

## Protection of Foamed Plastic Insulation

This Technical Bulletin provides information on the materials specifically allowed for the protection of foamed plastic insulation as outlined in Part 9 and Part 3 of the 2015 National Building Code of Canada.

Information is also provided on the test requirements to determine what materials, that are not specifically identified, can be used for the protection of foamed plastic insulation.

### Part 9 – Housing and Small Buildings

Article 9.10.17.10 covers the Protection of Foamed Plastic for houses and small buildings.

Specifically, foamed plastic insulation used in a wall or ceiling is required to be protected from adjacent space in the building other than adjacent concealed space within attics, roof spaces, crawl spaces and wall assemblies.

The protection may be provided by:

- One of the interior finishes described in Subsections 9.29.4 to 9.29.9 (Plaster, Gypsum Board with taped joints, Plywood, Hardboard, Fibreboard, Particleboard, OSB, or Waferboard).
- Sheet metal, at least 0.38 mm thick and with a melting point of 650 °C or higher if it is mechanically fastened to the supporting assembly independent of the insulation, and the building does not contain a Group C (residential) major occupancy.

Or

- Any thermal barrier material that meets the requirements of Sentence 3.1.5.15.(2).

For information on Sentence 3.1.5.15.(2), see Section titled “**Testing Other Materials to Qualify as Thermal Barriers for Foamed Plastic Insulation**”

### **Part 3 – Large Buildings and Protection of Foamed Plastic Insulation**

The materials allowed for the protection of foamed plastic insulation in Part 3 buildings depends on whether the building is of a) combustible or b) noncombustible construction.

#### **Combustible Construction**

Article 3.1.4.2 provides the requirements for the protection of foamed plastic insulation in combustible construction. The flame spread rating of foamed plastic insulation used in combustible construction must be 500 or less. In Canada, flame spread rating is determined in accordance with standards CAN/ULC-S102 for non-melting materials or CAN/ULC-S102.2 for melting materials.

Foamed plastic insulation, used in a wall or ceiling is required to be protected from adjacent space in the building, other than adjacent concealed space within attics, roof spaces, crawl spaces and wall assemblies.

This protection must be provided by one of the following options:

1. One of the interior finishes described in Subsections 9.29.4 to 9.29.9 (Plaster, Gypsum Board with taped joints, Plywood, Hardboard, Fibreboard, Particleboard, OSB, or Waferboard);
2. Sheet metal if, a) it is at least 0.38 mm thick and has a melting point of 650 °C or higher, b) it is mechanically fastened to the supporting assembly independent of the insulation, c) the building does not contain a Group B (care, treatment or detention) or Group C (residential) major occupancy;
3. Any thermal barrier material that meets the requirements of Sentence 3.1.5.15. (2).

See also section titled “**Testing Other Materials To Qualify As Thermal Barriers for Foamed Plastic Insulation**”

## Noncombustible Construction

For buildings of noncombustible construction, Article 3.1.5.15 requires a thermal barrier for the protection of foamed plastic insulation that have a flame spread rating of 500 or less when used in exterior or interior walls of buildings that are sprinklered throughout or less than 18 m high.:

The protection may be provided by one of the following options:

1. 12.7 mm or thicker gypsum board, mechanically fastened to a supporting assembly independent of the insulation,
2. lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,
3. masonry,
4. concrete
5. any thermal barrier that meets the requirements of Classification B when tested in accordance with standard CAN/ULC-S124.

For information on CAN/ULC S124, see section titled **“Testing Other Materials To Qualify As Thermal Barriers for Foamed Plastic Insulation”**.

