



Evaluation Report CCMC 12857-R Tyvek® HomeWrap® - Air Barrier Material

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Tyvek® HomeWrap® - Air Barrier Material”, when used as an air barrier material in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code 2010:

- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
 - Sentence 5.4.1.2.(1) Air Barrier System Properties

This opinion is based on CCMC's evaluation of the technical evidence in Section 4 provided by the Report Holder.

Ruling No. 10-08-245 (12857-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 2010-04-12 (revised on 2013-03-08) 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.

2. Description

This Report addresses the performance of the product as an air barrier material within the DuPont Canada-specified “Tyvek® HomeWrap®” air barrier system. The DuPont Canada-specified “Tyvek® HomeWrap®” air barrier system has not been evaluated, but is covered in Appendix A of this Report for the convenience of building officials and designers.

If the product is installed as part of the designated air barrier system, it will serve a dual function in the wall assembly. Use of the product as a sheathing membrane to control incidental water infiltration behind cladding is covered under a separate CCMC Evaluation Report (see CCMC 12808-R).

The product is a white, spun-bonded olefin material that is made by combining continuous fibres of high-density polyethylene into a sheet using a heat and pressure process. The product is 0.15 mm thick and is available in rolls ranging in widths from 0.91 m to 2.90 m and in lengths from 30.5 m to 60.9 m.

3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the “Tyvek® HomeWrap® - Air Barrier Material” being used in accordance with the conditions and limitations set out below.

- The product is capable of being the principal plane of airtightness in an air barrier system by demonstrating a sufficiently low air permeance equivalent to the materials outlined in the requirement in Sentence 5.4.1.2.(1) of Division B of the NBC 2010.

- When the product is installed as part of the airtight element in the designated air barrier system, the vapour barrier must generally comply with Sentences 9.25.4.2.(1), (2), (5) and (6), Vapour Barrier Materials, of Division B of the NBC 2010. In cases where an alternative low water vapour permeance element has been installed in the wall assembly, Sentences 9.25.4.2.(3) to (4) apply.
- A conforming installation must be installed:
 - with the printed side facing outward and protected from exposure to ultraviolet (UV) radiation from the sun within 60 days;
 - with a minimum 10-mm air space between the sheathing membrane and the cladding, unless the cladding has been deemed to not require an air space (e.g. deemed by CCMC or by building officials based on past cladding performance); and
 - according to DuPont Canada's most recently updated "Tyvek® HomeWrap®" Installation Manual (sheathing membrane, air barrier and header wrap). Examples of the installation details are presented as "Additional Information" in Appendix A of this Report.
- A concealed air space exceeding 25 mm in width must contain proper fire stopping in accordance with Subsection 9.10.16., Fire Blocks, of Division B of the NBC 2010.

4. Technical Evidence

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

4.1 Performance Requirements

Table 4.1

Test	Requirement	Result
Five 1 m ² membrane specimens tested and measured for air permeance at a minimum of six air pressure differentials (ΔP) between 0 Pa and 250 Pa	Air leakage rate at 75 Pa ΔP (based on linear regression of 30 data points) $\leq 0.02 \text{ L}/(\text{s}\cdot\text{m}^2)$	0.005 L/(s·m ²)

The assessment of the product's durability is covered under CCMC 12808-R.

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Appendix A

Additional Information

An air barrier material as part of an air barrier system

CCMC has not evaluated the performance of the “Tyvek[®] HomeWrap[®]” air barrier system as to its conformance with Article 9.25.3.2., Air Barrier System Properties, of Division B of the NBC 2010. However, CCMC’s opinion is that an air barrier system using this material and installed in conformance with the details outlined below as well as in DuPont Canada’s Installation Manual should satisfy the requirements for continuity of the air barrier system in Articles 9.25.3.1., Required Barrier to Air Leakage, and 9.25.3.3., Continuity of the Air Barrier System, of Division B of the NBC 2010.

