

## Evaluation Report

### CCMC 12857-R

**MASTERFORMAT DIVISION**

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## ***Tyvek® Homewrap™ – Air Barrier Material***

### 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 of Canada (NBC) 2005:

- 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), and
  - Appendix A-9.25.3.2.

This opinion is based on CCMC’s evaluation of the technical evidence in Section 4.1 provided by the Report holder.

### 2. Description

This report addresses the performance of “Tyvek® Homewrap™ – Air Barrier Material” 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 presented in Appendix A as additional information for the convenience of building officials and designers.

“Tyvek® Homewrap™ – Air Barrier Material,” if installed as part of the designated air barrier system, will serve a dual function in the wall assembly. The use of “Tyvek® Homewrap™” as a sheathing membrane to control incidental water infiltration behind cladding is covered under a separate CCMC Evaluation Report (see CCMC 12808-R).

“Tyvek® Homewrap™” is a spun-bonded olefin material made by combining continuous fibres of high-density polyethylene into a sheet through a process using heat and pressure. The product is 0.15 mm thick and white in colour. It comes in rolls ranging in width from 0.91 m to 2.90 m and in length 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.

- "Tyvek® Homewrap™ – Air Barrier Material" material has demonstrated a sufficiently low air permeance equivalent to the materials outlined in Appendix A-9.25.3.2. and Sentence 5.4.1.2.(1) of Division B of the NBC 2005, to be the principal plane of airtightness in an air barrier system.
- When "Tyvek® Homewrap™ – Air Barrier Material" is installed as part of the airtight element of the designated air barrier system, the vapour barrier need generally comply only with Sentences 9.25.4.2.(1) and (6) of Division B of the NBC 2005. In cases where another low water vapour permeance element has been installed in the wall assembly, Sentences 9.25.4.2.(2) to (5) 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;
  - installed 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 deemed by building officials based on past cladding performance); and
  - installed according to DuPont Canada's "Tyvek® Homewrap™" Installation Manual's (sheathing membrane, air barrier and header wrap) most recent update (examples of the installation details are presented as "Additional Information" in Appendix A).
- It should be noted that a concealed air space exceeding 25 mm in width must contain proper fire stopping, in accordance with Subsection 9.10.16. of Division B of the NBC 2005.

### 4. Technical Evidence

CCMC's Technical Guide for "Air Barrier Materials" sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an alternative solution in compliance with the NBC 2005. The Report holder has submitted test results and other data for CCMC's evaluation. Testing was conducted at an independent laboratory recognized by CCMC. The corresponding test results for "Tyvek® Homewrap™ – Air Barrier Material" are summarized below.

The durability assessment of "Tyvek® Homewrap™" is covered under CCMC 12808-R.

#### 4.1 NBC 2005 Compliance Data for “Tyvek® Homewrap™ — Air Barrier Material” on which CCMC Based its Opinion in Section 1

**Table 1. Results of Testing “Tyvek® Homewrap™ — Air Barrier Material” to CCMC’s Technical Guide for Air Barrier Material**

Test	Requirement	Result
Five 1 m <sup>2</sup> membrane specimens tested and measured for air permeance at a minimum of six air pressure differentials ( $\Delta P$ ) between 0 Pa and 250 Pa.	Air leakage rate at 75 Pa $\Delta P$ (based on linear regression of 30 data points)  $\leq 0.02 \text{ L}/(\text{s}\cdot\text{m}^2)$	0.010 L/(s·m <sup>2</sup> )

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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 in conformance with the NBC 2005, Division B, Article 9.25.3.2. However, CCMC’s opinion is that an air barrier system using this material and installed in conformance with the details as outlined below and in DuPont Canada’s Installation Manual should satisfy the requirements for continuity of the air barrier system in the NBC 2005, Division B, Articles 9.25.3.1. and 9.25.3.3.

