

## GENERAL COMMENTS – NATIONAL BUILDING CODE OF CANADA, 2005

### Part 3 - FIRE PROTECTION, OCCUPANT SAFETY and ACCESSIBILITY

#### Flame-Spread Rating and Smoke Developed Classification (3.1.12)

For spray polyurethane insulation,

- The flame-spread rating and smoke developed classification must be determined
  - In conformance with CAN/ULC-S102, “Test for Surface Burning Characteristics of Building Materials and Assemblies”,
  - On the basis of not less than three tests, and
- Testing in conformance with CAN/ULC-S102 includes completing tests in conformance with CAN/ULC-S127, “Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Foam Plastic Building Materials”.

**NOTE:**

Flame-spread ratings based on ASTM E84

- Are not recognized by the 2005 NBCC
- Are not comparable to results determined in conformance with CAN/ULC-S102

**NOTE:**

Standard CAN/ULC-S705.1, Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material-Specification, including amendments 1 & 2, requires that surface burning characteristics of spray polyurethane foam be determined in accordance with CAN/ULC-S102 (see clause 5.5.5 of CAN/ULC-S705.1-01).

#### Combustible Construction (3.1.4)

Foamed plastic insulation is permitted to be used in combustible construction as long as the flame-spread rating of the material not more than 500.

Foamed plastics used in walls and ceilings must be protected in conformance with the requirements of Article 3.1.4.2.

#### Non combustible Construction (3.1.5)

Combustible insulation is permitted to be used in noncombustible construction provided it is protected in conformance with the requirements of Article 3.1.5.12. The flame-spread rating of the insulation must be within the limits specified in Sentences 3.1.5.12.(1) to (7).

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### Part 5 - ENVIRONMENTAL SEPARATION

#### Heat Transfer (5.3)

Materials must be installed to:

- Provide sufficient resistance to heat transfer to minimize condensation
  - On the warm side of the component or assembly
  - Within the component or assembly when used with other materials or components
- Prevent convective airflow through and around the material

The 2005 NBCC stipulates that spray polyurethane insulation must be installed in accordance with the requirements of standard CAN/ULC-S705.2-05, "Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density, Installer's Responsibilities – Specification." (5.3.1.3)

#### **NOTES:**

Clause 4.1.3 in standard CAN/ULC-S705.2-05 requires that a spray polyurethane insulation manufacturer select a certification organization to deliver its field quality assurance program (FQAP).

CCMC listings of spray polyurethane products include information on the third party certification organization that operates the manufacturer's FQAP per CAN/ULC S705.2-05.

WALLTITE® Eco v.3 - CCMC Listing No:

- For insulation and air barrier material: 13588-L

Third party certification organization operating BASF Canada's FQAP: Morrison Hershfield (MH) Limited

WALLTITE Eco v.3 must be installed in accordance with standard CAN/ULC-S705.2-05 and BASF Canada's Quality Assurance and Training Program (QATP) manual by installers licensed through the QATP and certified by MH.

#### Air Leakage (5.4)

Air leakage through building assemblies must be controlled.

An air barrier system shall:

- Be installed
- Provide the principal resistance to air leakage

Materials and components used to control air leakage shall

- Be selected on the basis of their properties
- Be positioned within the building assembly to
  - Minimize the accumulation of condensation in the assembly
  - Maintain conditions for the intended purpose of the building
- **Have an air permeance not greater than 0.02 L/(s·m<sup>2</sup>) measured at an air pressure difference of 75P**

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Warning! These products can be used to prepare a variety of polyurethane products. Polyurethanes are organic materials and must be considered combustible.

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The Appendix to this section mentions how difficult it is to determine the performance of an air barrier system and recommends assembly testing be conducted.

### NOTES :

#### 2005 NBCC, Appendix A-5.3.1.3.(2) Position of Materials Providing Thermal Resistance

To be effective, a material providing thermal resistance must be either:

- “the component of the air barrier system providing principal resistance to air leakage or
- Installed in full and continuous contact with a continuous low air permeance component.”

### NOTES:

WALLTITE® Eco v.2 and WALLTITE® Eco v.3 – Air Leakage Characteristics:

- WALLTITE Eco v.3 - Air barrier material<sup>1</sup>:  $\leq 0.02 \text{ L/(s}\cdot\text{m}^2)$  at 75 Pa
- WALLTITE Eco v.2 - Air barrier system<sup>2</sup>:  $0.0054 \text{ L/(s}\cdot\text{m}^2)$  at 75 Pa

Currently, WALLTITE Eco v.2 is the only spray polyurethane product that has a CCMC evaluation report for an air barrier system.

