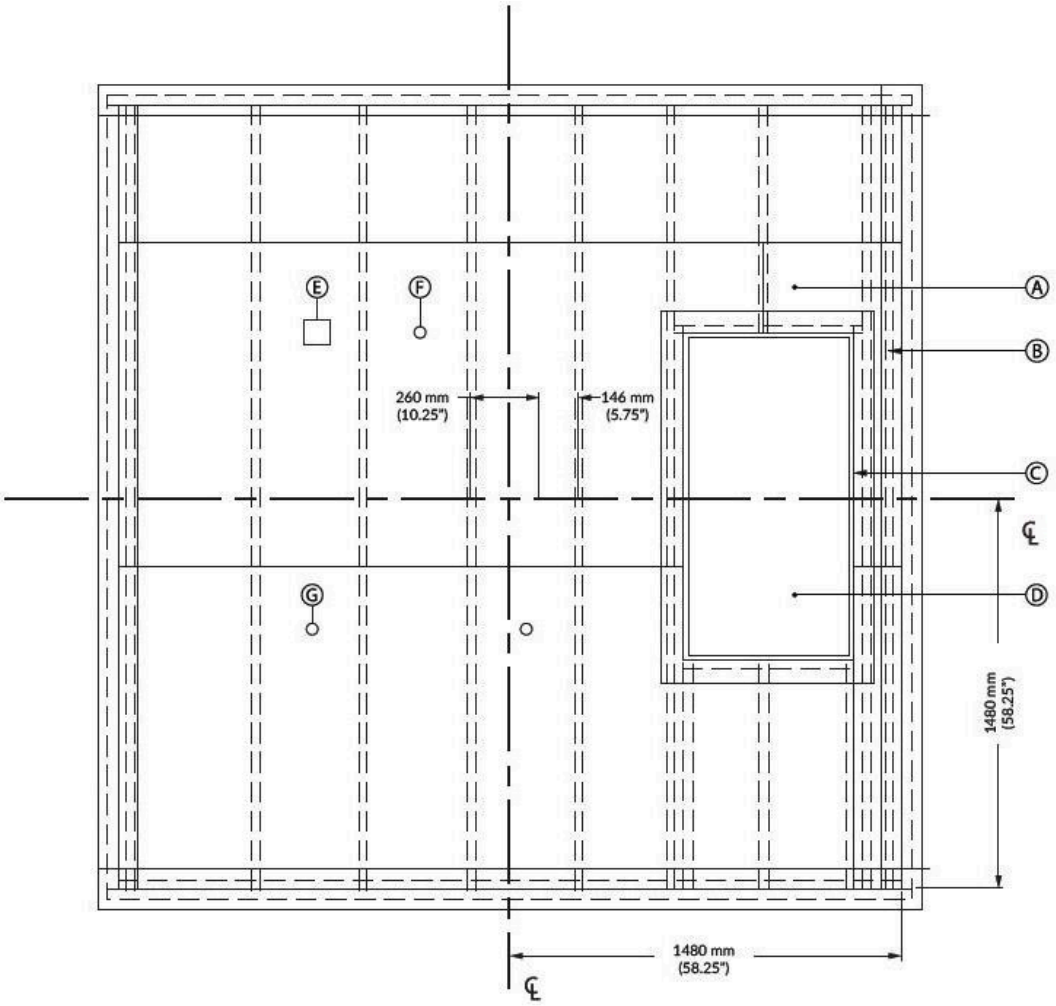

Figure 3. Exterior steel stud wall with penetrations

A. Exterior DensGlass® sheathing 13 mm (1/2 in.) thickness fastened to steel studs with 32 mm (1 1/4 in.) SF steel drill screws (corrosion-resistant) installed 102 mm (8 in.) apart
B. 92 mm (3 5/8 in.) 20 ga. steel studs installed 406 mm o.c.
C. Window rough opening perimeter sealed with Blueskin SA peel-and-stick membrane, gap between window and rough opening sealed with backer rod and Henry®
D. Plywood window sealed with backer rod and Henry® Company 925 BES sealant prior to primary air barrier material (SPF) application
E. 102 mm (4 in.) duct
F. Ø 38 mm (1.5 in.) PVC pipe
G. Ø 51 mm (2 in.) electrical conduit

Note: PVC pipe, square duct and electrical junction boxes sealed around perimeter prior to SPF application with Henry® Company Blueskin SA peel-and-stick membrane.