### **Discussion**

Authorities having jurisdiction 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 have adequate strength to resist that pressure in spanning between points of support, such as its own fastening points or the points where strapping or cladding are fastened to the wall. CCMC’s evaluation of “Tyvek® Homewrap™” material does not include the evaluation of this strength or the strength of the continuity details. The authority having jurisdiction must therefore determine whether the “Tyvek® Homewrap™” air barrier system, described herein, meets the intent of the NBC 2005, Division B, Sentence 9.25.3.2.(1) as being an effective barrier for the proposed construction in the proposed geographical/climate area. For example, the authority having jurisdiction may deem the proposed “Tyvek® Homewrap™” 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 authority having jurisdiction 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**

“Tyvek® Homewrap™” material is applied over exterior wood-based wall sheathing material complying with the NBC 2005. 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 “Tyvek® Homewrap™” 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.

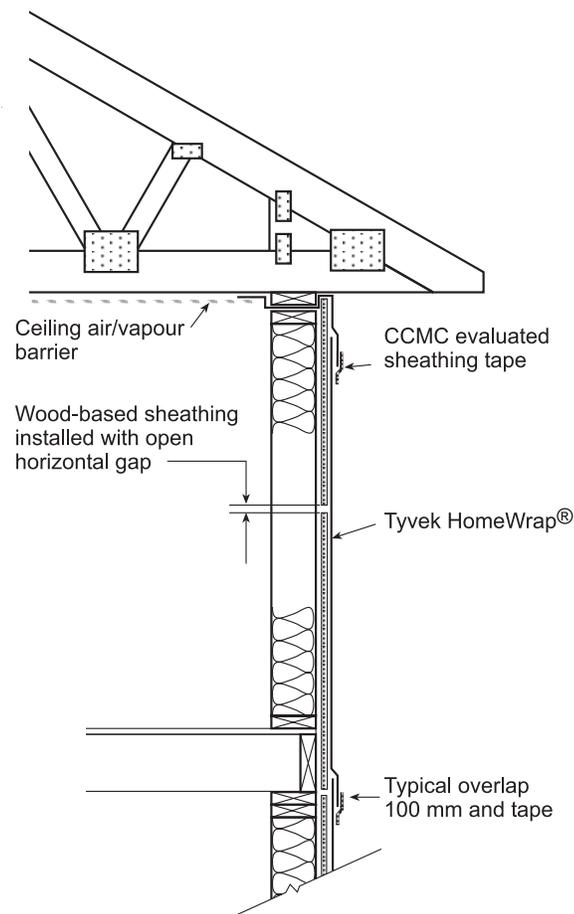
A successful air barrier system installation is predicated on sequencing during construction. Coordination is required during erection of framing and after completion of the air barrier system to ensure that no other trade breaches the integrity of the installed air barrier system.

The “Tyvek® Homewrap™” air barrier system is defined as possessing the following features:

- i) “Tyvek® Homewrap™” material as the principal plane of airtightness;