Discussion

Authorities having jurisdiction (AHJ) should be aware that this system differs from the typical air barrier approach, which uses a flexible membrane as the principal plane of airtightness. In the typical approach, the membrane (i.e. polyethylene sheet) is normally sandwiched between two other materials so that it is not required to resist, on its own, the full force of indoor/outdoor pressure differences induced by stack effect, mechanical systems and, most importantly, wind.

In a system in which the membrane is applied to the outer surface of the wall sheathing, as it is in the “Tyvek[®] HomeWrap[®]” air barrier system, that membrane does not have continuous support against outward air pressure and must, therefore, have adequate strength to resist that pressure by spanning between points of support, such as its own fastening points or the points where strapping or cladding is fastened to the wall. CCMC’s evaluation of the “Tyvek[®] HomeWrap[®]” material **does not include the evaluation of this strength** or the strength of the continuity details. The AHJ must, therefore, determine whether the product’s air barrier system, described herein, meets the intent of Sentence 9.25.3.2.(1), of Division B of the NBC 2010, as being an effective barrier for the proposed construction in the proposed geographical/climate area. For example, the AHJ may deem the proposed air barrier system adequate for buildings in urban areas, sheltered sites or areas of low wind, based on their experience, but inadequate in areas of high wind and exposed sites in rural or coastal areas.

An air barrier system checklist for the AHJ to consider is the following:

An 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.

Installation details

The product’s material is applied over exterior wood-based wall sheathing material complying with the NBC 2010. It does not contribute to an air barrier system until it is joined to the other components that make up the air barrier system of the building. DuPont Canada’s Installation Manual outlines how the product’s material must be joined to the foundation wall, to windows and doors, to penetrations in the wall and to the ceiling air barrier, thus forming the system.

A successful air barrier system installation is predicated on sequencing during construction. Coordination is required during erection of framing and after completion of the air barrier system to ensure that no other trade breaches the integrity of the installed air barrier system.

The proposed air barrier system is defined as possessing the following features:

- i. “Tyvek[®] HomeWrap[®]” material as the principal plane of airtightness;
- ii. accessories including: sealants and CCMC-evaluated sheathing tape to maintain continuity at junctions with penetrations in the wall assembly (i.e. windows, doors, pipes, ducts, electrical outlets, etc.) and in accordance with continuity details in the DuPont Canada Installation Manual;
- iii. durable, meeting UV and heat-aging requirements;
- iv. exterior sheathing with specified fasteners and fastening schedule of the “Tyvek[®] HomeWrap[®]” for structural support against anticipated pressure loads; and
- v. buildable in the field by builders following the DuPont Canada Installation Manual and reviewed by building officials.

Figures 1 to 7 outline typical construction details of the installation of the proposed air barrier system in the field. See DuPont Canada's "Tyvek® HomeWrap®" Installation Manual for additional details.

