

CCMC 12935-R

CCMC Canadian code compliance evaluation

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| Evaluation holder: | <p>Owens Corning Canada Inc. 3450 McNicoll Avenue Scarborough ON M1V 1Z5 Canada Website: owenscorning.ca/index.html Telephone: 1-800-988-5269</p> |
| Product name: | FOAMULAR®CodeBord®Air Barrier System (CABS) |
| Compliance: | NBC 2015, OBC |
| Criteria: | CCMC-TG-072709.01-15A, "CCMC Technical Guide for Air Barrier Systems" |

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 | <u>Acceptable</u> |
| 5.1.4.2. Resistance to Deterioration | <u>Acceptable</u> |
| 5.2.2. Structural Loads and Design Procedures | <u>Acceptable</u> |
| 5.4.1. Air Barrier Systems | <u>Acceptable</u> |
| 9.25.3.1. Required Barrier to Air Leakage | <u>Acceptable</u> |
| 9.25.3.2.(1) Air Barrier System Properties (effective barrier to air infiltration and exfiltration) | <u>Acceptable</u> |
| 9.25.3.2.(2) Air Barrier Systems Properties (alternative to 6-mil polyethylene air barrier) | <u>Alternative</u> |
| 9.25.3.3. Continuity of the Air Barrier System | <u>Acceptable</u> |
| 9.27.4.2.(2)(b) ASTM C 920-14 Elastomeric Joint Sealants ... | <u>Acceptable</u> |

Ontario Building Code

Ruling No. 09-39-237 (12935-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2009-12-30 (revised 2017-03-31) pursuant to s.29 of the Building Code Act, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

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

FOAMULAR®CodeBord®Air Barrier System (CABS)

Product description

This report addresses the performance of the product as an air barrier system as specified by Owens Corning. The product consists of the following components and accessories (see [Figure 1](#)) providing the following functions:

Plane of airtightness

- FOAMULAR® CodeBord® extruded polystyrene (XPS), Type 3 (see CCMC 13431-L) as the principal material in the plane of airtightness. **Please note that this evaluated air barrier system is achieved without a sealed polyethylene vapour barrier on the interior side of wall assembly.**

Continuity

Accessories for continuity include two approaches:

- **For Original CABS:**
 - FoamSealR™, a foamed polyethylene sealing gasket installed behind all (i.e., vertical and horizontal) FOAMULAR® CodeBord® XPS panel joints, and also at XPS panel termination points around penetrations such as around windows and doors;
- **For Hybrid CABS:**
 - FoamSealR™, a foamed polyethylene sealing gasket installed behind FOAMULAR® CodeBord® XPS horizontal joints at the perimeter of the uppermost top plate (i.e., top floor) and the bottom of the lowermost floor perimeter (i.e., along header) only, and around windows and doors;
 - CCMC-evaluated Owens Corning (OC) JointSealR® Foam Joint Tape (CCMC 14003-R) to seal horizontal and vertical joints of the XPS panels; and
 - CCMC-evaluated OC FlashSealR® Foam Flashing Tape (CCMC 14003-R) to seal around window and door openings, in lieu of FoamSealR™ foam gaskets. A combination of specified gasket and tape can also be used as per the manufacturer's details.
- **For both Original and Hybrid CABS:**
 - sealant foam that is a one-component, spray-in-place polyurethane evaluated by the CCMC (see CCMC 13074-L) or meeting CAN/ULC-S710.1-05, "Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification," and CAN/ULC-S710.2-05, "Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 2: Installation." The sealant must have qualified for sealing the 2 relevant contact surfaces around penetrations to be sealed, covering vinyl and wood as a minimum (i.e., for sealing wood rough opening and vinyl windows), but preferably also XPS and galvanized metal;
 - 4-mil polyethylene as the designated "vapour barrier" only (i.e., unsealed joints), compliant with Subsection 9.25.4., Vapour Barriers, of Division B of the NBC 2015;

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- 6-mil polyethylene air/vapour barrier conforming to CAN/CGSB-51.34-M86, “Vapour Barrier, Polyethylene Sheet for Use in Building Construction,” installed at ceiling locations and on the interior where specified in the CABS for the continuity of the plane of airtightness; and
- specified caulking sealants conforming to CAN/CGSB-19.0-M77, “Methods of Testing Putty, Caulking and Sealing Compounds.”