CCMC Evaluation Report:

- For air barrier system: 13467-R

<sup>1</sup> Evaluated per CCMC Technical Guide for Air Barrier Materials, Masterformat Section 07272

<sup>2</sup> Evaluated per CCMC Technical Guide for Air Barrier Systems for Exterior Walls of Low-Rise Buildings, Masterformat Section 07195

### Vapour Diffusion (5.5)

A vapour barrier must:

- Be installed
- Provide the principal resistance to water vapour diffusion

Materials and components used to control vapour diffusion shall:

- Have sufficiently low water vapour permeance
- Be positioned within an assembly to:
  - Minimize moisture transfer by diffusion or
  - Reduce moisture transfer by diffusion to such a rate that will not cause deterioration or sufficient accumulation

### NOTES:

WALLTITE Eco v.2 and WALLTITE Eco v.3 can fulfill several building envelope functions:

- Thermal insulation, air barrier material and air barrier system and vapour barrier (under certain conditions)

The installation of spray polyurethane foam:

- Is continuous without gaps, cracks or seams
- Has excellent adhesion and intimate contact to the substrate

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**NOTE:**

CBD-175, Vapour Barriers: What are they? Are they Effective?

J.K. Latta, NRC-IRC, March 1976

“It is probably more accurate to say that vapour diffusion by itself never initiates a problem.

Air leakage is now considered to be the prime cause of most condensation problems in walls and roof spaces. If, therefore, a building can be made tight against air leakage it may not need a vapour barrier, as defined. On the other hand, if there are openings that permit air to leak from the warm side to the cold side of the insulation, adding a vapour barrier (even of zero permeance) that does not seal off the openings will be useless.”

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### **Part 9 - HOUSING AND SMALL BUILDINGS**

#### **Protection of Foamed Plastics (9.10.17.10)**

Foamed plastics used in walls and ceilings must be protected in conformance with the requirements of Article 9.10.17.10.

#### **Low Permeance Materials (9.25.1.2)**

Materials with air barrier and vapour barrier characteristics, used in insulated building assemblies, must be installed “at a location where the ratio between the total thermal resistance of all materials outboard of its innermost impermeable surface and the total thermal resistance of all materials inboard of that surface is not less than that required by Table 9.25.1.2.”

#### **NOTES:**

##### **2005 NBCC, Appendix A-9.25.1.2 Location of Low Permeance Materials**

Location of materials with low air permeance is generally not critical. Regardless of the location, it can restrict the outward movement of indoor air whether it is located near the outer surface of the assembly, the inner surface or at some intermediate location. However if the material also has the characteristics of a vapour barrier, its location must be chosen more carefully to avoid moisture accumulation.

If the material of low air and vapour permeance is located where the temperature is the below the dewpoint of the air at that location, water vapour will condense and accumulate as water or ice. This will reduce the humidity level and encourage the movement of more water vapour into the assembly.

##### **2005 NBCC, Appendix A-5.3.1.2 Material and Component Properties and Condensation**

Total prevention of condensation is generally unnecessary and its achievement is rarely a certainty at design conditions. The occurrence of condensation should be sufficiently rare, or the quantities accumulated should be sufficiently small and dry rapidly enough, to avoid material deterioration and the growth of mould and fungi. Part 5, therefore, requires that condensation be minimized.

#### **Required Insulation (9.25.2.1)**

Walls, floors and ceilings that separate heated spaced from unheated space, the exterior air or exterior soil must have sufficient insulation to prevent moisture condensation on the room side during the winter.

#### **Insulation Materials (9.25.2.2)**

Spray polyurethane insulation must conform to CAN/ULC-S705.1, Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material-Specification.

#### **NOTE:**

CCMC Evaluation Listing 13588-L states that WALLTITE® Eco v.3 conforms to the requirements of standard CAN/ULC-S705.1, including Amendments 1 and 2.

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### Installation of Thermal Insulation (9.25.2.3)

Thermal insulation shall be installed so that:

- It provides the principal resistance to air leakage, or
- At least one face is in full and continuous contact with an element with low air permeance

**NOTE:**

WALLTITE® Eco v.3 is sprayed onto a substrate and can fulfill the function of thermal insulation and/or the air barrier material.

