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CCMC 12932-R

CCMC *EVALUATION REPORT*

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Re-Evaluation
in process

Walltite® – Air Barrier System

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1. Purpose of Evaluation

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that “Walltite® Air Barrier System” can serve as an air barrier system for the exterior walls of low-rise buildings, in compliance with the intent of the National Building Code of Canada (NBC) 1995.

2. Opinion

Subject to the limitations and conditions stated in this report, test results and assessments provided by the proponent show that “Walltite® Air Barrier System” complies with CCMC’s Technical Guide, Air Barrier Systems for Exterior Walls of Low-Rise Buildings, MasterFormat Number 07272, dated 96-02-09, and provides a level of performance equivalent to that required in:

- NBC 1995, Section 5.4. and Subsection 9.25.3.

Ruling No. 06-10-154 (12932-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made

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by the Minister of Municipal Affairs and Housing on 10 May, 2006 pursuant to s.29 of the Building Code Act, 1992 (see Ruling for terms and conditions)

Canada Mortgage and Housing Corporation permits the use of this product in construction financed or insured under the National Housing Act.

3. Description

This report addresses the performance of the “Walltite® Air Barrier System” as an air barrier ‘system’ as specified by BASF Canada. The “Walltite® Air Barrier System” is defined as possessing the following components and accessories:

- “BASF Walltite®” spray urethane material as the principal material in the plane of airtightness;
- Accessories for continuity are comprised of: Blue Skin SA®, a modified-bituminous membrane (i.e. peel-and-stick or thermally fused) manufactured by Monsey Bakor as a transition membrane over construction, control and expansion joints, at junctions between different assemblies and at penetrations; and

Specified sealants that conform to CAN/CGSB-37.29-M89 at membrane-to-foundation junctions and conforming to CGSB 19.0-M77 on the interior side around window and door openings;

- System component for strength:

A structural substrate such as concrete block or exterior gypsum sheathing, OSB or plywood sheathing substrate, within a wall designed to withstand the anticipated loads.

- Installation:

To be installed on-site BASF Canada - trained installers following the BASF Canada specified

“Walltite® Air Barrier System” installation manual entitled “BASF Walltite Technical Guide” and dated December 1, 1999. In addition, Morrison Hershfield (MH) Limited carries out follow-up inspections of the installations on a periodic⁽¹⁾ basis.

“Walltite®” 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. The use of “Walltite®” as an insulation is covered under CCMC Evaluation Report No. 12840-R.

The foam system “Walltite®” consists of two components: “Walltite®” polyurethane resin and “Lupranate® 17 Isocyanate.” The two components are mixed on site by a qualified licensed installer with fixed-ratio positive displacement equipment. The finished product is light blue in colour. The final cured product has a nominal density of 30.4 kg/m³ and an assigned design thermal resistance value of 1.05 m² ·°C/W per 25 mm (R6 per inch). If “Walltite®” foam insulation serves as the principal component in “Walltite® Air Barrier System” it must be installed at a minimum thickness and density specified below.

4. Usage and Limitations

The “Walltite® Air Barrier System” has demonstrated sufficiently low air permeance, when having a 25.4 mm thickness and a minimum field density of 35.6 kg/m³, to meet the intent of Section 5.4. and Subsection 9.25.3 of the NBC 1995. This conformance applies for buildings with an indoor relative humidity of 35% RH or less. For special cases of buildings with higher relative humidity (i.e. swimming pools, museums) additional assessment would be required.

The structural wind loading conducted qualifies the “Walltite® Air Barrier System” for low-rise buildings in geographical locations where the Q₁₀ value does not exceed 0.60 kPa. The Q₁₀ value is the hourly wind pressure for a 1-in-10 year return period which can be found in Appendix C of the NBC 1995.

When “Walltite®” insulation material, which has low air and vapour permeance, is installed as part of the airtight element of the designated air barrier system, the vapour barrier must comply with NBC Sentence 9.25.4.2.(2). Also, in this case, “Walltite®” must be installed at a 25.4 mm or greater thickness to comply with Article 9.25.1.2. for the respective geographical location.