Strength

Specified XPS thickness, stud spacing, cap nails and nailing schedule to provide the strength to resist wind loads in low-rise buildings achieved by fastening the CABS to the supporting structure.

Installation

To be installed by Owens Corning-trained installers following detailed air barrier system fabrication site details.

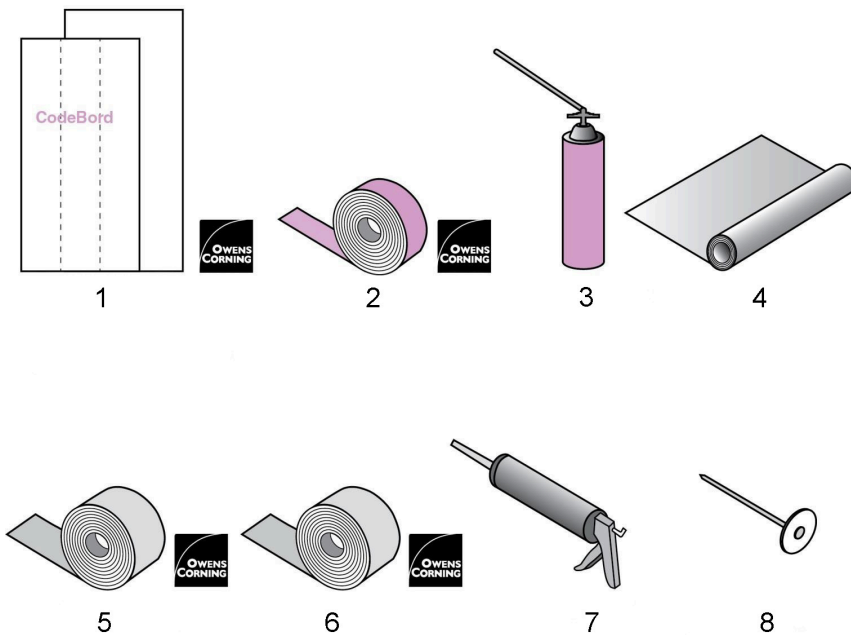


Figure 1. Components and accessories used for the in-field installation of the product (Items 1, 2, 5 and 6 are Owens Corning products)

1. CodeBord[®] extruded polystyrene insulating sheathing (4 ft. x 8 ft. or 4 ft. x 9 ft.) with ship lap or butt edges
2. FoamSealR[™] polyethylene sealing gaskets (3-¹/₂ in. or 5-¹/₂ in.)
3. Single-component foam sealant CCMC-evaluated
4. 4-mil polyethylene vapour barrier (6-mil air/vapour barrier for ceiling applications)
5. JointSealR[®] foam joint tape
6. FlashSealR[®] foam flashing tape
7. Caulking sealant
8. Nails with plastic or metal washers

Manufacturing plant

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

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| Product name | Manufacturing plant |
|--------------|---|
| | FOAMULAR® CodeBord® Air Barrier System (CABS) |