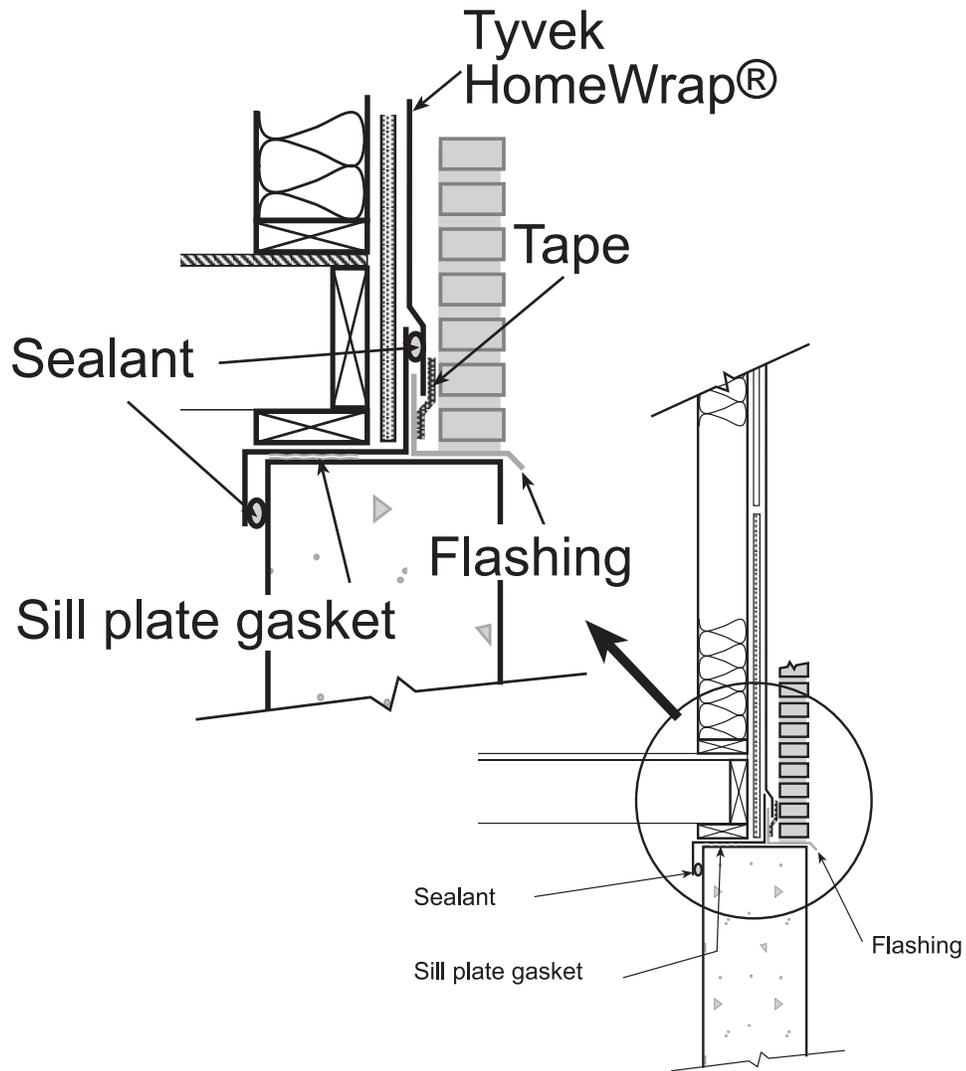
- ii) accessories including: sealants and CCMC-evaluated sheathing tape to maintain continuity at junctions with penetrations in the wall assembly (i.e. windows, doors, pipes, ducts, electrical outlets, etc.) and in accordance with continuity details in the DuPont Canada Installation Manual;
- iii) durable, 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 “Tyvek® Homewrap™” air barrier system in the field. See DuPont Canada’s “Tyvek® Homewrap™” Installation Manual for additional details.