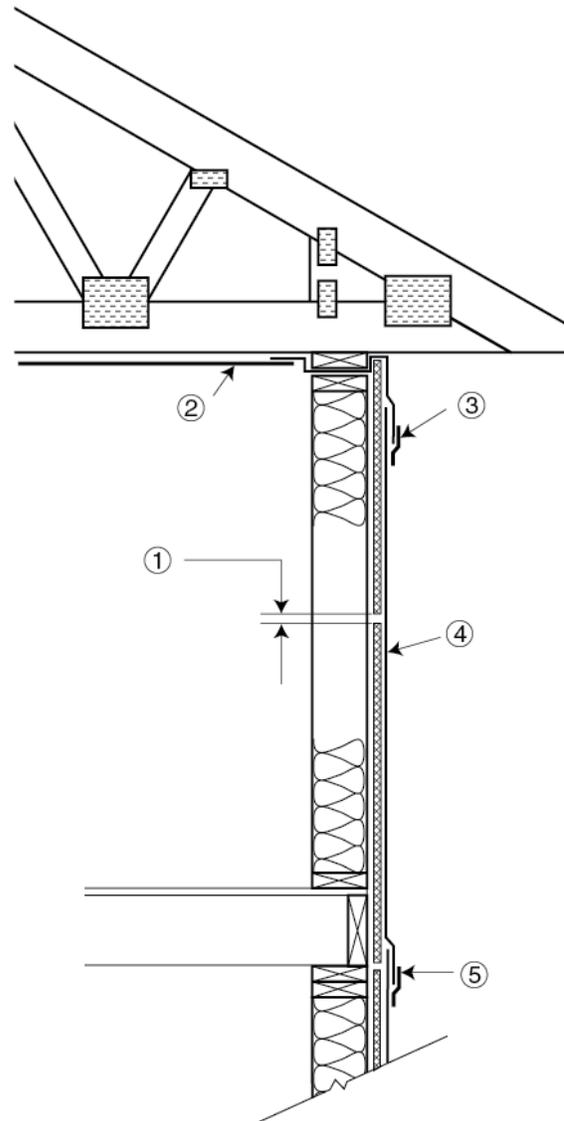


Figure 1. "Tyvek® HomeWrap®" exterior wall cross-section – top wall/ceiling continuity

- 1. wood-based sheathing installed with open horizontal gap**
- 2. ceiling air/vapour barrier**
- 3. CCMC-evaluated sheathing tape**
- 4. "Tyvek® HomeWrap®"**
- 5. typical overlap 100 mm and tape**

All horizontal joints in the material must be overlapped 100 mm and taped with CCMC-evaluated sheathing tape. To maintain continuity of the plane of airtightness, the material must bridge through the top plates and be taped to the ceiling membrane. Wood-based sheathing not more than 12.5 mm thick and complying with Article 9.23.17.2., Thickness, Rating and Material Standards, of Division B of the NBC 2010 does not require special joint treatment.