☑ 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 2 CABS systems have demonstrated sufficiently low air permeance in accordance with NBC 2015 for buildings with an indoor environment of 20°C and winter design relative humidity (RH) of 35% or less (see table "Results of testing of air leakage rate of the product after wind loading" below).
- The **Hybrid CABS** has demonstrated sufficient strength to resist wind loads and to be used in low-rise buildings in geographical locations:
 - where the wind pressure $Q_{50} \leq 0.75$ kPa (1-in-50 year wind pressure return period found in Appendix C of the NBC 2015), for the 20-mm-thick XPS on studs at 400 mm (16 in.) o.c., for maximum building height of 20 m, and
 - where the wind pressure $Q_{50} \leq 0.55$ kPa, for the 25-mm-thick XPS on studs at 600 mm (24 in.) o.c., for a maximum building height of 12 m.
- The **Original CABS** has demonstrated sufficient strength to be used in low-rise buildings in geographical locations:
 - where the wind pressure $Q_{50} \leq 0.60$ kPa, for the 25-mm-thick XPS on studs at 400 mm (16 in.) o.c., for maximum building height of 12 m.
- In order to confirm air leakage control and strength in the field, the CABS **must be installed:**
 - with the minimum specified thickness for the respective stud spacing over wood-frame walls; and
 - installed in the field by Owens Corning-trained installers/contractors according to the Owens Corning "FOAMULAR® CodeBord® Air Barrier System (CABS)" installation manual, publication no. 300494, dated 2011, which contains detailed construction drawings which must be followed for the original CABS and alternative details (Section 6-1), and also "FOAMULAR® CodeBord® Air Barrier System Installation Manual," publication no. 300494A, dated 2016 for installation of the hybrid system (see Appendix A for examples).
- 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 identification card upon request by the building official.

Technical information

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

| Criteria number | Criteria name |
|-----------------------|--|
| CCMC-TG-072709.01-15A | CCMC Technical Guide for Air Barrier Systems |

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.

The product has demonstrated performance that meets the criteria of the CCMC Technical Guide. 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 testing

Table 1. Results of testing of air leakage rate of the product after wind loading

| Wood-frame walls | | Requirement | Result |
|---|---|---|--|
| Original CABS (25-mm FOAMULAR® CodeBord®; XPS with foam gaskets beneath XPS panel joints) | Specimen no. 1 – opaque wall | Air leakage rate ⁽¹⁾ at 75 Pa $\Delta P \leq 0.05$ L/(s·m ²) | 0.048 L/(s·m ²) ⁽²⁾ |
| | Specimen no. 2 – continuity at penetrations | | |
| | Specimen no. 3 – continuity at foundation and brick straps | | |
| Hybrid CABS (20-mm FOAMULAR® CodeBord® XPS(R4) with exterior taped seams) | Specimen no. 1 – opaque wall | Air leakage rate ⁽³⁾ at 75 Pa $\Delta P \leq 0.05$ L/(s·m ²) | 0.042 L/(s·m ²) ⁽²⁾ |
| | Specimen no. 2 – continuity at penetrations, foundation, brick straps | | |
| Hybrid CABS (25-mm FOAMULAR® CodeBord® XPS(R5) with exterior taped seams) | Specimen no. 1 – opaque wall | Air leakage rate ⁽¹⁾ at 75 Pa $\Delta P \leq 0.05$ L/(s·m ²) | 0.040 L/(s·m ²) ⁽²⁾ |
| | Specimen no. 2 – continuity at penetrations, foundation, brick straps | | |

Notes

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- 1 The air leakage rate of the specimens is determined after structural aging of the air barrier system. Aging of the air barrier system was conducted to qualify it for a design structural wind load of $Q_{50} = 0.60$ kPa (**Original CABS**) and $Q_{50} = 0.55$ kPa (**Hybrid CABS**), the Q_{50} being 1-in-50 year wind pressure return period from National Building Code (NBC) climatic data in Appendix C. The air barrier system was subjected to a loading schedule involving one-hour sustained positive and negative pressure at the Q_{50} value (kPa), 2 000 cycles of positive and negative pressure set at 0.80 kPa, and a wind gust of positive and negative pressure set at 1.2 kPa. The air leakage rate was determined in accordance with ASTM E 1424-91(2008), "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.
- 2 The air leakage performance results in a Classification A1 as per CAN/ULC-S742-11, "Standard for Air Barrier Assemblies – Specification." The air leakage rate criteria is based on the permissible air leakage rates shown in table "Permissible air leakage rates" below, which are considered to be in accordance with the NBC in regards to air barrier system performance and drying potential of the wall assembly.
- 3 The air leakage rate of the specimens is determined after structural aging of the air barrier system. Aging of the air barrier system was conducted to qualify it for a design structural wind load of $Q_{50} = 0.75$ kPa (NBC climatic data in Appendix C) for a 1-in-50 year return period. The air barrier system was subjected to a loading schedule involving one-hour sustained positive and negative pressure set at 0.75 kPa, 2 000 cycles of positive and negative pressure set at 1.210 kPa, and a wind gust of positive and negative pressure set at 1.810 kPa. The air leakage rate was determined in accordance with ASTM E 1424-91(2008) at an air temperature of -20°C to verify any deformation causing leakage at low temperatures.

