



## Evaluation Report CCMC 13583-R Foamsulate-Eco – Air Barrier System

<b>MasterFormat:</b>	07 27 09.01
<b>Evaluation issued:</b>	2012-11-26
<b>Re-evaluated:</b>	2017-02-28
<b>Re-evaluation due:</b>	2018-11-26

### 1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Foamsulate-Eco – Air Barrier System,” when used as an air barrier system for exterior walls of buildings in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code (NBC) of Canada 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:
  - Subsection 9.25.3., Air Barrier Systems

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

Ruling No. 13-03-294 (13583-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 2013-07-12 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 system as specified by Accella Polyurethane Systems Canada Inc. The product is defined as having the following components and accessories:

- Foamsulate-Eco spray urethane material is the principal material in the plane of airtightness:
  - The foam system consists of two components: Foamsulate™ polyurethane isocyanate and Foamsulate-Eco resin. The two components are mixed on-site by an installer trained by the manufacturer.
- System component for strength:
  - A wall assembly consisting of steel studs that are sheathed with Georgia-Pacific DensGlass Gold® exterior sheathing over a concrete foundation and constructed to withstand the anticipated loads.
- Accessories for continuity:
  - Blueskin® SA and Blueskin® SA LT are modified bituminous membranes (i.e., peel and stick or thermally fused) that are manufactured by BAKOR for use as transition membranes over construction, control and expansion joints, at junctions between different assemblies and at penetrations.
  - Dow FROTH-PAK™ is a one component polyurethane post-expanding foam with backer rod (CCMC 13074-R) for use between a plywood buck and window rough opening framing.

As per CCMC 13527-L, the finished product is Georgian Pine in colour. The product is a Type 2 spray urethane with an assigned long-term thermal resistance (LTTR) value of 2.00 m<sup>2</sup>C/W per 50 mm. If the product's foam insulation serves as the principal component in the Accella Polyurethane Systems Canada Inc. proprietary air barrier system, it must be installed at a minimum thickness and density, which is specified in Section 3 of this Report.

Installation of the product is to be done on-site by installers trained by Accella Polyurethane Systems Canada Inc. following the Accella Polyurethane Systems Canada Inc. document, “Foamsulate-Eco Air Barrier System Guide Specification,” dated February 2017. In addition, Morrison Hershfield Ltd. (MH) will perform follow-up inspections of the installations on a periodic basis.

Foamsulate-Eco insulation material, if installed as part of the designated air barrier system, will serve a dual function in the wall assembly: as the principal plane of airtightness of the designated air barrier system and as an exterior insulation. Use of the product as an insulation is covered under CCMC 13527-L.

### **3. Conditions and Limitations**

The CCMC compliance opinion in Section 1 is bound by the “Foamsulate-Eco – Air Barrier System” being used in accordance with the conditions and limitations set out below.

#### **3.1 Air Barrier System**

The air barrier system has demonstrated sufficiently low air permeance when it has a thickness of 38.1 mm and a minimum field density of 37.0 kg/m<sup>3</sup> in order to meet the intent of Section 5.4., Air Leakage, and Subsection 9.25.3. of Division B of the NBC 2010 for buildings with an indoor relative humidity (RH) of 35% or less. For buildings with a higher RH (for example, swimming pools and museums) an additional assessment is required in accordance with Part 5.

The structural wind loading tests that were conducted qualify the air barrier system for use in low-rise buildings in geographical locations where the Q<sub>50</sub> value does not exceed 0.60 kPa (the Q<sub>50</sub> value is the hourly wind pressure for a 1-in-50 year return period, which can be found in Appendix C of the NBC 2010).

For control of condensation, when the air barrier system insulation material has low air and vapour permeance *and* is installed on the cold side of the wall assembly, the interior vapour barrier must comply with Article 9.25.4.2., Vapour Barrier Materials, of Division B of the NBC 2010. Additionally, the insulation material, which is installed outboard of the wall assembly, must be installed at a thickness of 25.4 mm or greater to comply with Article 9.25.5.2., Position of Low Permeance Materials, of Division B of the NBC 2010 for the respective geographical location.

For the control of air leakage, a conforming installation of the proposed air barrier system must be installed:

- with a minimum thickness of 38.1 mm as exterior insulation over exterior gypsum board sheathing; and
- on-site by installers trained by Accella Polyurethane Systems Canada Inc. according to the Accella Polyurethane Systems Canada Inc. document, “Foamsulate-Eco Air Barrier System Guide Specification,” dated February 2017, where detailed construction drawings must be followed (see Appendix A of this Report for examples).