Where the building is not sprinklered throughout and is more than 18 m high, foamed plastic insulation with a flame spread rating of 500 or less used in exterior walls must be protected from adjacent space in the building, other than concealed space within wall assemblies, by a thermal barrier consisting of one of the following options:

1. 12.7 mm or thicker gypsum board, mechanically fastened to a supporting assembly independent of the insulation with all joints either backed or taped and filled;
2. lath and plaster, mechanically fastened to a supporting assembly independent of the insulation;
3. masonry or concrete not less than 25 mm thick;
4. any thermal barrier that when tested in conformance with standard CAN/ULC-S101 will not develop an average temperature rise of 140 °C or a maximum temperature rise of 180 °C at any point on its unexposed face within 10 minutes.

For information on standard CAN/ULC-S101 see section titled “**Testing Other Materials To Qualify As Thermal Barriers For Foamed Plastic Insulation**”.

Where the building is not sprinklered throughout and is more than 18 m high, foamed plastic insulation with a flame spread rating of 500 or less used in interior walls, within ceiling and roof assemblies must be protected from adjacent space in the building other than concealed space within wall assemblies by a thermal barrier consisting of one of the following options:

1. 15.9 mm or thicker Type X gypsum board mechanically fastened to a supporting assembly independent of the insulation with all joints either backed or taped and filled
2. non-loadbearing masonry or concrete not less than 50 mm thick
3. loadbearing masonry or concrete not less than 75 mm thick
4. any thermal barrier that when tested in conformance with CAN/ULC S101 will not develop an average temperature rise of 140 °C or a maximum temperature rise of 180 °C at any point on its unexposed face within 20 minutes and stay in place for not less than 40 minutes.

### **Testing Other Materials To Qualify As Thermal Barriers For Foamed Plastic Insulation**

For materials that are not prescriptively permitted, the National Building Code of Canada allows other materials to be used as thermal barriers provided, they meet specific test requirements.

#### **CAN/ULC-S124**

Clause 3.1.5.15.2.(e) specifies that materials meeting the requirements of Classification B, when tested in conformance with standard CAN/ULC-S124, are permitted as thermal barriers for foamed plastic insulation. This test exposes the material to a furnace that follows the time-temperature curve of standard CAN/ULC-S101, reaching over 700 °C after 10 minutes. Thermocouples are used to measure the temperature at the interface between the material deemed the thermal barrier and the foamed plastic insulation. This interface is the unexposed side of the thermal barrier material (see Figure 1). For a Classification B rating, the temperature rise at the interface of the deemed thermal barrier material and the foamed plastic insulation cannot exceed an average of 140 °C for all the thermocouples or a maximum rise of 180 °C at any single thermocouple for 10 minutes.

Listings issued by organizations such as ULC, Intertek or QAI can confirm if a material has a Classification B rating based on standard CAN/ULC-S124 to be a thermal barrier for foamed plastic insulations.

### **CAN/ULC-S101 For Materials**

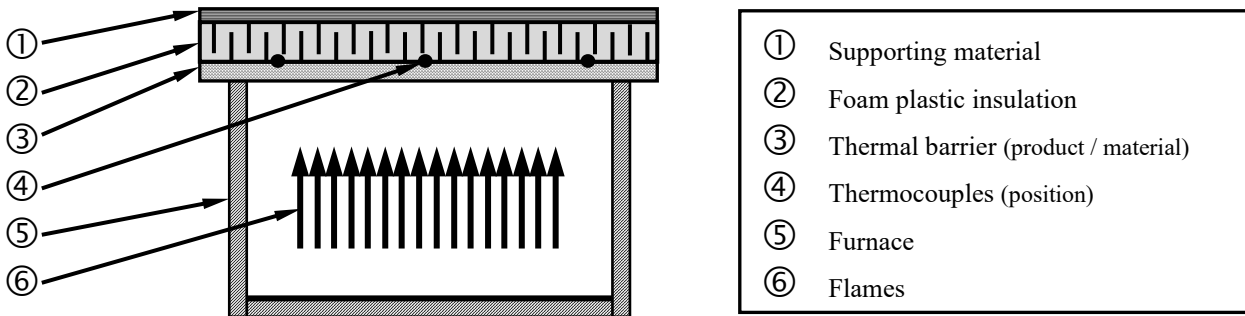
Clause 3.1.5.15.(3) (d) allows for the testing of materials in conformance with standard CAN/ULC-S101 to determine if they can be used as a thermal barrier for foamed plastic insulation in exterior walls of a building required to be of noncombustible construction. As in standard CAN/ULC S-124 thermocouples are used to measure the temperature at the interface between the material deemed the thermal barrier and the foamed plastic insulation (see Figure 2). The temperature rise at the interface of the deemed thermal barrier material and the foamed plastic insulation cannot exceed an average of 140 °C for all the thermocouples or a maximum rise of 180 °C at any single thermocouple for 10 minutes.