Table 2. Permissible air leakage rates

| Drying potential based on water vapour permeance (WVP) of outermost layer of wall assembly ($\text{ng}/\text{Pa}\cdot\text{s}\cdot\text{m}^2$) | Maximum permissible air leakage rates ($\text{L}/\text{s}\cdot\text{m}^2$) @ 75 Pa |
|--|--|
| $15 < \text{WVP}^{(1)} \leq 60$ | 0.05 ⁽¹⁾ |
| $60 < \text{WVP} \leq 170$ | 0.10 |
| $170 < \text{WVP} \leq 800$ | 0.15 |
| > 800 | 0.20 |

Note

- 1 As the FOAMULAR® CodeBord®; extruded polystyrene is less than $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ (for a 20-mm thickness, $\text{WVP} = 50 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$), this air leakage requirement must be met. However, due to the reduction in the risk of condensation from the insulation value, the air leakage rate could be increased by $0.05 \text{ L}/\text{s}\cdot\text{m}^2$ if the thermal resistance FOAMULAR®, CodeBord® meets the requirements of Table 9.25.5.2., Ratio of Outboard to Inboard Thermal Resistance, of Division B of the NBC 2015.

Durability of system components

Table 3. Results of testing of durability of components of the product

| Component | | Requirement | Result |
|---------------|---------------------|--|-----------------------|
| Original CABS | FOAMULAR® CodeBord® | Air permeance before and after aging (ASTM D 726-84) $< 10\%$ increase | Passed ⁽¹⁾ |

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| Component | | Requirement | Result |
|--------------------|---|---|---|
| | | Thermal resistance after heat aging and weathering 90% retention | Passed |
| | FoamSealR™ polyethylene sealing gasket | Oxidative induction time (OIT) ≥ 30 minutes | Passed |
| | proprietary spray-in-place foam sealant | Air leakage after aging ≤ 0.5 L/s at 75 Pa ΔP | Passed |
| | caulking sealant for protection from weather | Meets ASTM C 920-14 | Not evaluated for durability of air leakage performance |
| Hybrid CABS | FOAMULAR® CodeBord® | Air permeance before and after aging as per ULC S741 aging (i.e., 28 cycles of UV exposure + heat aging 772 h at 50°C) < 10% increase | Passed |
| | JointSealR®; Foam Joint Tape | See CCMC 14003-R | Passed |
| | FlashSealR® Foam Flashing Tape | See CCMC 14003-R | Passed |

Note

- 1 The results of the testing were deemed a pass when reviewing the performance of the control specimen and considering the error and bias of the test procedure.

Wind load resistance for the product

| XPS panel | Attachment schedule | Wind load limit (Q ₅₀) | Deflection beyond framing (max.) |
|---------------------------|--|------------------------------------|----------------------------------|
| 20-mm FOAMULAR® CodeBord® | Nails with 25-mm (1-in.) diameter cap washers, at 150 mm (6 in.) o.c., into wood studs at 400 mm (16 in.) o.c. | Q ₅₀ ≤ 0.75 kPa | 22 mm |
| 25-mm FOAMULAR® CodeBord® | Nails with 25-mm (1-in.) diameter cap washers, at 150 mm (6 in.) o.c., into wood studs 600 mm (24 in.) o.c. | Q ₅₀ ≤ 0.55 kPa | 11 mm |

Appendix A – Construction details

The figures below outline the specimens tested representing typical construction details to be reproduced in the field by Otrained installers as part of the installation quality control of the “FOAMULAR® CodeBord® Air Barrier System (CABS).” See Owens Corning’s installation manuals entitled “FOAMULAR® CodeBord® Air Barrier System” publication no. 300494, dated 2011 and “FOAMULAR® CodeBord® Air Barrier System Installation Manual” publication No. 300494A, dated 2016, for more complete details.