For the control of air leakage, a conforming installation of the “Walltite® Air Barrier System” must be:

- installed with a minimum thickness of 25.4 mm as exterior insulation over exterior sheathing or masonry back-up wall;
- installed according to BASF Canada’s Air Barrier System Installation Manual where detailed construction drawings must be followed (see example details as tested in Section 5 below).
- when the “Walltite®” spray-urethane is applied as the designated air barrier system, BASF requires that the installer be BASF Canada trained and MH audits⁽¹⁾ be conducted to provide assurance that:
 - 1) the approved accessories are being utilized;
 - 2) the proper installation of the transition membrane by periodic tension testing as part of the BASF specified quality control;
 - 3) the continuity details and the substrate conformance as part of the “Walltite® Air Barrier System” quality control procedure;
 - 4) the proper application of the “Walltite®” spray foam; and
 - 5) daily work records for the air barrier system installation are maintained.

Note to Section 4;

BASF Canada mandates, as part of their field quality control assurance and training program, that the “Walltite®” spray foam insulation

material and air barrier system shall be manufactured on-site by qualified installers licensed by BASF Canada with field inspections carried out by a third-party certification organization. The third-party certification organization certifies the BASF Canada training program and provides follow-up inspection of installers in the field for installations in accordance with CAN/ULC-S705.2-98, “ Standard for Thermal Insulation-Spray Applied Rigid Urethane Foam, Medium Density, Installer’s Responsibilities-Specification” (formerly CAN/CGSB-51.39-92).

The third-party certification organization¹ specified by BASF Canada Inc. is Morrison Hershfield (MH) Limited. The installation procedure shall follow the manufacturer’s installation instruction manual. A copy of this manual shall be available at the job site at all times during the installation. All installers shall present their BASF Canada licensing card and specific site work sheet upon request by the building official.

1. Note: The BASF Canada field quality assurance program calls for periodic audits of the installers, usually random inspections with some mandatory inspections of larger projects. Building officials may contact BASF Canada (1-866-474-3538) and require an inspection for a specific jobsite if the building official deems it necessary. In cases where the installation is deemed non-conforming by MH/BASF Canada and is not being remedied by the installer, MH/BASF Canada will inform the owner/architect/building official of the non-conforming installation.

See CCMC 12840-R for additional limitations on the installation of the “Walltite®” spray foam product.

The components: “Walltite®” polyurethane resin and “Lupranate® 17 Isocyanate.” must have their respective containers (i.e. drums) identified by the phrase “CCMC 12840-R and CCMC 12932-R.”

BASF Canada mandates that the “Walltite® Air Barrier System” be installed in the field by BASF Canada-trained installers following the BASF Canada specified “Walltite® Air Barrier System” installation manual dated Dec. 1, 1999 and in conformance with CAN/ULC-S705.2-98, “Sprayed Application of Rigid Polyurethane Cellular Plastic Thermal Insulation for Building Construction.”

A copy of the installation instructions shall be available at the job site at all times during the installation for review by building officials. All installers shall present their BASF Canada licensing card upon request by the building official.

5. Performance

Testing of this air barrier system was conducted at an independent laboratory recognized by CCMC. The results of testing the “Walltite® Air Barrier System” are summarized in Tables 1 and 2 which was conducted on four representative specimens.

The performance of the “Walltite® Air Barrier System” has been tested in accordance with the CCMC Technical Guide for qualification for use as an air barrier system, namely:

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.

Table 1. Results of Testing the “Walltite® Air Barrier System”

Air Leakage Rate Testing	Requirement	Result
Masonry Walls (Figures no. 1 and no. 2 below)	Air Leakage Rate ⁽¹⁾ at 75 Pa ΔP ≤ 0.05L/(s·m ²) ⁽²⁾	Air Leakage Rate ⁽¹⁾ at 75 Pa ΔP 0.0054 L/(s·m ²) ⁽²⁾
Exterior Gypsum/Metal Stud Walls (Figures no. 3 and no. 4 below)		

- (1) The air leakage rate of the specimen is determined after the structural wind loading ($Q_{10}=0.6$ kPa) 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, 2000 cycles of positive and negative pressure set at 0.80 kPa, and a gust wind of positive and negative pressure of 1.2 kPa.