#### **3.2 Air Barrier System – Field Quality Assurance**

When the Foamsulate-Eco spray urethane is applied as the designated air barrier system, the installer must be trained by Accella Polyurethane Systems Canada Inc. and MH audits must be conducted to ensure:

- the approved accessories are being used;
- proper installation of the transition membrane by conducting periodic tension testing as part of the Accella Polyurethane Systems Canada Inc. specified quality control;
- proper continuity details and substrate conformance as part of the product’s quality control procedures;
- proper application of the Foamsulate-Eco spray foam; and
- daily work records for the air barrier system installation are maintained.

#### **3.3 Insulation – Field Quality Assurance**

When the proposed spray urethane is applied as spray foam insulation, the material must be manufactured on-site by qualified installers licensed by the manufacturer with field inspections carried out by MH. MH certifies the Accella Polyurethane Systems Canada Inc. training program and conducts field audits to ensure installations are in accordance with CAN/ULC-S705.2-05, “Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Application.”

The installation procedure must follow the manufacturer’s installation instruction manual. A copy of this manual must be available on the job site at all times during the installation. All installers must present their Accella Polyurethane Systems Canada Inc. licensing card and specific site worksheet upon request by the building official.

The Accella Polyurethane Systems Canada Inc. field quality assurance program requires periodic audits of the installers, usually random inspections with some mandatory inspections of larger projects. Building officials may contact Accella Polyurethane Systems Canada Inc. (1-306-721-1339) and request an inspection for a specific job site if the building official deems it necessary. In cases where the installation is deemed non-conforming by MH/Accella Polyurethane Systems Canada Inc. and is not remedied by the installer, MH/Accella Polyurethane Systems Canada Inc. will inform the owner/architect/building official of the non-conforming installation. See CCMC 13527-L for additional limitations on the installation of the proposed spray foam product.

Foamsulate-Eco polyurethane resin and Foamsulate™ isocyanate must have their respective containers (i.e., drums) identified by the phrases “CCMC 13527-L” and “CCMC 13583-R.”

## 4. Technical Evidence

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

### 4.1 Performance Requirements

Three representative specimens of the product were tested and the performance resulting from these tests has been deemed applicable to the product 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:

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

#### 4.1.1 Air Leakage Rate

**Table 4.1.1.1 Results of Testing the Air Leakage Rate of the Product**

Property	Requirement	Result
<b>GP DensGlass Gold®/metal stud walls (Figures A1.1 and A1.2 in Appendix A)</b>	Air leakage rate <sup>1</sup> at 75 Pa $\Delta P$ $\leq 0.05 \text{ L}/(\text{s} \cdot \text{m}^2)$ <sup>2</sup>	0.03 $\text{L}/(\text{s} \cdot \text{m}^2)$

#### Notes to Table 4.1.1.1:

1. The air leakage rate of the specimens is determined after the structural wind loading ( $Q_{50} = 0.6 \text{ kPa}$ ) in order to represent structural aging of the air barrier system. The air barrier system was subjected to a loading schedule involving: one-hour sustained positive and negative pressure set at 0.60 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.
2. The air leakage rate requirement is based on Table 4.1.1.2 developed by the CCMC/NRC with input from an industry consortium. Table 4.1.1.2 is deemed to meet the intent of the NBC 2010 for air barrier system performance.

**Table 4.1.1.2 Permissible Air Leakage Rate of the Product**

Water Vapour Permeance 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
$15 < \text{WVP} \leq 60$	0.05
$60 < \text{WVP} \leq 170$	0.10
$170 < \text{WVP} \leq 800$	0.15
$> 800$	0.20

For more information on the CCMC Technical Guide requirements and how they relate to the NBC 2010 requirements, please see the NBC Publication, *Air Barrier Systems for Walls of Low-Rise Buildings: Performance and Assessment*.

## 4.1.2 Durability of Air Barrier System Components

**Table 4.1.2.1 Results of Testing the Durability of the Product Components**

Property	Requirement	Result
“Foamsulate-Eco” spray urethane insulation	Air permeance before and after aging, $\leq 10\%$ increase	Pass
	Thermal resistance after heat aging and weathering, 90% retention	Pass
Transition membrane: Blueskin® SA	Physical properties before and after aging, 85% retention	Pass
Dow FROTH-PAK™	CCMC 13074-R	Pass

### Report Holder

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## Appendix A

### A1 Specimens Tested to Qualify System Details

Figures A1.1, A1.2 and A1.3 outline the *original* full-scale specimens tested with Foamsulate-Eco spray urethane, which represents typical construction details to be reproduced in the field as part of the installation of the Accella Polyurethane Systems Canada Inc. *current* proprietary “Foamsulate-Eco – Air Barrier System.”