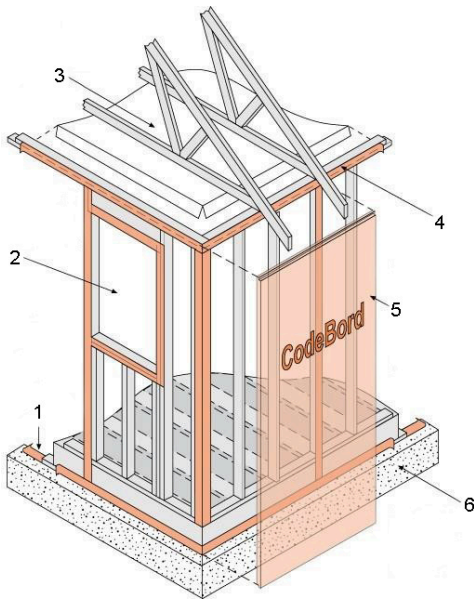


Figure 2. FOAMULAR® CodeBord® Air Barrier System (CABS) – Original CABS

1. FoamSealR™ gaskets are installed under the sill plates to maintain continuity with foundation wall
2. Continuity at penetrations for windows and doors is maintained with spray foam and caulking
3. Polyethylene air/vapour barrier is installed at ceiling according to contractor's preferred method
4. FoamSealR™ gaskets are applied over exterior framing members at joints between boards, corners, outside edges and around openings
5. CodeBord® sheathing is securely fastened to outside of wood framing to provide airtight seals at all joints and outside edges
6. Air sealing details for basement and crawlspace have been specially developed to work together with the CodeBord® system



Figure 3. FOAMULAR® CodeBord® Air Barrier System (CABS) – Hybrid CABS with exterior seam and flashing tape

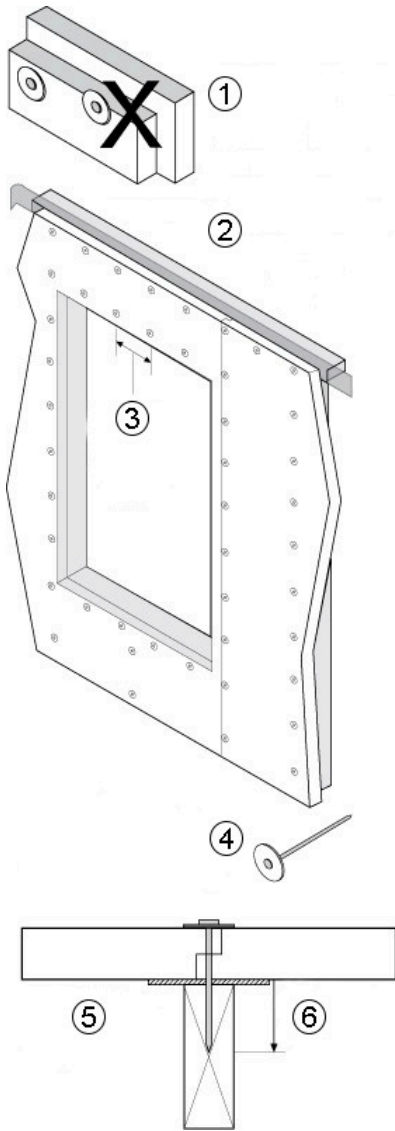


Figure 4. FOAMULAR® CodeBord® Air Barrier System (CABS) sealing with gasket at joints (Original CABS) and fastening details (or Hybrid CABS, the gasket is replaced by a proprietary sheathing tape over the panel joint)

1. NEVER set nails so that washers overlap the edges of the sheathing. This prevents proper joining of boards
2. Nails are required at all outside edges, all edges around openings, along all panel joints, and all intermediate framing members
3. Maximum 6 in. (150 mm) centre to centre
4. Spiral nail with plastic or metal washers are the only approved means of fastening the sheathing
5. Gaskets are required behind ALL joints between panels
6. Minimum depth of penetration 1 in. (25 mm)