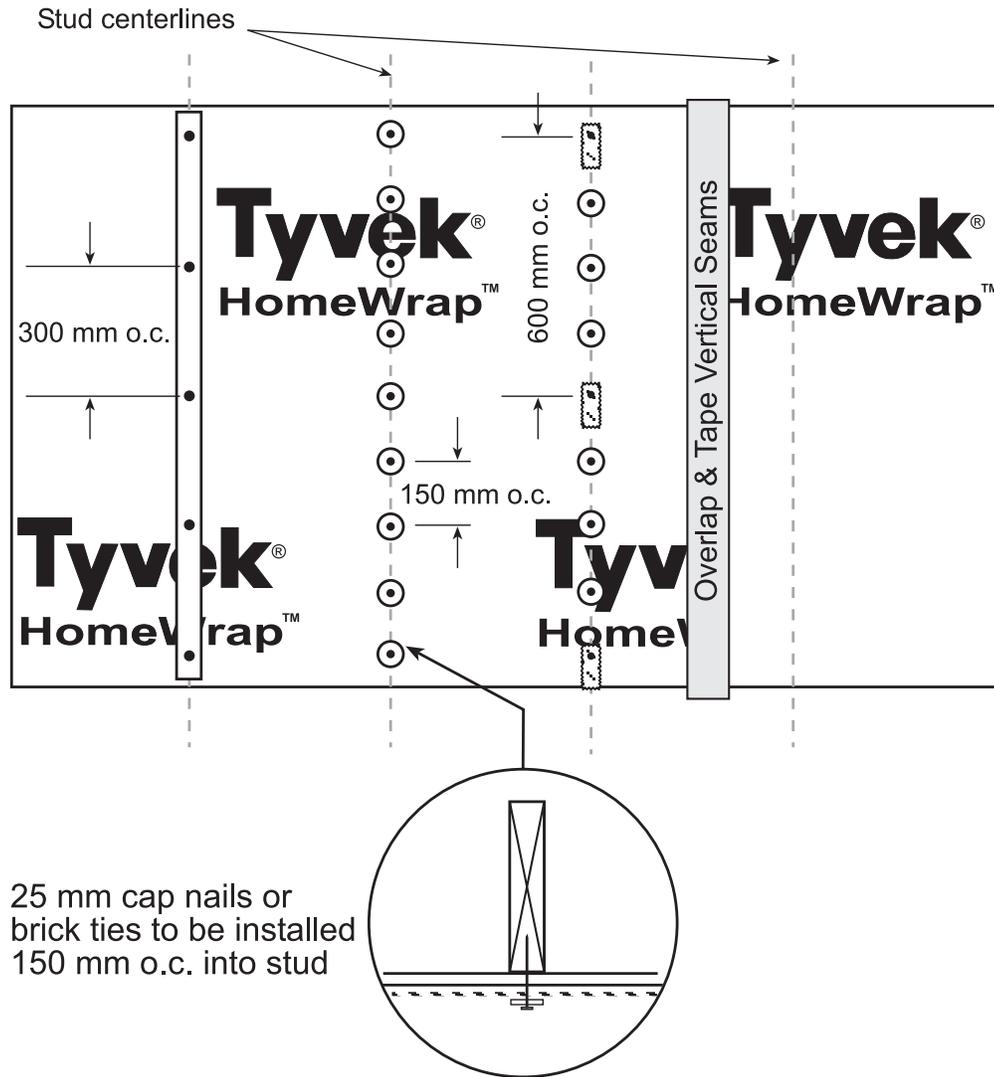
**Figure 1. “Tyvek® Homewrap™” exterior wall cross-section – top wall/ceiling continuity.**

All horizontal joints in “Tyvek® Homewrap™” material must be overlapped 100 mm and taped with CCMC-evaluated sheathing tape. To maintain continuity of the plane of airtightness, the “Tyvek® Homewrap™” 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 9.23.16.2. of Division B of the NBC 2005 does not require special joint treatment.



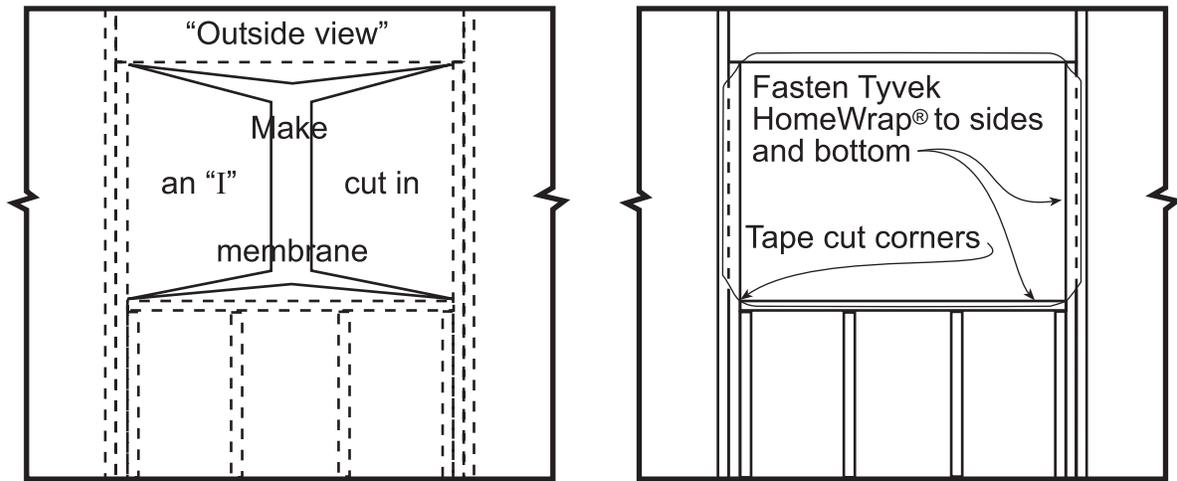
**Figure 2. “Tyvek® Homewrap™” bottom foundation detail.**