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- 2) The air leakage rate requirement is based on the following Permissible Air Leakage Rate Table developed by CCMC/IRC with input from an industry consortium. The following table is deemed to meet the intent of the NBC 1995 for air barrier system performance.

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

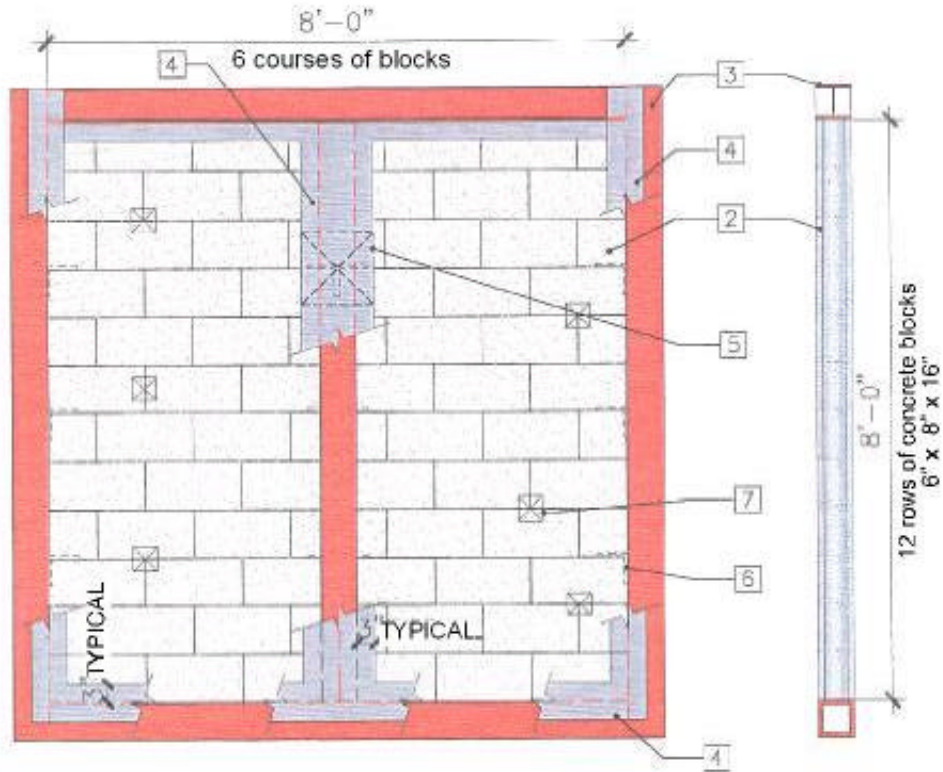
For more information on the CCMC Technical Guide requirements and how they relate to the NBC 1995 requirements, please see the IRC Publication. *Air Barrier Systems for Walls of Low-Rise Buildings: Performance and Assessment*.

Table 2. Results of Durability Testing of Components in the “Walltite® Air Barrier System”

Component	Requirement	Result
Walltite® Urethane Insulation	Air Permeance before and after aging (ASTM D726-84) <10% increase	Passed
	Thermal Resistance after heat aging and weathering 90% retention	Passed
Transition Membrane Product — Blue Skin SA	Physical Properties before and after aging 85% retention	Passed
Sealant— membrane /Foundation Product —Polybitume 570-05 by Monsey Bakor	CAN/CGSB-37.29-M89	Passed
Sealant— warm side of window and door frames Product—DyMonic by Tremco	CGSB 19.0-M77	Passed

Figures 1 to 4 outline the specimens tested, representing typical construction details to be reproduced in the field as part of the installation of the “Walltite® Air Barrier System.” The representative specimens tested also contained defects (e.g. mortar missing, missing primer for mod-bit

membrane) to verify the sensitivity of the “Walltite® Air Barrier System” to these possible field defects and allow for tolerances. See “BASF Walltite Technical Guide,” dated December 1, 1999, for more complete details.