Exterior concrete wall with penetrations

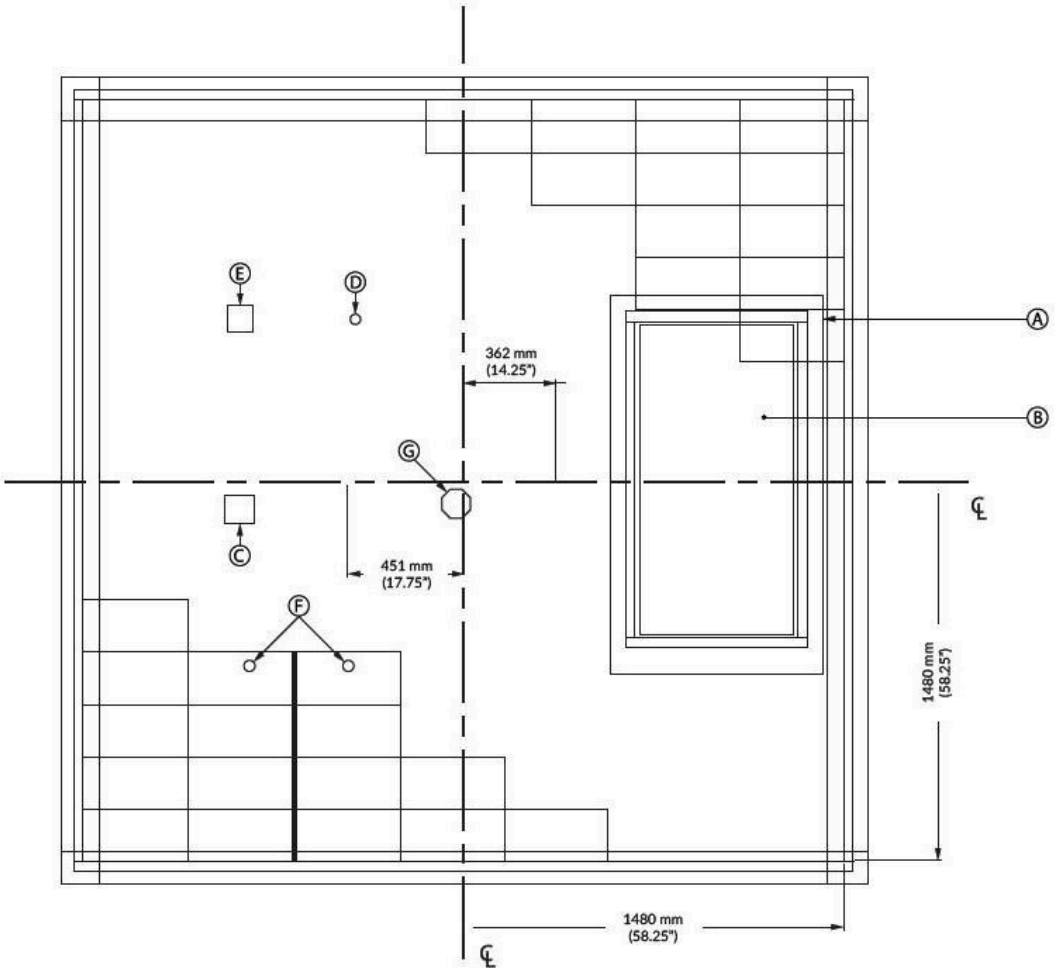

Figure 4. Exterior concrete wall with penetrations

A. Window rough opening perimeter sealed with Blueskin SA peel-and-stick membrane, gap between window and rough opening sealed with backer rod and Henry® Company 925 BES sealant
B. Plywood window sealed with backer rod and Henry® Company 925 BES sealant prior to primary air barrier material (SPF) application
C. 102 mm (4 in.) duct
D. Ø 38 mm (1.5 in.) PVC pipe
E. Rectangular junction box
F. Ø 38 mm (1.5 in.) conduit pipe
G. Hexagonal junction box

Note: PVC pipe, square duct and electrical junction boxes are sealed around the perimeter prior to SPF application with Henry® Company Blueskin SA peel-and-stick membrane.