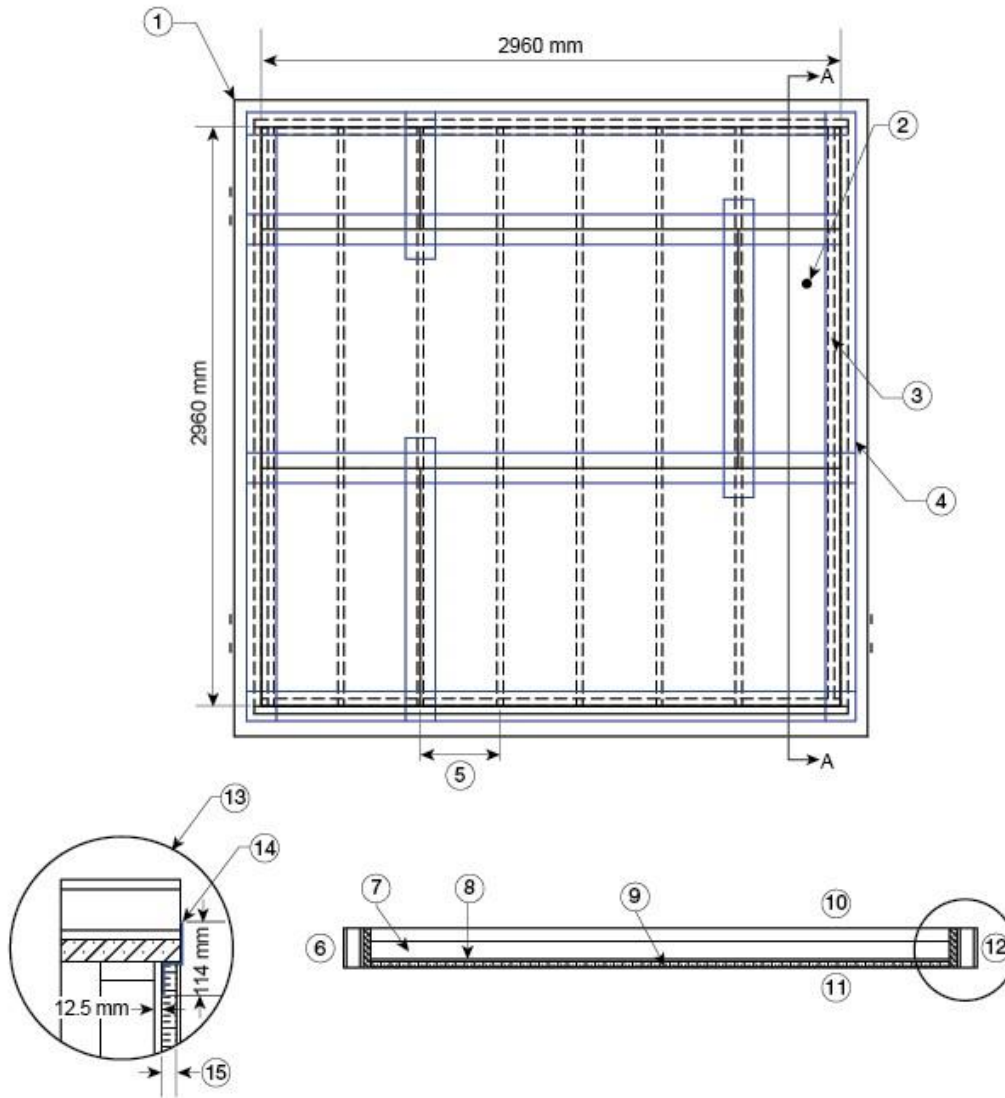


Figure A1.1. Specimen No. 1 – opaque wall:

1. wall section installed in steel frame
2. 38-mm-thick exterior gypsum sheathing fastened to steel studs
3. 92 mm, 20 ga. steel studs installed at 406 mm on centre (o.c.)
4. 150-mm-wide flashing membrane
5. stud spaced at 406 mm o.c.
6. figure call-out showing Section A-A
7. steel studs
8. 12.5 mm exterior sheathing
9. Foamsulate-Eco spray foam insulation with a nominal thickness of 38 mm
10. interior side
11. exterior side
12. detail A
13. figure call-out showing detail A
14. flashing membrane installed around wall perimeter and sealed to steel frame (all walls, 1-3)
15. 38-mm-thick spray foam

#### Notes to Figure A1.1:

1. Foamsulate-Eco spray-applied foam insulation installed on the exterior side of the wall section; target thickness of 38 mm (nominal).
2. All sheathing joints sealed as per flashing membrane and primer installation instructions prior to spray foam application.

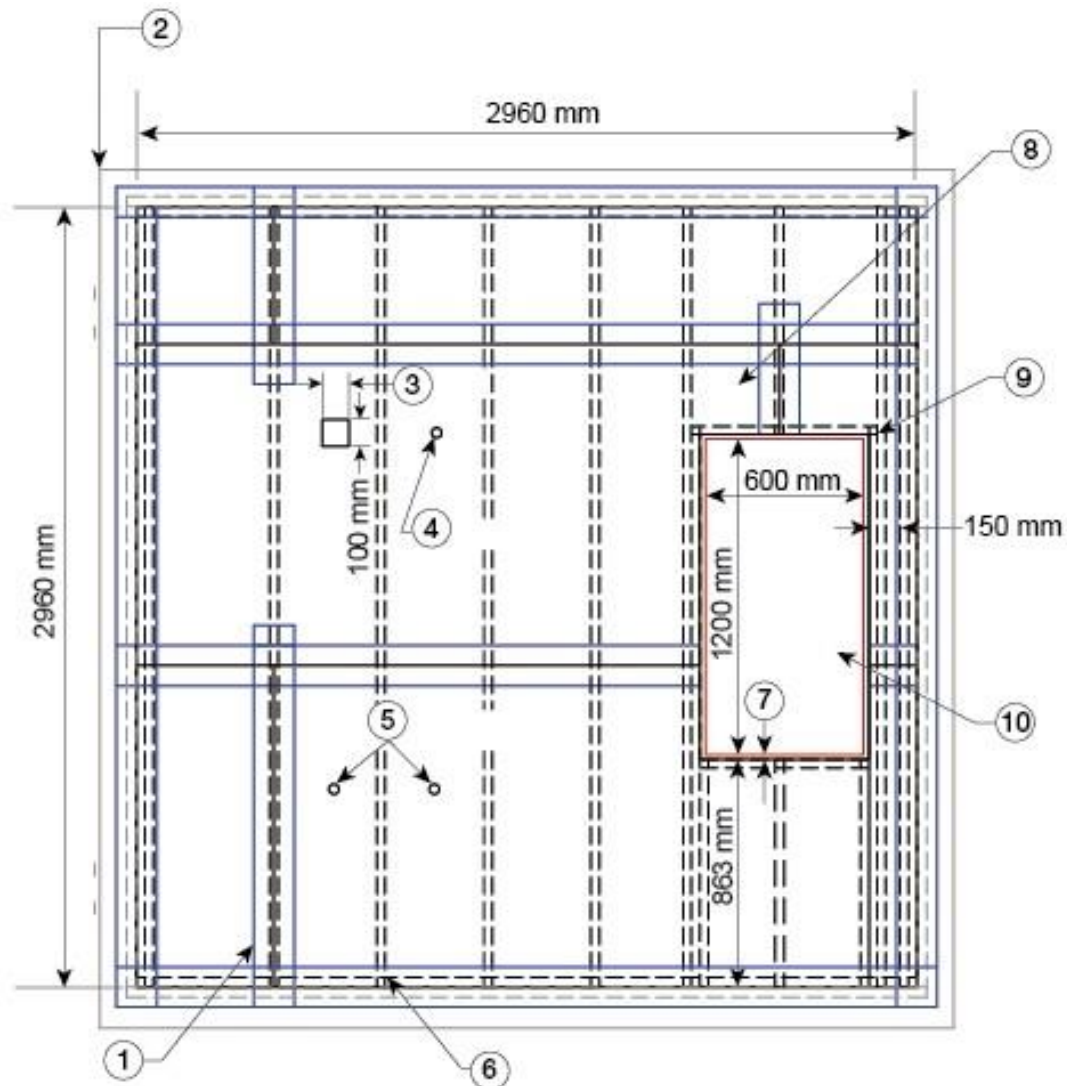
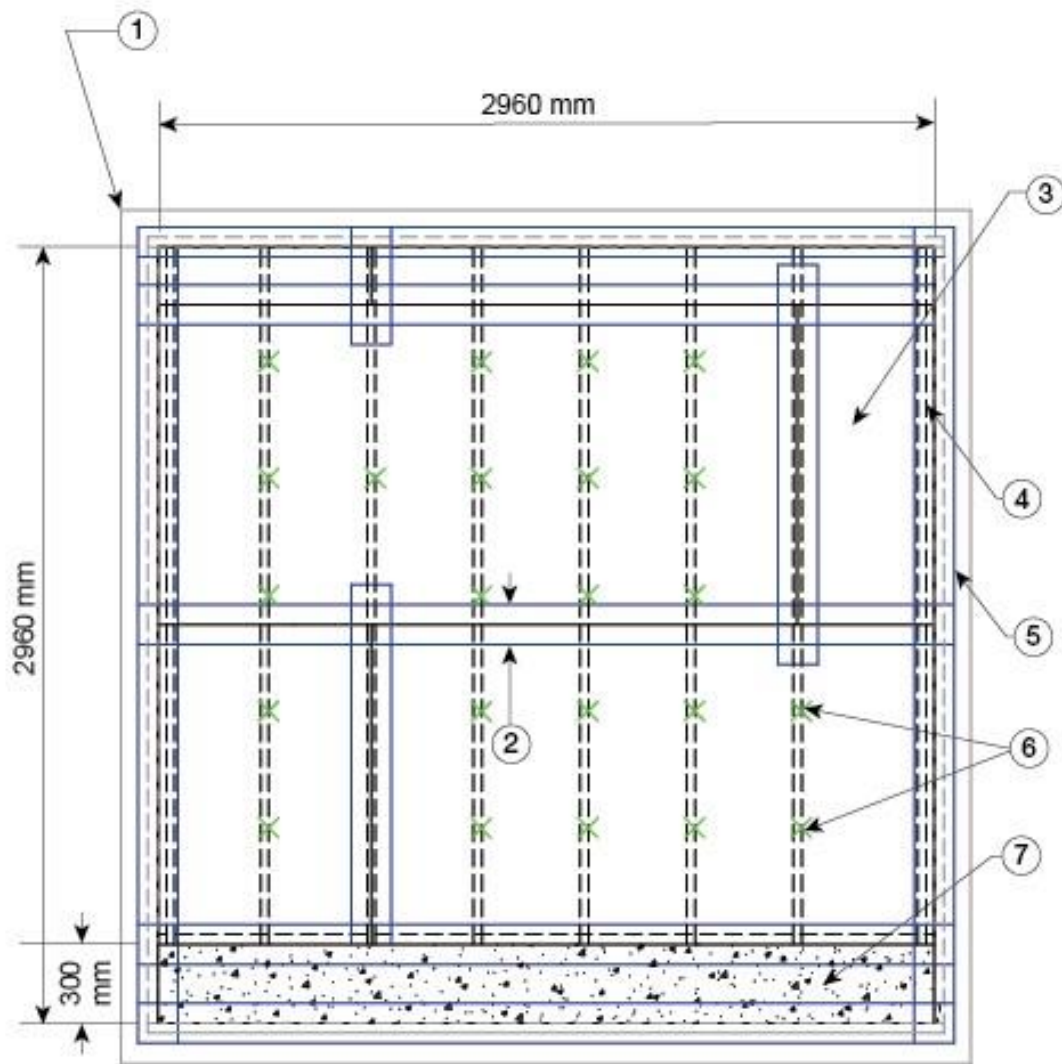