When the foundation wall is part of the air barrier system, the “Tyvek® Homewrap™” material must be sealed to the foundation wall to maintain the continuity of the plane of airtightness. Sealant used must be compatible with “Tyvek® Homewrap™,” 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.



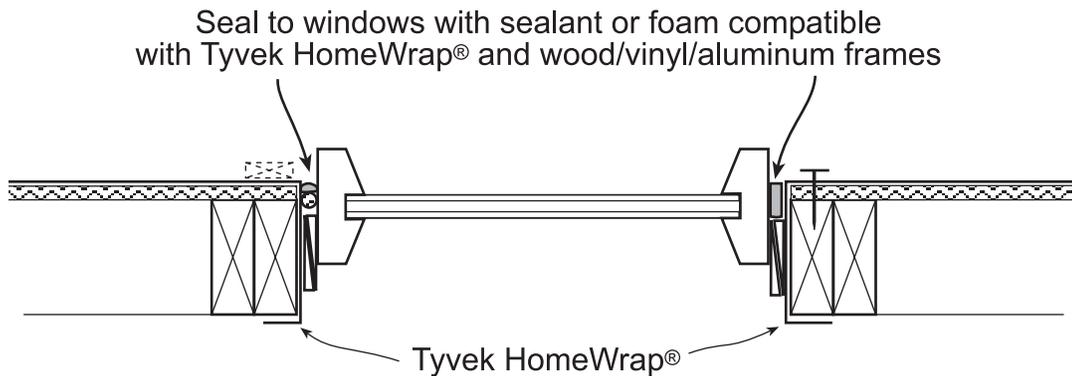
**Figure 3. “Tyvek® Homewrap™” structural fasteners.**

When installed as the principal plane of airtightness, “Tyvek® Homewrap™” 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).



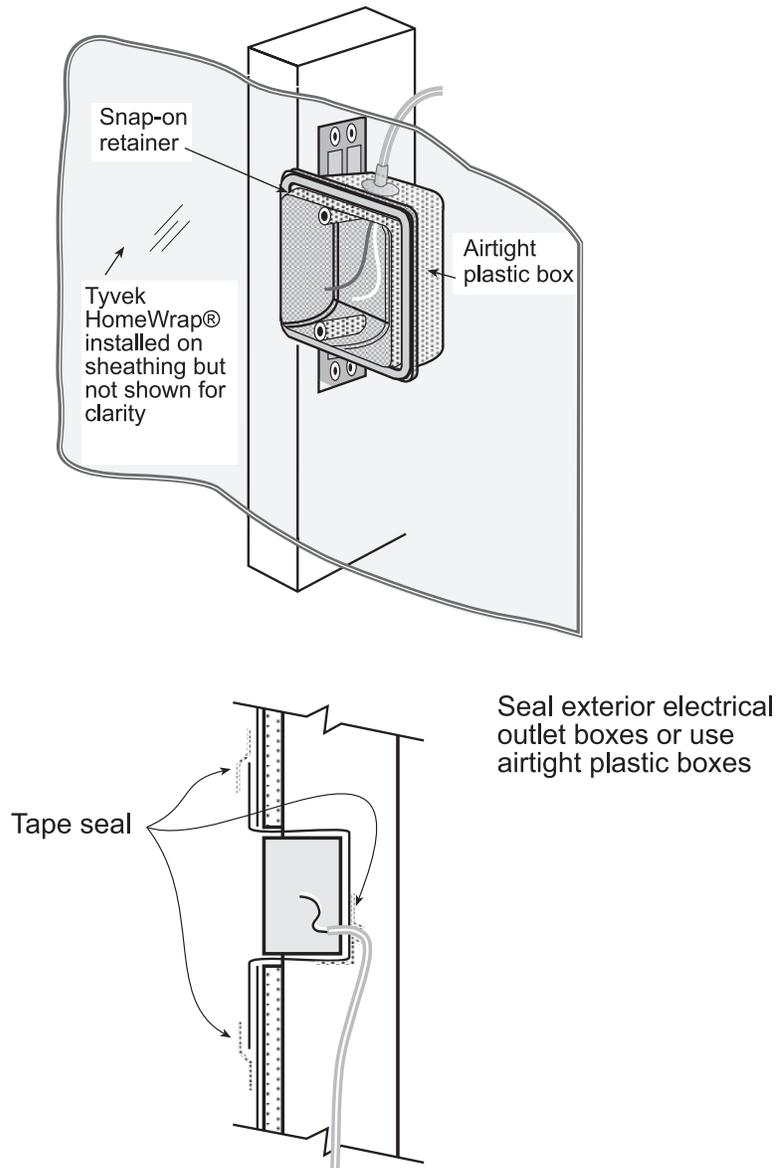
**Figure 4. “Tyvek® Homewrap™” window and door openings.**