Exterior stud wall with foundations

As the foundation wall is designated as part of the air barrier system in this case, a transition membrane with sealant (see cross-section details) must be sealed to the foundation wall to maintain the continuity of the plane of airtightness. In addition, note that mechanical fasteners for brick veneer and penetrations from electrical wiring, pipes or ducts must be sealed through the use of a transition membrane.

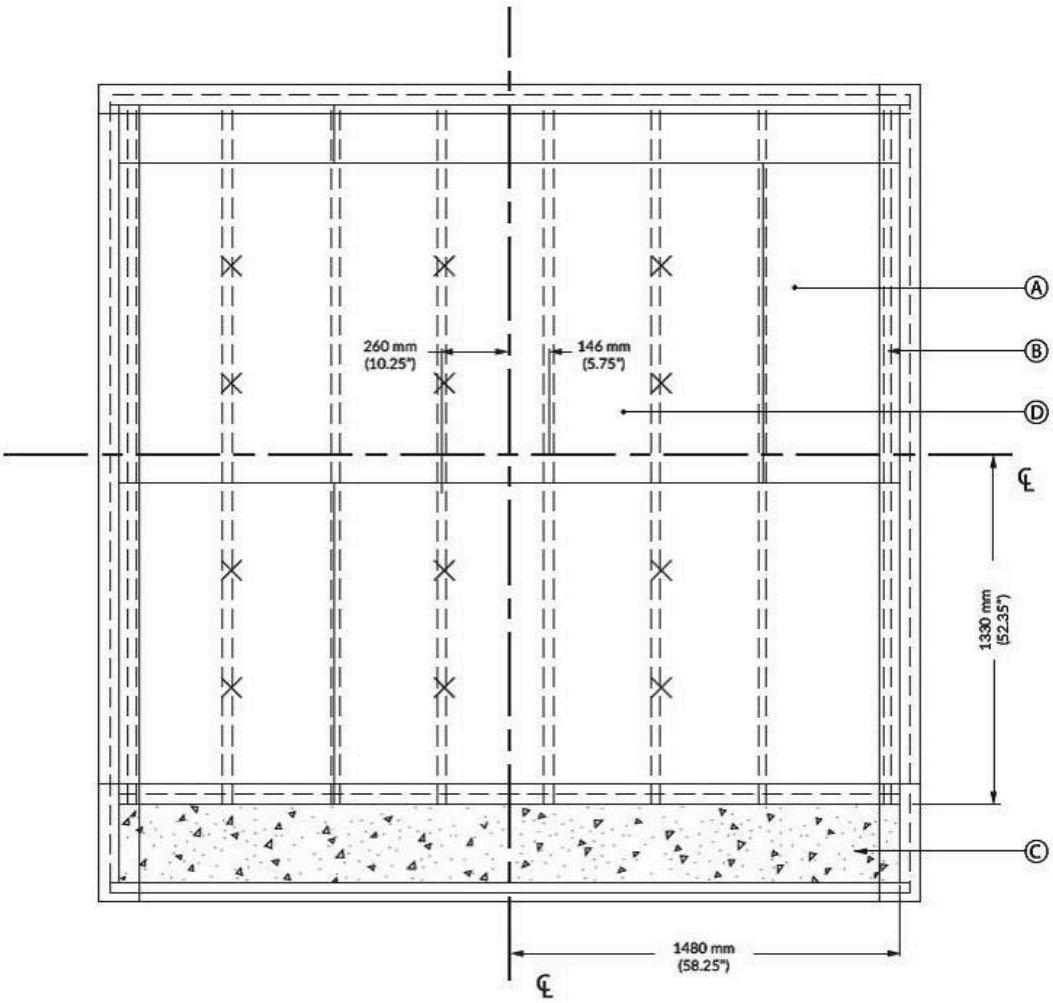

Figure 5. Exterior stud wall with foundation

A. Exterior DensGlass® sheathing 13 mm (1/2 in.) thickness fastened to steel studs with 32 mm (1 1/4 in.) SF steel drill screws (corrosion-resistant) installed 102 mm (8 in.) apart
B. 92 mm (3 5/8 in.) 20 ga. steel studs installed 406 mm (16 in.) o.c.
C. Concrete foundation interface sealed on exterior with Blueskin SA peel-and-stick membrane to exterior sheathing
D. Elastochem Wrapsulate® Foam Jacket SPF application; target thickness 38 mm (1.5 in.)