Figure A1.2. Specimen No. 2 – continuity at penetrations:

1. flashing membrane
2. wall section installed in steel frame
3. 100 mm duct
4. 38 mm PVC pipe
5. 38 mm conduit pipes
6. 92 mm, 20 ga. steel studs installed at 406 mm o.c.
7. 12.5 mm rough opening gap
8. 12.5-mm-thick exterior gypsum sheathing fastened to steel studs
9. window rough opening framing members sealed with flashing membrane
10. plywood window sealed to rough opening with backer rod and CCMC evaluated one component spray foam for use with windows

#### Notes to Figure A1.2:

1. Foamsulate-Eco spray-applied foam insulation installed on the exterior side of the wall section; target thickness of 38 mm (nominal).
2. All sheathing joints sealed as per flashing membrane and primer installation instructions prior to spray foam application.



**Figure A1.3. Specimen No. 3 – foundation interface and opaque wall with modifications (brick ties):**

1. wall section installed in steel frame
2. 150 mm flashing tape
3. 12.5-mm-thick exterior gypsum sheathing fastened to steel studs
4. 92 mm, 20 ga. steel studs installed at 406 mm o.c.
5. flashing membrane and primer installed as per manufacturer's installation instructions
6. brick ties
7. concrete foundation interface (exterior of concrete sealed with flashing membrane)

**Notes to Figure A1.3:**

1. Foamsulate-Eco spray-applied foam insulation installed on the exterior side of the wall section; target thickness of 38 mm (nominal).
2. All sheathing joints sealed as per flashing membrane and primer installation instructions prior to spray foam application.
3. No flashing or sealing product applied around brick ties; penetrations sealed with spray foam insulation.
4. In this case, because the foundation wall is designated as part of the air barrier system, 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, the penetrations from electrical wiring, pipes or ducts must be sealed through the use of a transition membrane. Mechanical fasteners for brick veneer must also be installed to verify the seal at these attachments.