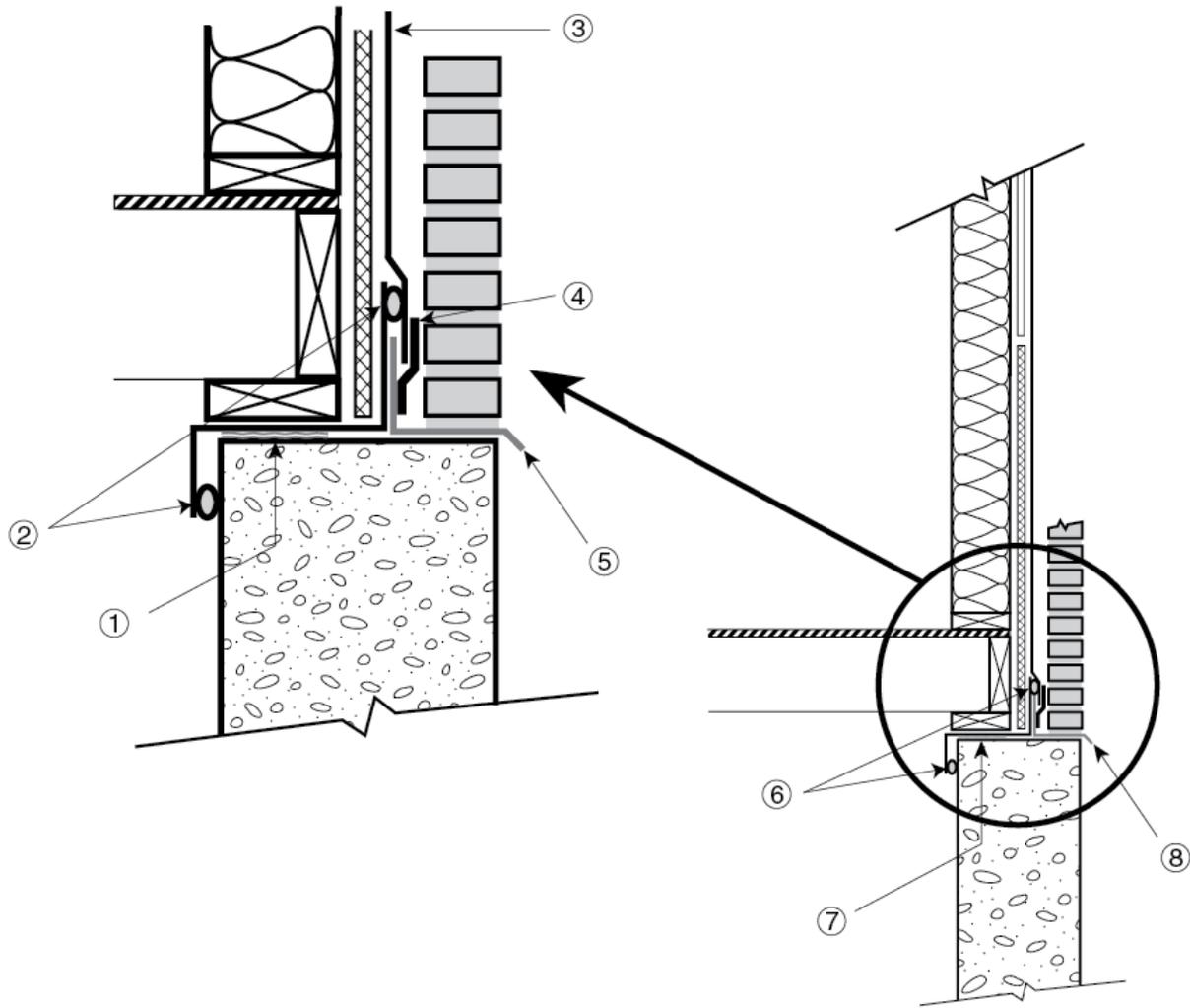


Figure 2. “Tyvek® HomeWrap®” bottom foundation detail

- 1. sill plate gasket
- 2. sealant
- 3. “Tyvek® HomeWrap®”
- 4. tape
- 5. flashing
- 6. sealant
- 7. sill plate gasket
- 8. flashing

When the foundation wall is part of the air barrier system, the material must be sealed to the foundation wall to maintain the continuity of the plane of airtightness. Sealant used must be compatible with the product, for example, silicone-based sealants must not be used. To maintain watertightness, “Tyvek® HomeWrap®” sheathing membrane must be installed over the flashing and taped to properly drain any rain penetration breaching the cladding.