X. Blok-Lok BL-607 brick ties sealed around perimeter prior to SPF application with Henry® Company 925 BES sealant

Exterior concrete wall with foundation

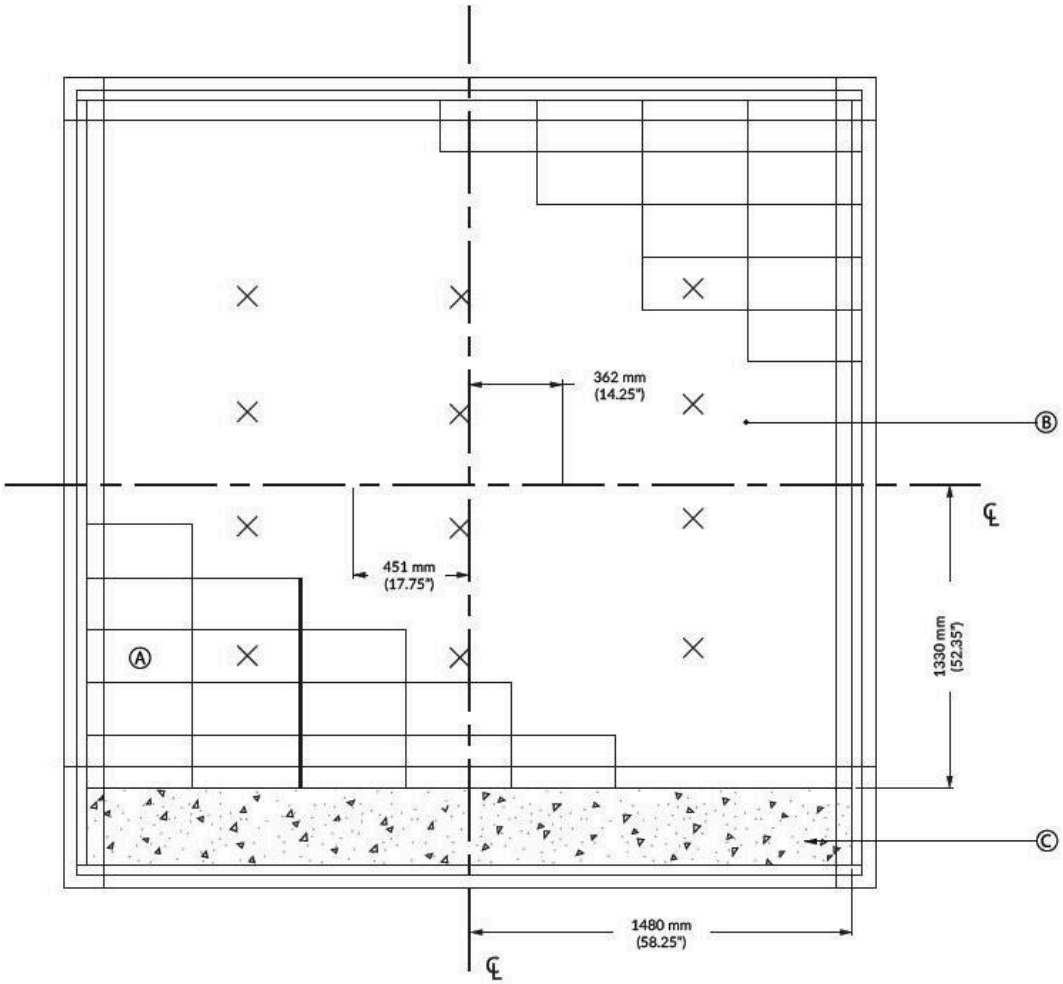

Figure 6. Exterior concrete wall with foundation

A. 203 mm × 400 mm × 203 mm (8 in. × 16 in. × 8 in.) CMU block
B. Elastochem Wrapsulate® Foam Jacket SPF application; target thickness 38 mm–50 mm (1.5 in.–2.0 in.)
C. Concrete foundation interface sealed on exterior with Blueskin SA peel-and-stick membrane to exterior sheathing