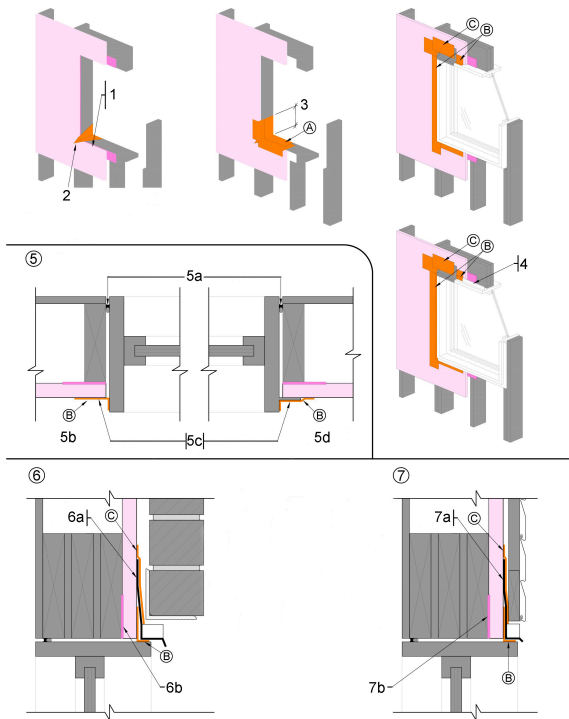


Figure 5. Sealing details around box and flanged windows (see manufacturer's literature for other sealing options)

- Owens Corning FlashSealR™ foam flashing tape used in 3 ways
 - A. Sealing rough opening to FOAMULAR® CodeBord® panel
 - B. Sealing window frame to FOAMULAR® CodeBord® panel
 - C. Sealing head flashing to FOAMULAR® CodeBord® panel

1. Note: sill flashing (not shown) must be installed
2. Important: bottom 2 corners of rough opening (before installing window) are sealed with tapered strips of Owens Corning FlashSealR™ foam flashing tape
3. 8 in. (203 mm) minimum (up each side)
4. Flange window
5. Plan view:
 - a. Air-tight seal to all sides of opening
 - b. Box window
 - c. Owens Corning FlashSealR™ foam flashing tape (top and sides only)
 - d. Flange window
6. Section (brick veneer):
 - a. Head flashing
 - b. FoamSealR™ gasket
7. Section (vinyl siding):
 - a. Head flashing
 - b. FoamSealR™ gasket

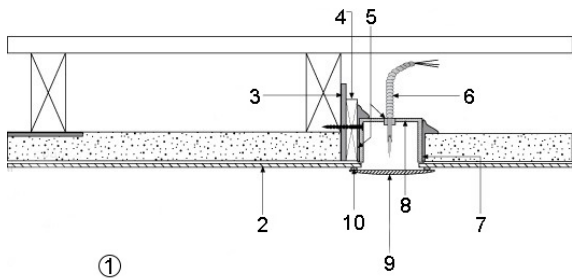


Figure 6. Sealing of exterior electrical boxes to maintain plane of airtightness

1. Locate electrical box adjacent to stud framing member, and cut hole in the CodeBord®. Apply FoamSealR™ gasket to stud and attach stud support for electrical box. Screw the airtight outdoor electrical box to stud support. Seal around the electrical box with PinkSeal foam sealant. Seal the opening for the electrical wires. Caulk the box cap to the siding.
2. Siding
3. FoamSealR™ gasket
4. Stud support
5. Foam sealant
6. Electric wires in metal conduit
7. Foam sealant
8. Airtight outdoor electrical box
9. Cap
10. Caulking

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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Language

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CCMC recognition

The Canadian Construction Materials Centre (CCMC) assesses compliance with Canadian building, energy and safety codes. We are the only construction code compliance service supported and operated by the Government of Canada. Trusted by over 6,000 regulators across Canada.

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

CCMC assessments are recognized by construction authorities across Canada:

Alliance of Canadian Building Official Associations (ACBOA)



(Alliance of Canadian Building Official Associations (ACBOA))

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))

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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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