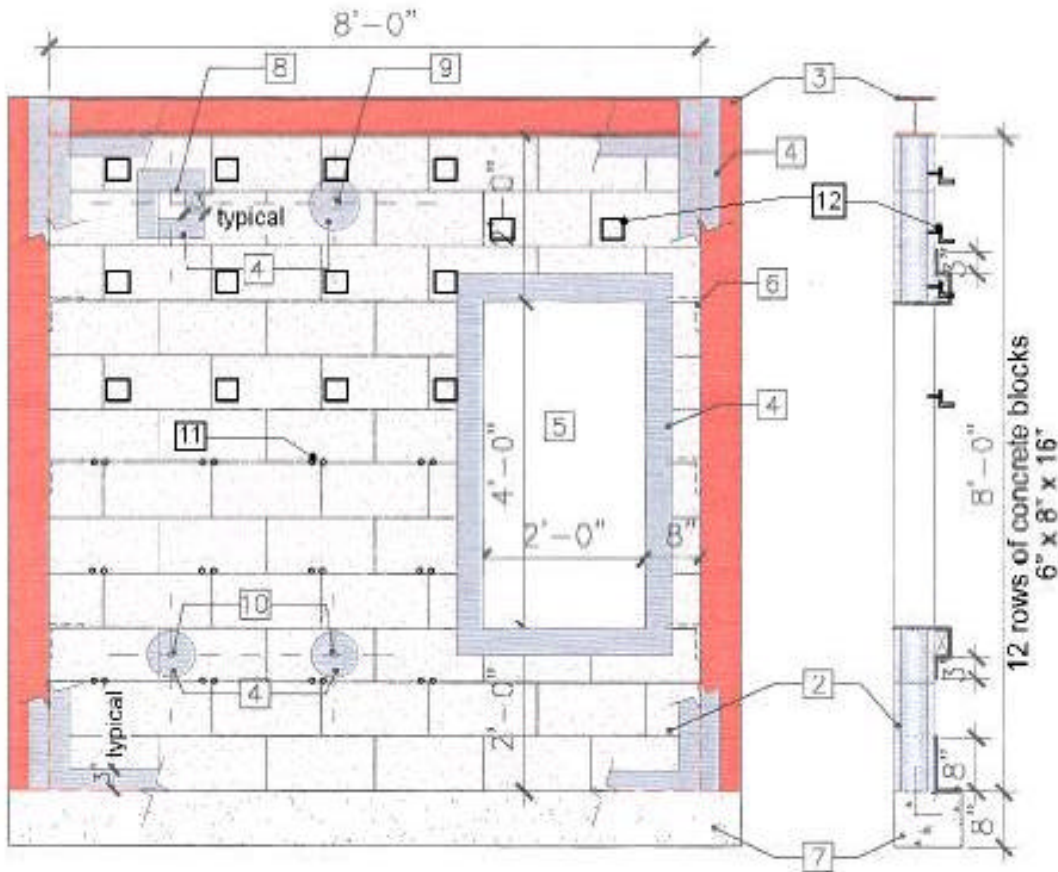


*	Walltite® 25.4 mm over surface (not shown)	5	Peel-n-Stick bituminous membrane w.o./primer
2	Concrete blocks	6	Structural tie
3	Steel frame	7	Intentional mortar joint defect for testing
4	Peel-n-Stick bituminous membrane w/primer		

Figure 1. Specimen no. 1 ¾ Opaque Wall
Construction Type ¾ Masonry block infill between steel frame