X. Blok-Lok BL-607 brick ties sealed around perimeter prior to SPF application with Henry® Company 925 BES sealant

Penetration details

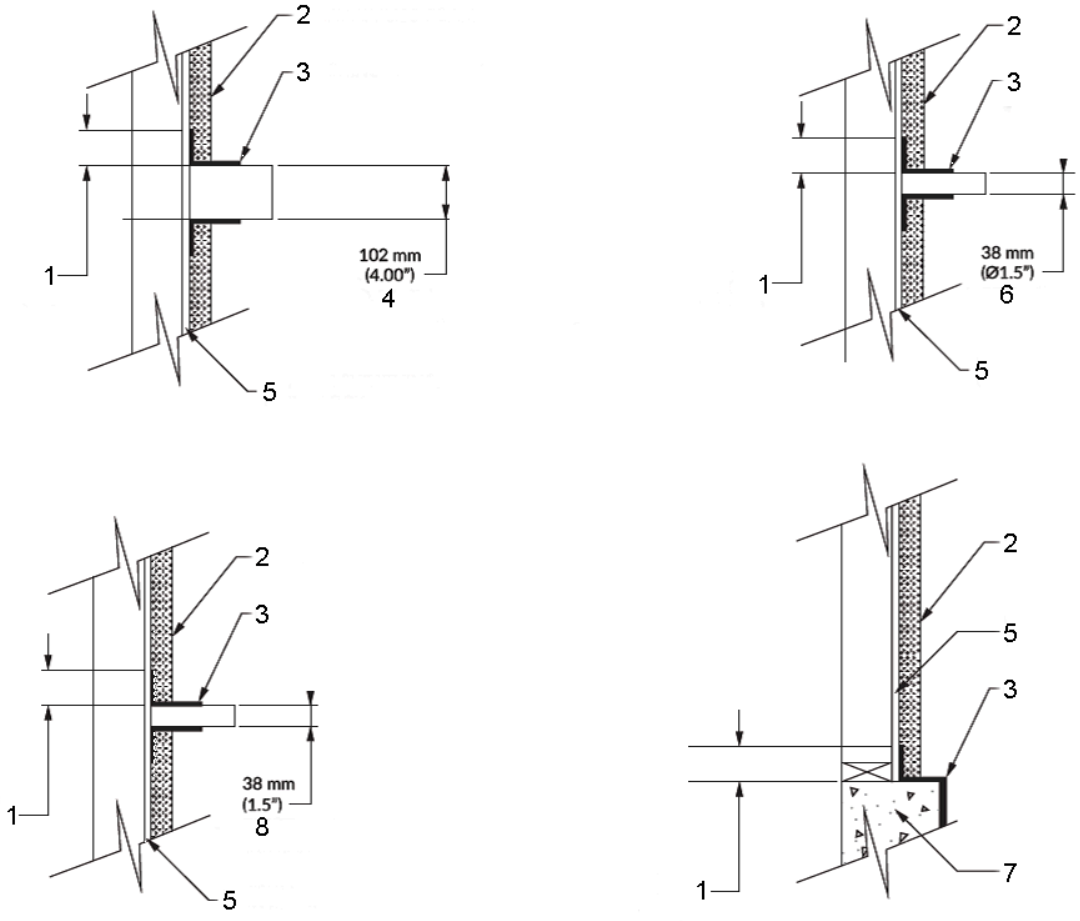

Figure 7. Penetration/termination details

1. 76 mm (3.00") typical
2. Spray-applied foam
3. Flashing membrane
4. Sq. duct/sq. junction box/hex junction box
5. Gypsum sheathing/CMU block
6. Pipe (PVC)
7. Concrete slab
8. Electrical conduit