## A2 Proprietary Air Barrier System Details

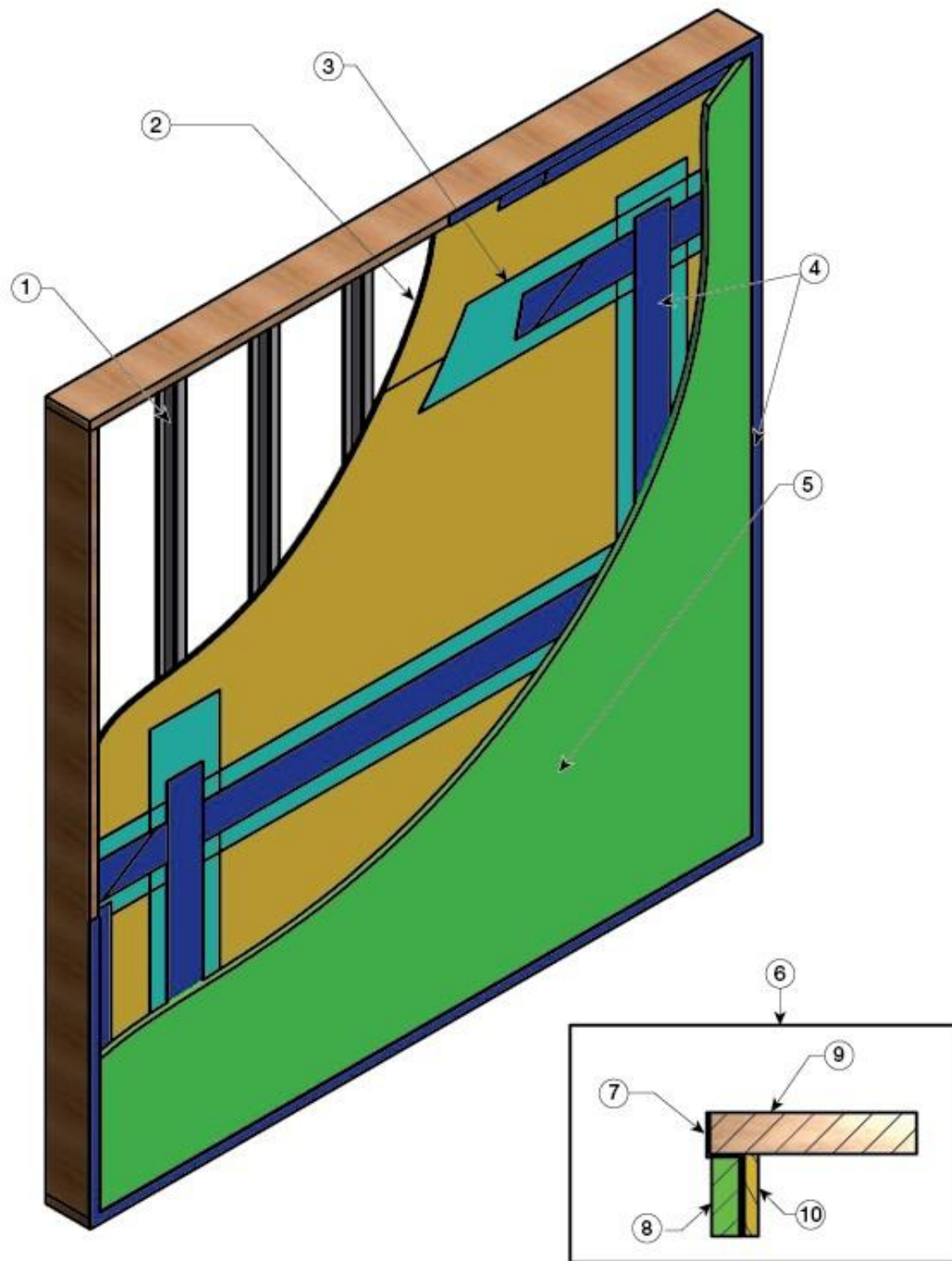


Figure A2.1. Air barrier system details – opaque wall:

1. metal studs
2. 12.5-mm-thick Georgia-Pacific DensGlass Gold® exterior sheathing
3. joint primer
4. all joints sealed with 150-mm-wide Blueskin SA
5. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
6. figure call-out showing corner detail
7. 150-mm-wide Blueskin SA formed around edge
8. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
9. sill or edge
10. Georgia-Pacific DensGlass Gold®



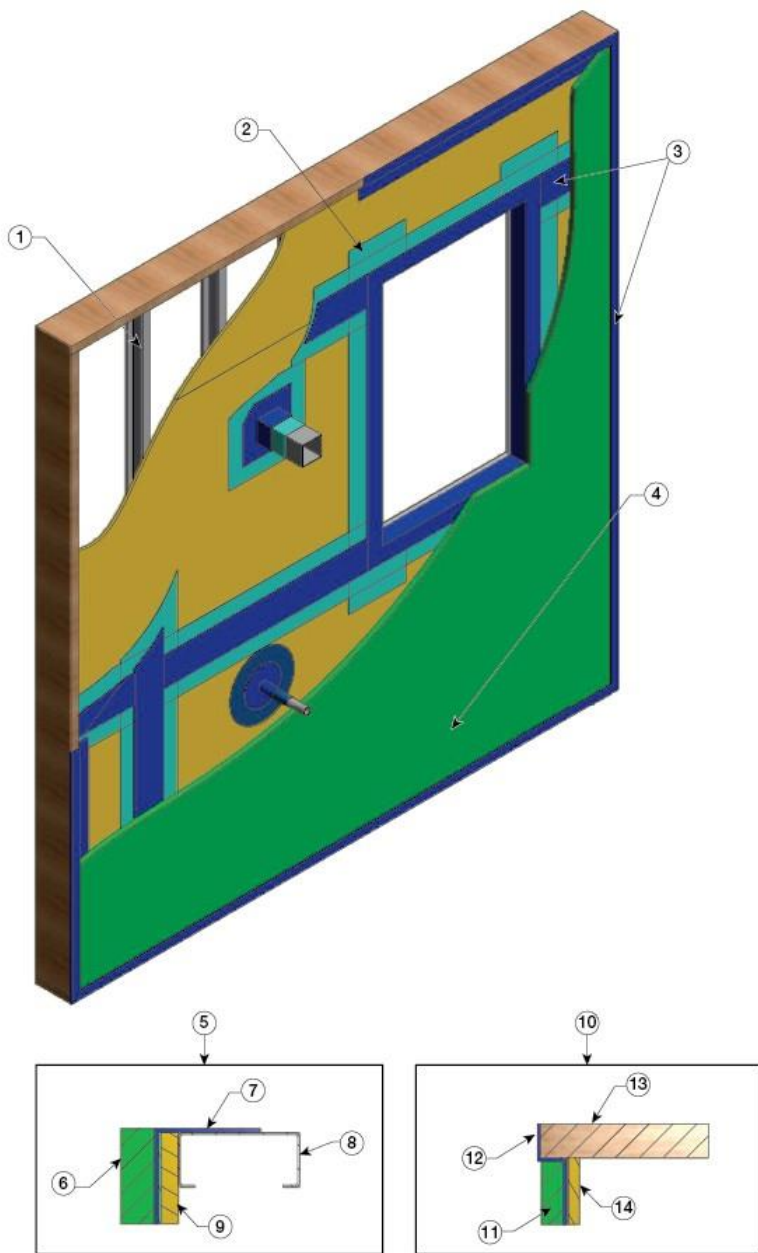


Figure A2.2. Air barrier system details – penetrations:

1. studs
2. joint primer
3. all joints sealed with 150-mm-wide Blueskin SA
4. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
5. figure call-out showing window detail
6. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
7. 150-mm-wide Blueskin SA formed around edge
8. window rough opening
9. Georgia-Pacific DensGlass Gold®
10. figure call-out showing corner detail
11. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
12. 150-mm-wide Blueskin SA formed around edge
13. sill or edge
14. Georgia-Pacific DensGlass Gold®

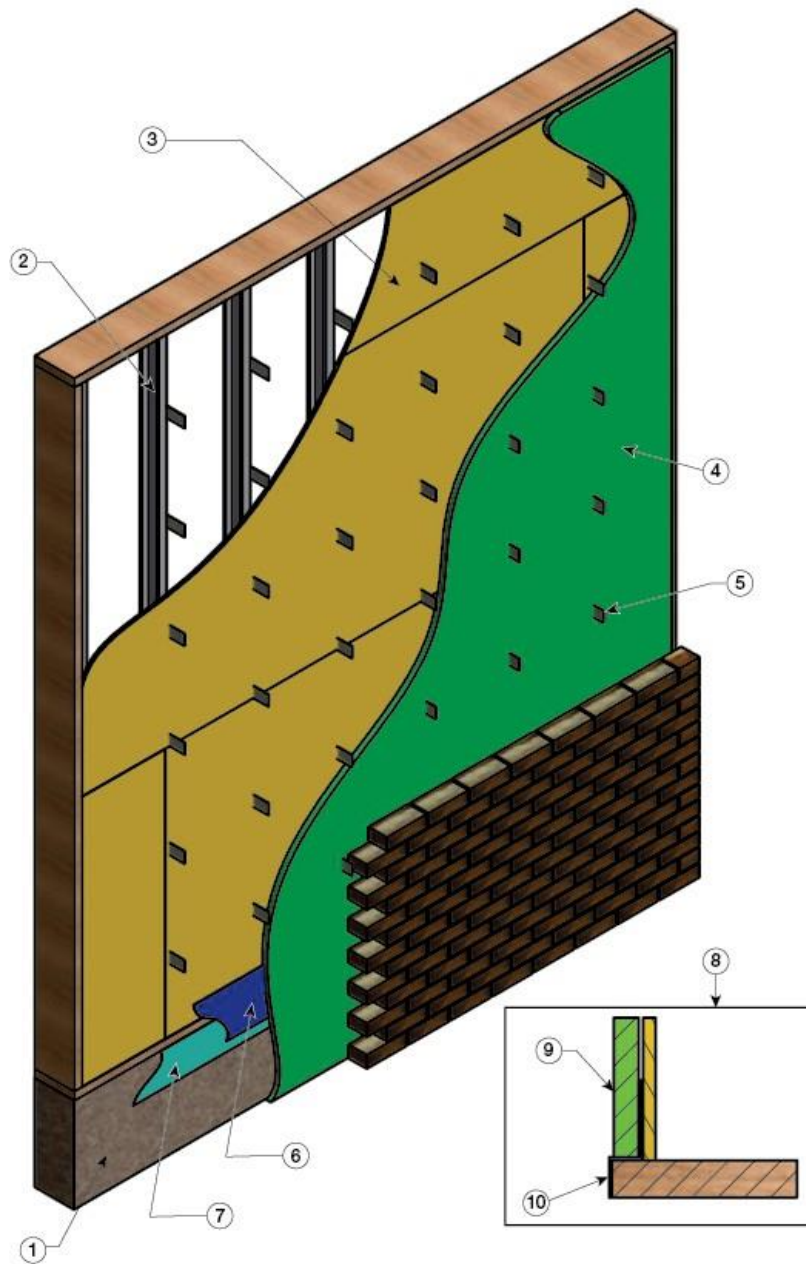


Figure A2.3. Air barrier system details – foundation wall and brick ties:

1. concrete foundation
2. metal studs
3. 12.5-mm-thick Georgia-Pacific DensGlass Gold® exterior sheathing
4. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
5. Blok-Lok BL-607 brick ties
6. 150-mm-wide Blueskin SA formed around edge
7. joint primer
8. figure call-out showing corner detail
9. 38-mm-thick (nominal) Foamsulate-Eco spray foam insulation
10. 150-mm-wide Blueskin SA formed around edge

Date modified:  
2017-03-08