Example of Continuity Across Joints with Transition Membrane

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

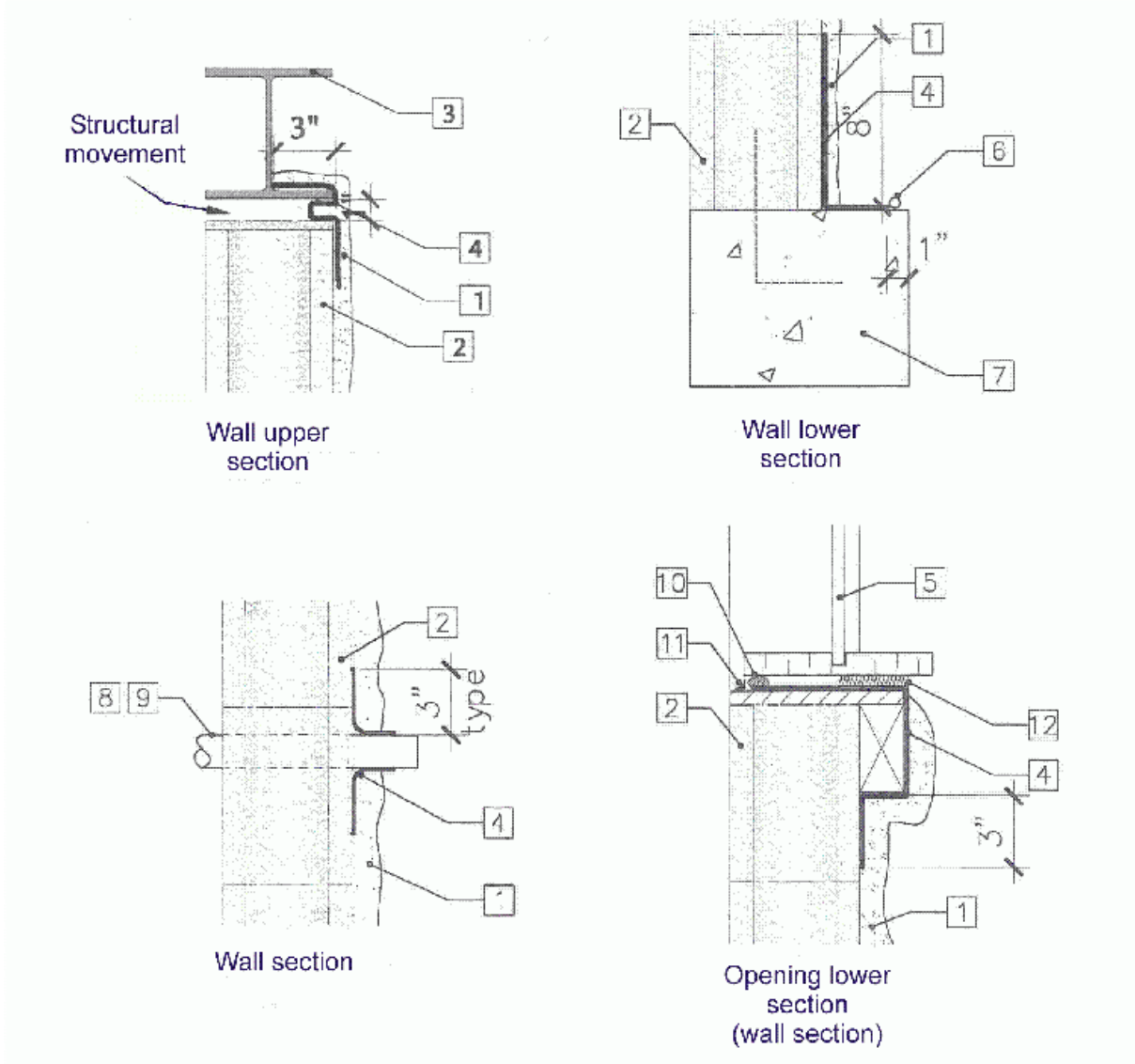


*	Walltite® 25.4 mm over surface (not shown)	7	Concrete footing
2	Concrete blocks	8	Galvanized steel duct
3	Steel frame	9	Steel pipe
4	Peel-n-Stick bituminous membrane w/primer	10	Electrical conduit
5	Window opening	11	Reinforcing ties
6	Structural tie	12	Brick veneer anchors

**Figure 2a. Specimen no. 2^{3/4} Opaque Wall with Penetrations and Fasteners (masonry ties and anchors).
Construction Type 3⁴ Masonry block infill with steel frame**

Example of Continuity Across Junctions, Penetrations and at Foundation Wall

Since 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 penetrations from electrical wiring, pipes or ducts must be sealed through the use of a transition membrane. Mechanical fasteners for brick veneer also installed to verify seal at these attachments.