Note: Gypsum sheathing = exterior DensGlass® sheathing

Window sealing details

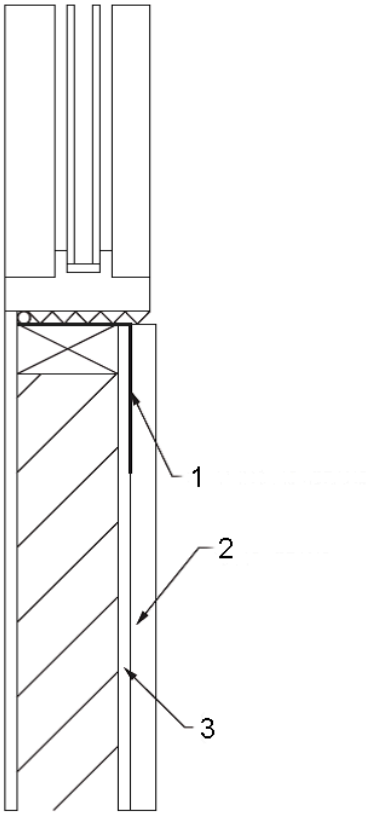

Figure 8. Window sealing details

1. Flashing membrane
2. Spray-applied foam
3. Gypsum sheathing/CMU block

Note: Gypsum sheathing = exterior DensGlass® sheathing

Administrative information

Use of Canadian Construction Materials Centre (CCMC) assessments

This assessment must be read in the context of the entire CCMC Registry of Product Assessments, any applicable building code or by-law requirements, and/or any other regulatory requirements (for example, the Canada Consumer Product Safety Act, the Canadian Environmental Protection Act, etc.).

It is the responsibility of the user to confirm that the assessment they are using is current and has not been withdrawn or superseded by a later version on the CCMC Registry of Product Assessments.

Disclaimer

The National Research Council of Canada (NRC) has evaluated only the characteristics of the specific product described herein. The information and opinions in this evaluation are directed to those who have the appropriate degree of experience to use and apply its contents (such as authorities having jurisdiction, design professionals and specifiers). This evaluation is valid when the product is used as part of permitted construction, respecting all conditions and limitations stated in the evaluation, and in accordance with applicable building codes and by-laws.

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> Most Canadian authorities having jurisdiction (AHJs) consider CCMC product assessments acceptable as evidence for product approval.

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First Nations National Building Officers Association (FNNBOA)	(First Nations National Building Officers Association (FNNBOA))
Canadian Home Builders' Association (CHBA)	(Canadian Home Builders' Association (CHBA))
Alberta Building Officials Association (ABOA)	(Alberta Building Officials Associations (ABOA))
Saskatchewan Building Officials Association (SBOA)	(Saskatchewan Building Officials Association (SBOA))
Manitoba Building Officials Association (MBOA)	(Manitoba Building Officials Association (MBOA))
Ontario Building Officials Association (OBOA)	(Ontario Building Officials Association (OBOA))
New Brunswick Building Officials Association (NBBOA)	(New Brunswick Building Officials Association (NBBOA))
Nova Scotia Building Officials Association (NSBOA)	(Nova Scotia Building Officials Association (NSBOA))

> The CCMC provides code compliance assessments to Canadian code requirements, consulting nationwide with construction regulators to elicit regional variations in code requirements as well as provincial and local interpretations. Users are advised to review the technical information presented in CCMC assessments when making approval decisions. Learn more about how the CCMC provides a unique service for Canada.

For more information, contact the CCMC by phone at (613) 993-6189 or by email at ccmc@nrc-cnrc.gc.ca

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Code compliance as an acceptable solution

Code Compliance via Acceptable Solutions

> If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable **acceptable solutions** in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code.
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(a)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Acceptable Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

- complying with the applicable acceptable solutions in Division B, or
- using an alternative solution that will achieve at least the minimum level of performance required by Division B in the areas defined by the objective and functional statements attributed to the applicable acceptable solutions.

The CCMC assesses compliance with Canadian building, energy and safety codes, and is trusted by over 6,000 regulators across Canada.

Code compliance as an alternative solution

Code Compliance via Alternative Solutions

> Where a design differs from the acceptable solutions in Division B, then it should be treated as an "**alternative solution**." A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions [...] Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B—not “well enough” but “as well as.”
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(b)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Alternative Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

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