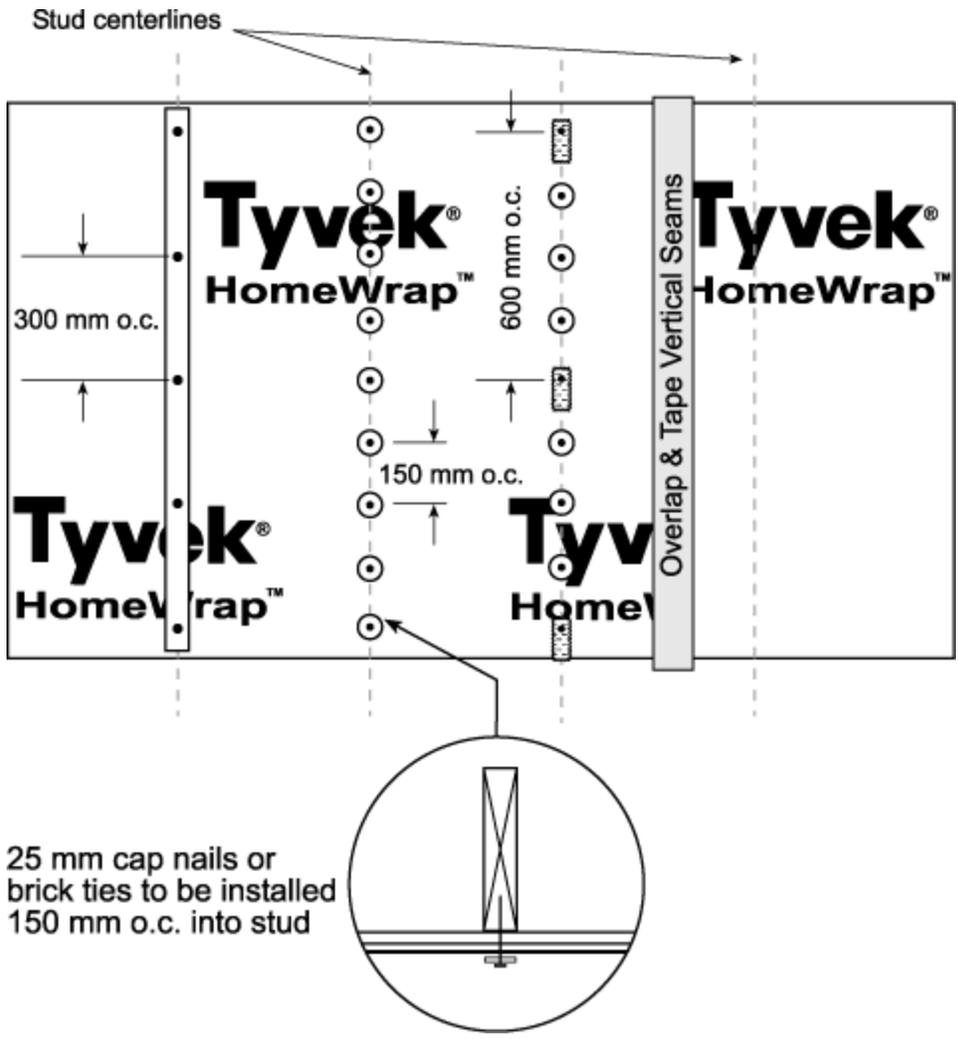


Figure 3. “Tyvek® HomeWrap®” structural fasteners

When installed as the principal plane of airtightness, the product must be structurally attached with either 19-mm-thick furring strips, 25-mm diameter cap nails or brick ties. These attachments must be fastened to the framing members and spaced as specified by DuPont Canada (see the Installation Manual).

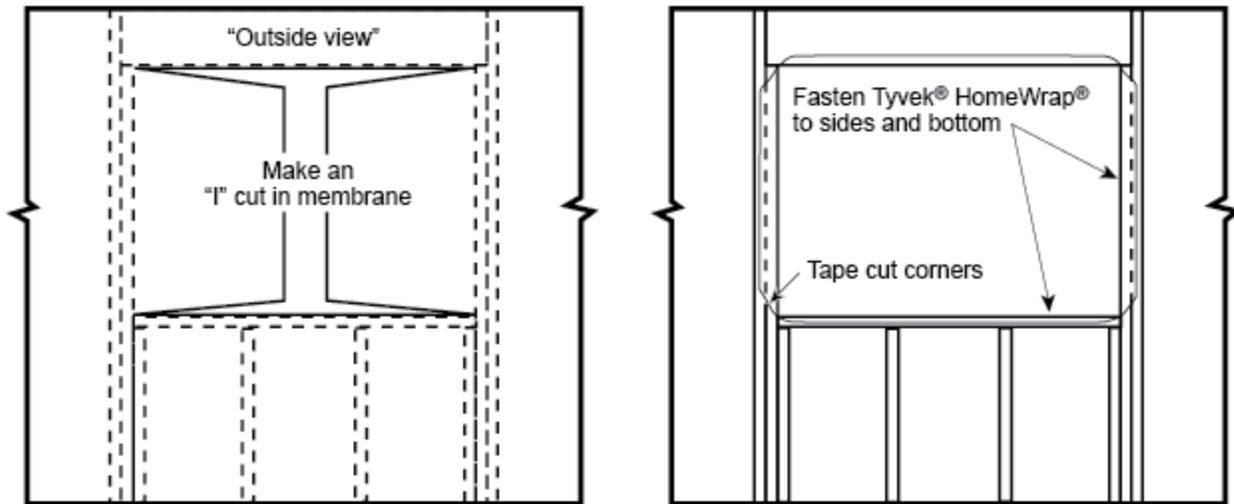


Figure 4. “Tyvek® HomeWrap®” window and door openings

The material shall be cut and wrapped around framing at openings (see Figure 4). Cut ends should then be taped or caulked to the inside frame. To ensure continuity at this junction, a seal must be established with the window or door element (see Figure 5).

