A New Generation for Closed Cell Spray Polyurethane Foam Insulation

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Since its introduction in the 1980s, closed cell spray polyurethane foam insulation (ccSPF) has been recognized for its high performance, versatility, and durability.

This article will explain changes related to ccSPF in Canada, including the new federal regulation that requires the elimination of hydrofluorocarbons (HFC) blowing agents and the national and provincial code changes to the standard that spray foam must comply with.

Closed cell spray foam is manufactured on-site by combining the two components: isocyanate and resin. The resin contains a "blowing agent" that makes the mixture expand to create a foam with "closed cells." The finished product provides high-performance insulation and an air and vapour barrier.

New-generation spray foams use a hydrofluoroolefins (HFO)-type blowing agent that has a very low global warming potential (GWP) compared to the HFC blowing agents being phased out as a result of federal regulations.

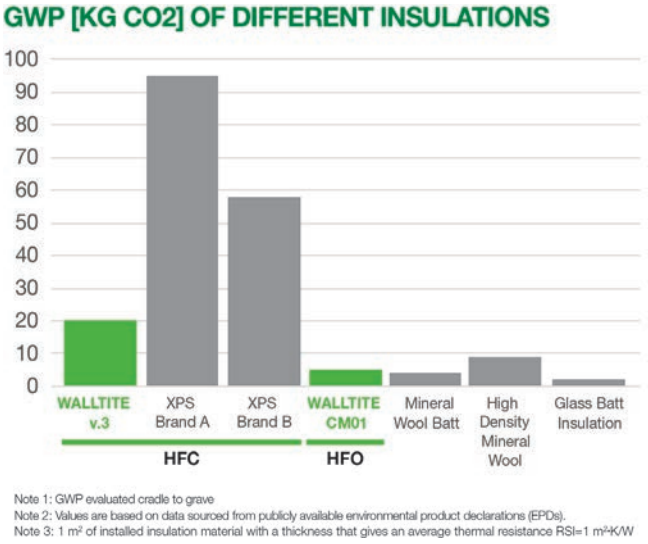

Figure 1.

FEDERAL REGULATIONS

On January 1, 2021, the regulatory elimination of HFCs, driven by the *Kigali Amendment* to the *Montreal Protocol*, will come into effect. According to the federal regulation[1], blowing agents with a GWP of greater than 150, including HFCs used in foamed plastics (e.g., spray foam, XPS), will be banned. The current HFC-based chemistry found in blowing agents is being replaced by HFOs. HFOs have a GWP of less than one kilogram CO2eq and zero ozone depleting potential; the same as the HFCs they replace.

The result of this change is that spray foams made using HFO blowing agents continue to offer the excellent features of spray foam but with 80 per cent lower GWP compared to those made with HFC blowing agents. Spray foam made with HFO also has a significantly lower GWP than semi-rigid mineral fibre and XPS, based on data contained in Environmental Product Declarations, as can be seen in Figure 1, on this page.

CODE CHANGES

The second printing of the *2015 National Building Code* now includes an updated version of the material standard that describes spray foam, *CAN/ULC S705.1-15*. This new version includes tighter limits on dimensional stability, a test for fungi resistance, and an updated version of the test method required for measuring the R-value or long-term thermal resistance performance (see Table 1 on page 20). The new *CAN/ULC S770-09* long-term thermal resistance method is a more complex method of measuring and reporting the R and RSI values. By now, these new reference standards have been adopted by most provinces, including Ontario, where it became effective for all projects receiving a permit as of January 1, 2020 or after.

TARGET R-VALUE

Spray foam continues to have a higher R-value compared to most insulation products; however, due to these changes, the design R-value used for spray foam will now be slightly lower. Due to the inherent properties of the HFO molecule, the R-value of the HFO-blown foam will be less than that of HFC-blown foam in every formulation by every supplier. In addition, the new test method, *CAN/ULC S770-09*, is more complex, resulting in a lower reported R-value for spray foam. In practice, this could mean specifying 85mm of HFO

	Previous Codes	National Building Code 2015 Second Printing
Product Standard	CAN/ULC S705.1- 01	CAN/ULC S705.1- 15
Long-Term Thermal Resistance Test Method in Standard	CAN/ULC S770-03	CAN/ULC S770-09 (More Complex)
Dimensional Stability Volume Change Per Cent	No Limit Listed on Shrinkage	Maximum of Two Per Cent Shrinkage Allowed
Fungi Resistance ASTM C1338	Not Included	No Fungal Growth Allowed

Table 1. Code changes.

foam, where you had specified 75mm of HFC foam to achieve the same target R-value.

PREPARING FOR THE FUTURE

As an industry, it is critical that everyone understands how these changes will impact projects that are in design and construction phases. To ensure your specifications are compliant, we recommend the following changes be made immediately:

- Product must comply with *CAN/ULC S705.1-15* as confirmed by a current CCMC listing; and
- R-values used for design must be as tested to *CAN/ULC S770-09*.

In summary, spray foam, by the nature of its chemistry, offers unmatched benefits. Now, there are even more reasons to specify it in projects, with the advent of HFO blowing agents and their improved environmental profile. With the added benefit of great versatility, spray foam can be used in many areas of the building, including above-grade and below-grade walls; overhead areas such as soffits and ceilings; exterior of below-grade foundation walls; and under slabs on ground (radon control). ■

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