“Tyvek® Homewrap™” 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).



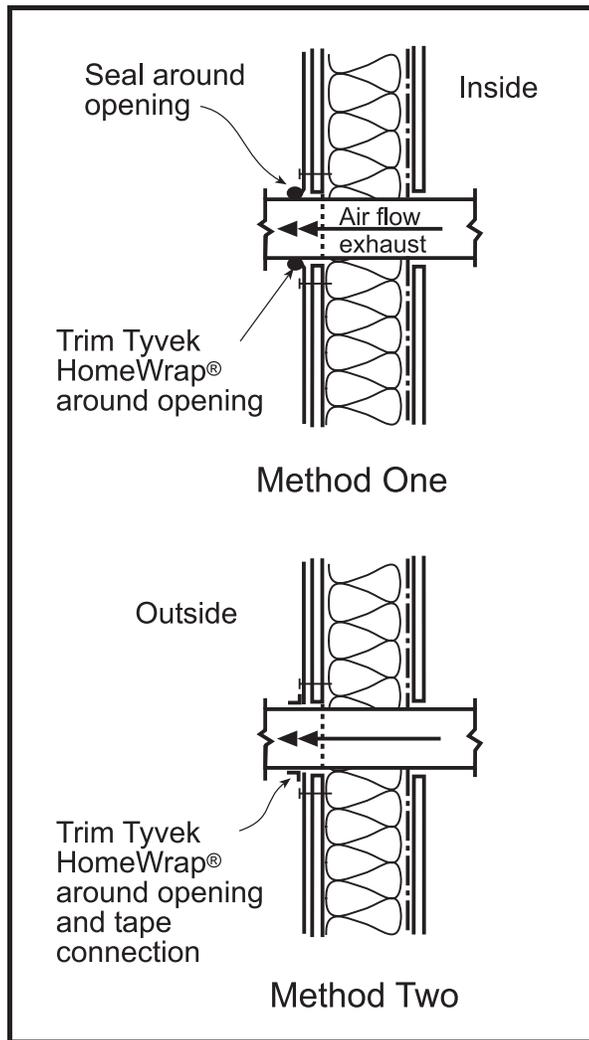
**Figure 5. “Tyvek® Homewrap™” window frame cross-section.**

The plane of airtightness of the “Tyvek® Homewrap™” material must be made continuous with windows and doors that are part of the air barrier system for the building envelope. “Tyvek® Homewrap™” 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 “Tyvek® Homewrap™” material and adhere to the framing material.



**Figure 6. “Tyvek® Homewrap™” exterior electrical boxes.**

All exterior electrical boxes or other penetrations through the “Tyvek® Homewrap™” 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 “Tyvek® Homewrap™” membrane, or airtight electrical boxes could be used.



**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 “Tyvek HomeWrap® – Air Barrier Material™” and the pipe or duct material or CCMC-evaluated sheathing tape is recommended.