1	WALLTITE® (thickness 1)
2	Concrete blocks
3	Steel structure
4	Self-adhesive membrane section with primer
5	Opening
6	Polymer base caulking strip

7	Concrete footing 8" x 10" with reinforcement
8	Galvanized steel duct 4" x 4"
9	Steel pipe 1 1/2" dia.
10	Foam seal gasket
11	Caulking
12	Glass fiber

Figure 2b. Transition Membrane Details ³/₄ at joints of masonry wall and steel frame

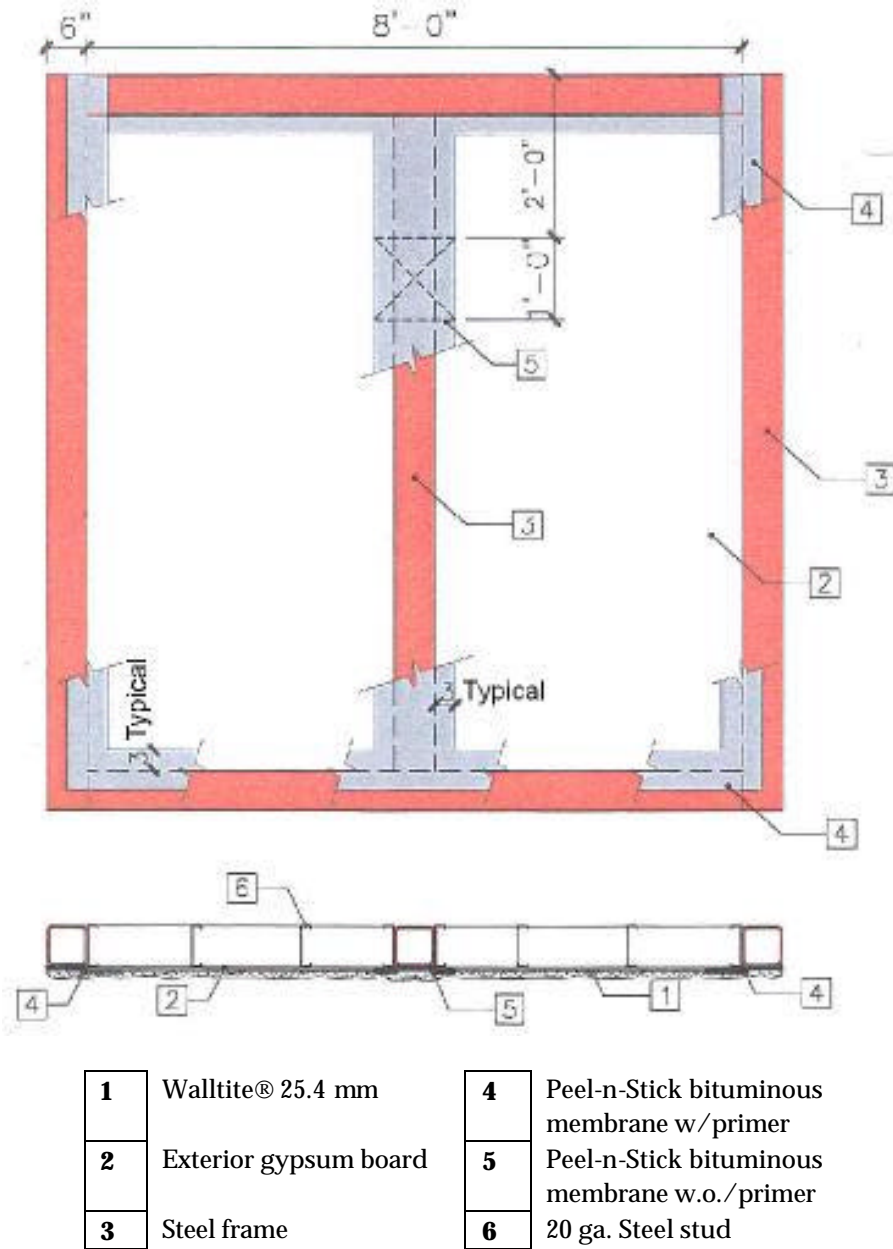
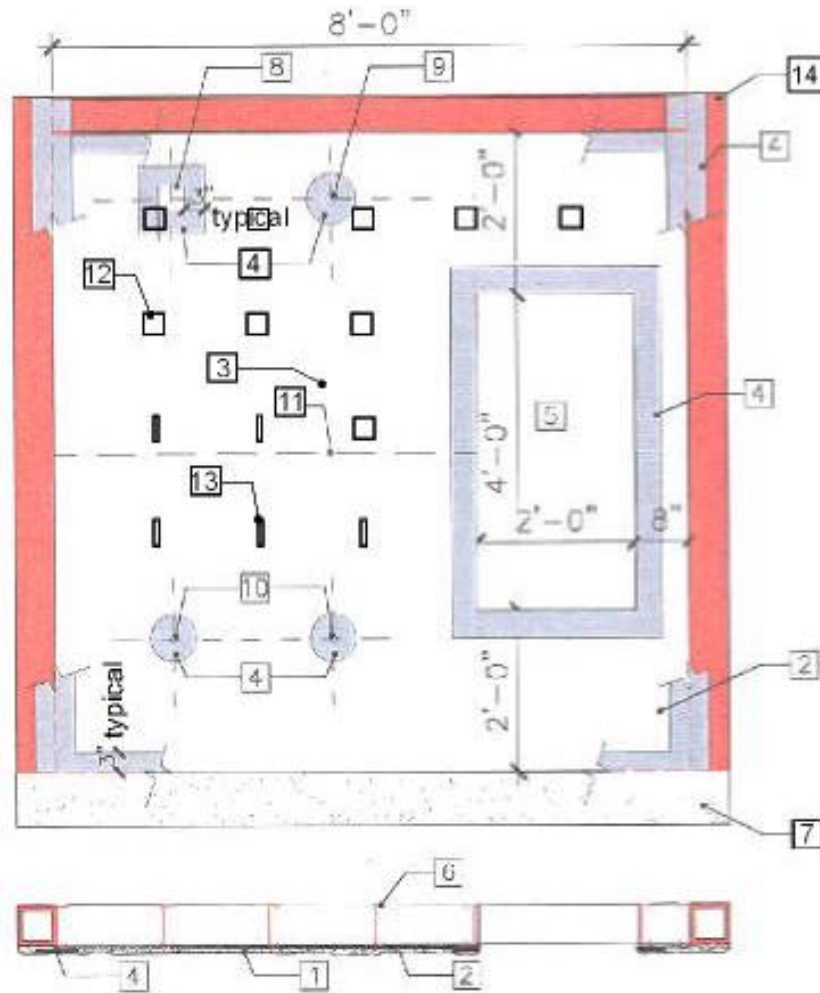