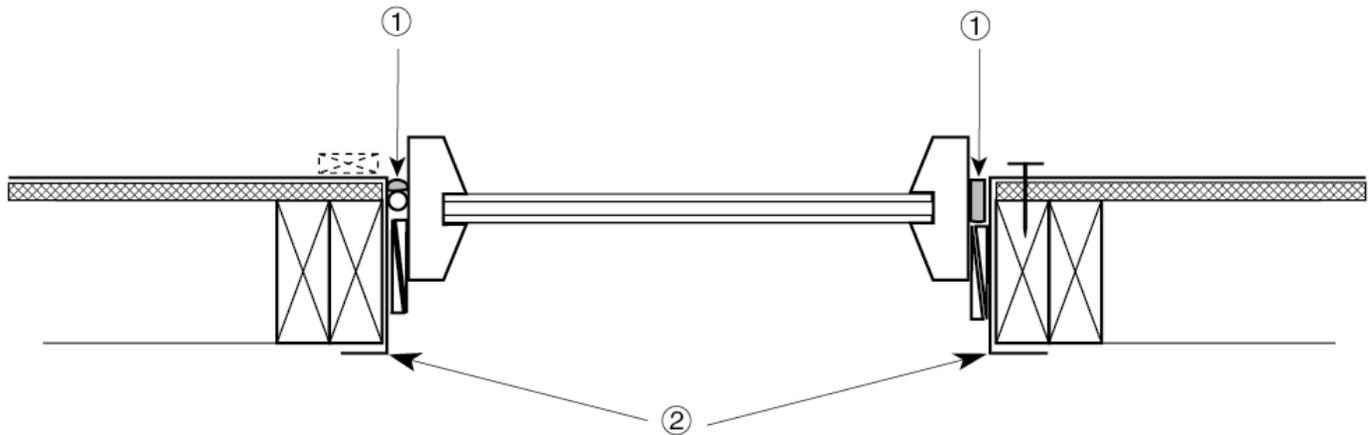


Figure 5. “Tyvek® HomeWrap®” window frame cross-section

1. seal to window with sealant or foam compatible with “Tyvek® HomeWrap®” and wood/vinyl/aluminum frames
2. “Tyvek® HomeWrap®”

The plane of airtightness of the material must be made continuous with windows and doors that are part of the air barrier system for the building envelope. The material must be sealed to the window or door frames with either sealant/backer rod or filled with sealant foam. Sealants must be compatible with the material and adhere to the framing material.