**NOTE:**

**CBD-231: Moisture Problems in Houses**

A.T. Hansen, NRC-IRC, May 1984

“Contrary to what one may expect, condensation does not occur initially within the insulation, even though the temperature may be below the dew point of the air. It collects on the first solid surface that is below dew point temperature, usually the wall or roof sheathing. If the condensing surface’s temperature is below freezing, the condensation will be in the form of frost or ice.”

### Installation of Spray-Applied Polyurethane (9.25.2.5)

The 2005 NBCC stipulates that spray polyurethane insulation must be installed in accordance with the requirements of standard CAN/ULC-S705.2, “Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density, Installer’s Responsibilities – Specification.”

**NOTES:**

Clause 4.1.3 in standard CAN/ULC-S705.2-05 requires that a spray polyurethane insulation manufacturer select a certification organization to deliver its field quality assurance program (FQAP). CCMC listings of spray polyurethane products include information on the third party certification organization that operates the manufacturer’s FQAP per CAN/ULC S705.2-05.

WALLTITE® Eco v.3 - CCMC Listing No.: 13588-L

Third party certification organization operating BASF Canada’s FQAP: Morrison Hershfield (MH) Limited

WALLTITE Eco v.3 must be installed in accordance with standard CAN/ULC-S705.2-05 and BASF Canada’s Quality Assurance and Training Program (QATP) manual by installers licensed through the QATP and certified by MH.

### Required Barrier to Air Leakage (9.25.3.1)

An air barrier system is required in thermally insulated wall, ceiling and floor assemblies to provide a continuous barrier to air leakage to prevent condensation due to air leakage.

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### NOTES:

WALLTITE® Eco v.2 and WALLTITE® Eco v.3: Air leakage characteristics:

- WALLTITE Eco v.3 - Air barrier material<sup>1</sup>:  $\leq 0.02 \text{ L/(s}\cdot\text{m}^2)$  at 75 Pa
- WALLTITE Eco v.2 - Air barrier system<sup>2</sup>:  $0.0054 \text{ L/(s}\cdot\text{m}^2)$  at 75 Pa

Currently, WALLTITE Eco v.2 is the only spray polyurethane product that has a CCMC evaluation report for an air barrier system.

CCMC Evaluation Report:

- For air barrier system: 13467-R

<sup>1</sup> Evaluated per CCMC Technical Guide for Air Barrier Materials, Masterformat Section 07272

<sup>2</sup> Evaluated per CCMC Technical Guide for Air Barrier Systems for Exterior Walls of Low-Rise Buildings, Masterformat Section 07195

### Vapour Barriers (9.25.4)

Vapour barriers:

- Are required in all thermally insulated wall, ceiling and floor assemblies
- Must have a water vapour permeance (WVP) not greater than  $60 \text{ ng/Pa}\cdot\text{s}\cdot\text{m}^2$
- WVP is to be measured in accordance with ASTM E96, "Water Vapour Transmission of Materials," using the desiccant method (dry cup)

### NOTE:

Standard CAN/ULC-S705.1, Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material-Specification, including amendments 1 & 2, requires that water vapour permeance of spray polyurethane foam be determined in accordance with ASTM E96 (see clause 5.5.12.3 of CAN/ULC-S705.1-01).

### NOTE:

#### 2005 NBCC, Appendix A-9.25.1.2 Location of Low Permeance Materials, Thermal Insulation

Where low-permeance foamed plastic is the sole thermal insulation in a building assembly, the temperature of the inner surface of this element will be close to the interior temperature. In this case, no additional vapour barrier is needed to control condensation within the assembly due to vapour diffusion. However, where low-permeance thermal insulation is installed on the outside of an insulated frame wall, the temperature of the inner surface of the insulation may fall below the dew point. In this case, a separate element must be installed to provide the necessary vapour diffusion protection.

### TECHNICAL ASSISTANCE

For more detailed information, call:

#### **Eastern region**

Ontario, Quebec, Maritimes

Toll-Free: 1-866-474-3538

#### **Western region**

British Columbia, Alberta, Saskatchewan, Manitoba,  
North Western Territories, Yukon, Nunavut

Toll-Free: 1-800-891-0671

BASF Canada Inc.: [www.walltite.com](http://www.walltite.com)

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WALLTITE and WALLTITE Eco are registered trade-mark of BASF Canada Inc.

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