Clause 3.1.5.15.(4) (d) allows for the testing of materials in conformance with standard CAN/ULC-S101 to determine if they can be used as a thermal barrier for foamed plastic insulation in interior walls, within ceilings and within roof assemblies. The temperature rise at the interface of the deemed thermal barrier material and the foamed plastic insulation cannot exceed an average of 140 °C for all the thermocouples or a maximum rise of 180 °C at any single thermocouple for 20 minutes. In addition, the material must stay in place for at least 40 minutes.

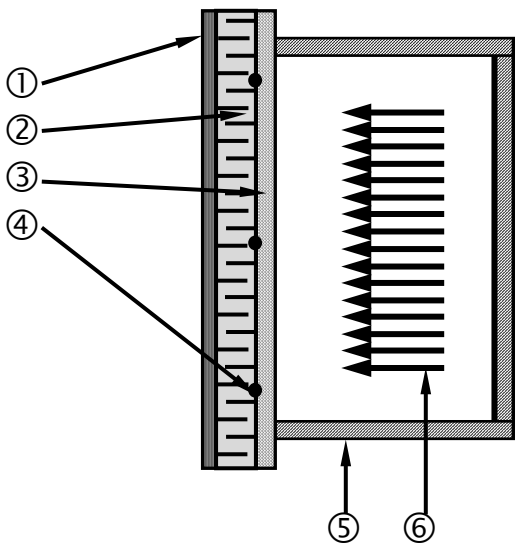
### **CAN/ULC-S101 For Assemblies**

Standard CAN/ULC-S101 is also used to measure the fire resistance rating of assemblies. For this type of testing, the thermocouples and temperature measurements are on the unexposed side of the assembly (see Figure 3). This approach is different than what is used to assess the thermal barrier performance of materials.

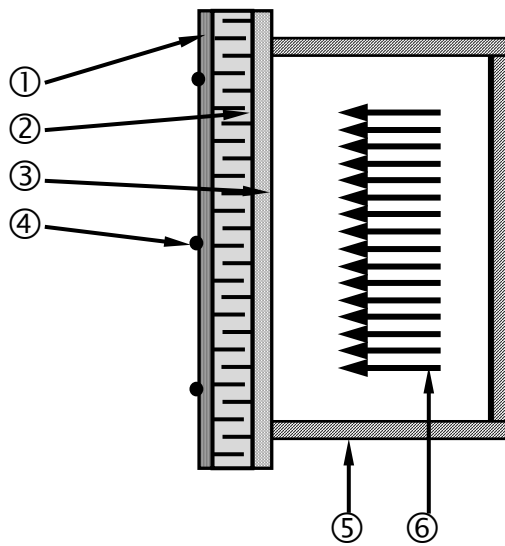
Fire resistance ratings for assemblies based on standard CAN/ULC-S101 can be found in listings issued by organizations such as ULC, Intertek and QAI. These types of listings are not used to confirm that a material meets the requirements of a thermal barrier for foamed plastic insulation.



**Figure 1 – CAN/ULC-S124- Test for thermal barrier material**



**Figure 2 – CAN/ULC-S101 - Thermocouple position for thermal barrier material test**



**Figure 3 – CAN/ULC-S101 - Thermocouple position for fire resistance of assembly test**

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