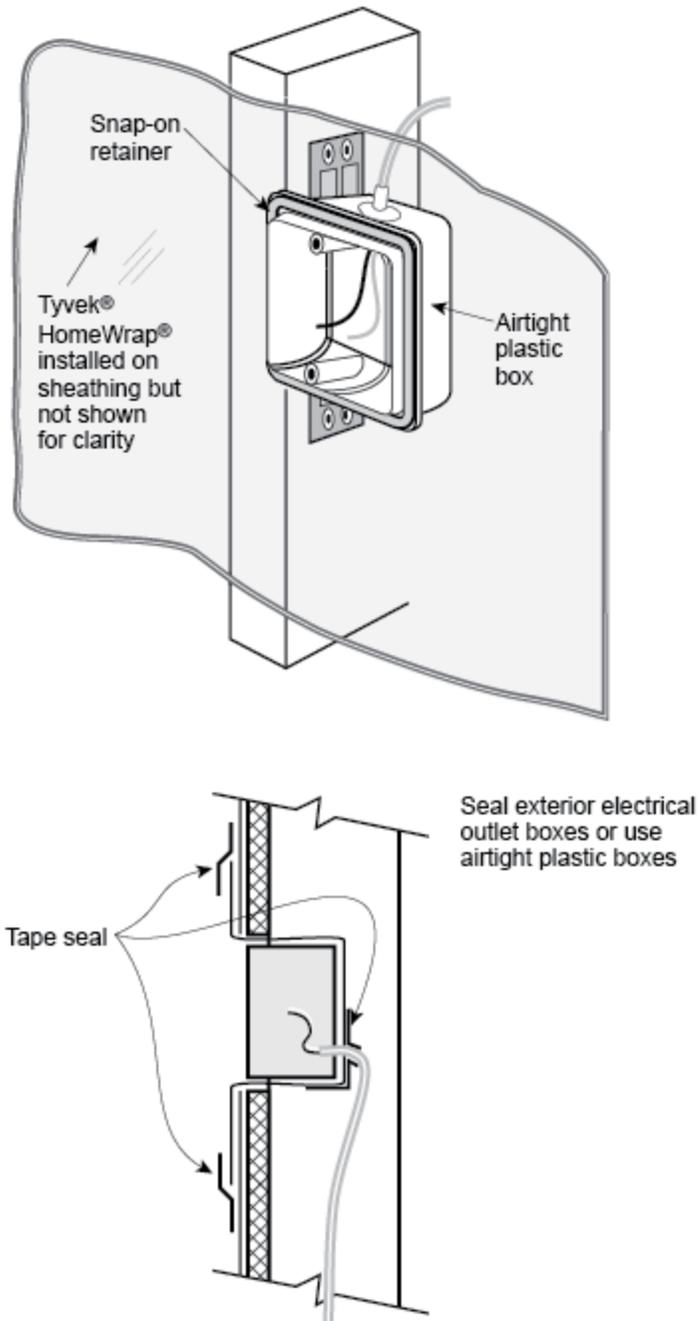
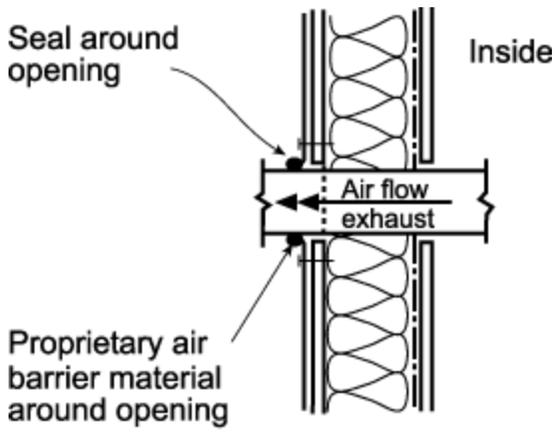
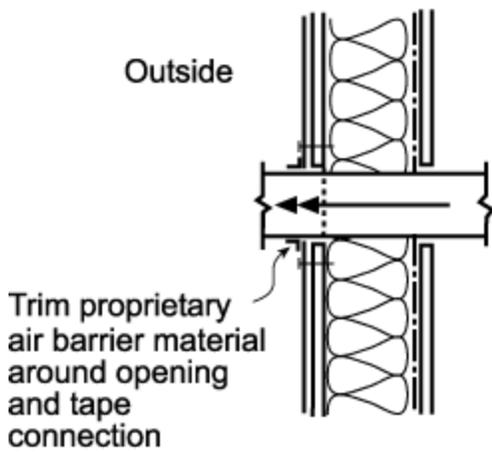


Figure 6. “Tyvek® HomeWrap®” exterior electrical boxes

All exterior electrical boxes or other penetrations through the material must be rendered airtight to maintain the plane of airtightness of the air barrier system. All electrical boxes must be wrapped and taped to the product's membrane, or airtight electrical boxes can be used.



Method One



Method Two

Figure 7. Sealing at wall penetrations

Where pipes and ducts may breach the “Tyvek[®] HomeWrap[®] – Air Barrier Material” membrane, they must be sealed to the membrane. A sealant bead compatible with the product and the pipe or duct material or CCMC-evaluated sheathing tape is recommended.

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