Figure 3. Specimen no. 3^{3/4} Opaque Wall
Construction Type^{3/4} Exterior gypsum/ metal studs (20 ga) infill wall with steel frame.

Example of Continuity Across Joints with Transition Membrane

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



1	Walltite® 25.4 mm	8	Galvanized steel duct
2	Exterior gypsum board	9	Steel pipe
3	Exterior gypsum board	10	Electrical conduit
4	Peel-n-Stick bituminous membrane w/primer	11	Gypsum panel joint
5	Window opening	12	Dur-o-wall anchors
6	20 ga. steel stud	13	Bailey Brick Connector
7	Concrete footing	14	Steel frame

Figure 4a. Specimen no. 4^{3/4} Opaque Wall with Penetrations and Fasteners
Construction Type 3⁴ Exterior gypsum/metal studs (20 ga) infill wall

Example of Continuity Across Junctions, Penetrations and at Foundation Wall

Since 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 penetrations from electrical wiring, pipes or ducts must be sealed through the use of a transition membrane. Mechanical fasteners for brick veneer also installed to verify seal at these attachments.

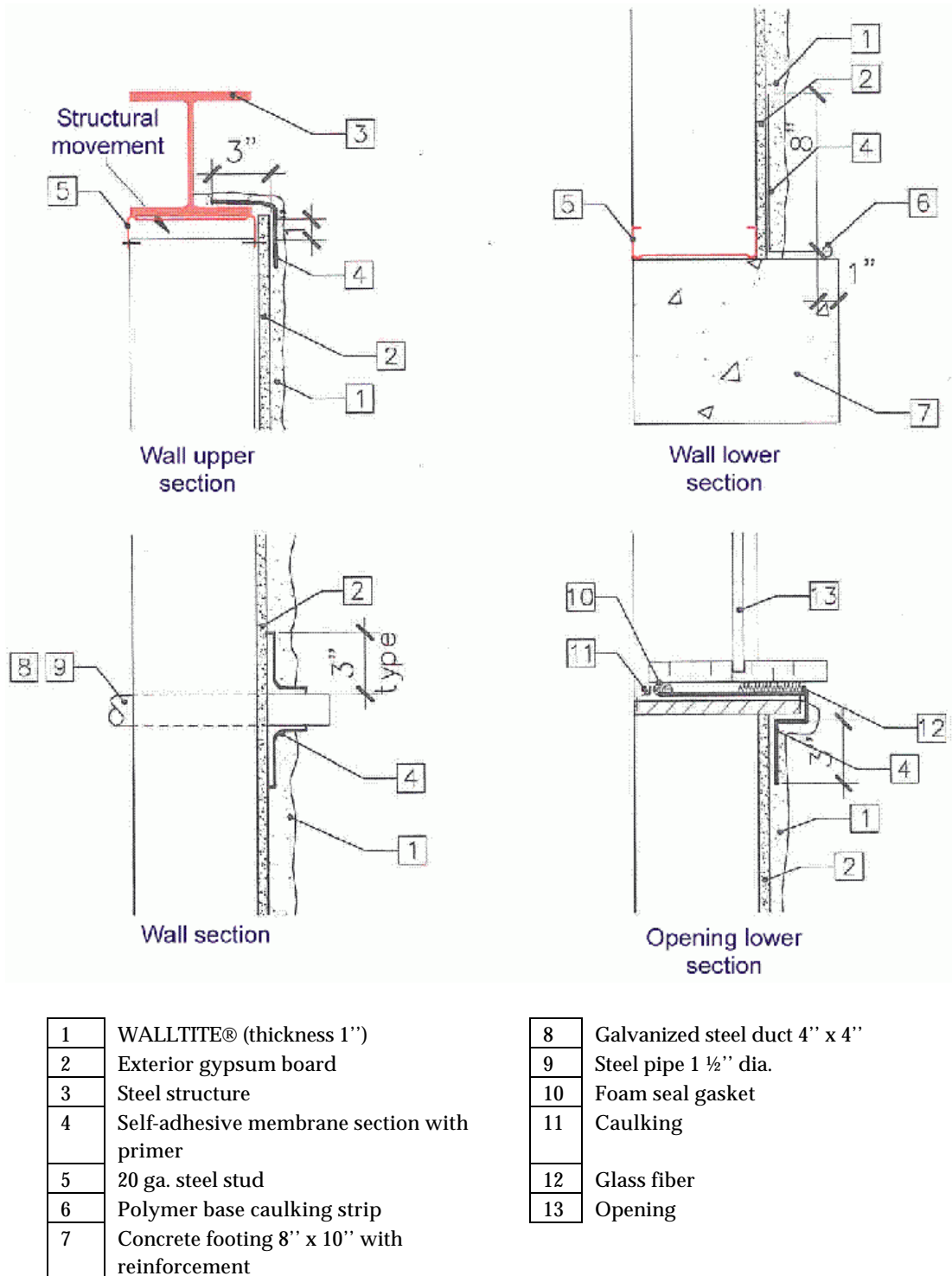


Figure 4b. Transition Membrane Details ³/₄ at joints of exterior sheathing wall and penetrations

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