

National Research Council of Canada's Canadian Construction Materials Centre (CCMC) Ensures Code Compliance for Non-Standardized Products

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Editor's Note: In response to questions generated by the Editorial Spotlight "No Shortcuts to Safety" in the Jan/Feb 2017 issue, we offer the following information by the Canadian Construction Materials Centre (CCMC).

The Canadian Construction Materials Centre's (CCMC) mandate is to provide technical opinions on construction products when there is no clear "product standard" regulating a specific product within a building code for compliance with Canadian building codes, with the ultimate goal of protecting the health and safety of Canadians. On behalf of the provinces and territories, and for use by the respective building authorities, CCMC develops test protocols and produces evaluations of innovative construction products, materials, and systems, i.e. alternative solutions.

As there is no product standard for intumescent coatings currently published, none is referenced in the National Building Code of Canada (NBC). There is, though, a test method, ULC S124, for assessing any covering (i.e. mineral fibre, cementitious, cellulose, or intumescent) over foam plastic, which is specified for Part 3 buildings of non-combustible construction.

SEEKING CLARITY

When discussing Codes and testing protocols, the use of multiple terms can become confusing. The term "alternative solution" replaced the term "equivalency" for seeking compliance to a Code. This

is the basis for establishing Code evaluation bodies and is intended to allow for products that are not standardized. Non-standardized products are often referred to as "innovative," and equivalency in performance is used to establish compliance to the respective Code so that an innovation may enter the marketplace. The performance level for equivalency is based on the "minimum" Code requirements.

Another area where clarification is helpful is in understanding the difference between the CAN/ULC S124 test and the CAN/ULC 9705 test. Although ULC S124 is specified in Part 3 for non-combustible buildings, it is also referenced in Part 9. This makes sense because what is specified in Part 3 for large buildings would typically be beyond the Code-minimum in Part 9 buildings. The ULC S124 test method focuses on the temperatures behind the protective coating at the face of the foam plastic.

The ISO/ULC 9705 test, on the other hand, focuses on the performance of the room on the fire-side of the assembly to be able to evaluate the protective covering's impact on fire growth and time-to-escape, before the flashover event. In fact, the temperature requirements of ULC S124 were developed by NRC researcher T.T. Lie, based on the performance of gypsum in a full-scale type fire test, similar to the ISO/ULC 9705.

The scope of the CCMC evaluation is for Part 9 buildings of the NBC (i.e.

small buildings, three stories or less, of combustible construction). However, note that in Part 3 of the NBC there is also permitted combustible construction that specifies the same minimum foam plastic protection as in Part 9.

MEETING CODE

Here are the steps that must be followed to meet the requirements as outlined in the CCMC Report, CCMC 14036-R published in the CCMC Registry of Product Evaluations:

Coating Requirements and Durability

- First, if the product is an intumescent coating, and is in the "paint" family, as such it needs to meet the similar performance and durability requirements of paint. The CCMC Report outlines the drying time, consistency, solid content, etc. as well as limitations on lead content phthalates and VOCs.
- The durability of the coating is then evaluated with several tests on the adhesion with a criteria covering before-and-after high humidity conditioning, as well as local impact resistance (i.e. chipping), moisture resistance, fungal/mildew resistance, and its water vapour permeance – if the coating is breathable.

Thermal Barrier Benchmarking and Performance

- The NBC code solutions need to be benchmarked to determine the Code-minimum that needs to be met to be able to state equivalency

to the Code. Data on full-room tests need to be produced on the NBC-specified minimum interior finishes for foam plastic protection (i.e. fibreboard, OSB, plywood, particleboard, 9.5-mm gypsum).

- Concurrently, the 10 Provinces and three Territories across Canada, being the Regulators of construction, are consulted with respect to which of the Code-specified interior finishes they would accept as the "minimum" protection of foam plastic. In addition, the Regulators need to provide guidance on whether only the spray urethane in the cavity needs to be protected or the exposed wood member as well, as would be the case with any panel product attached to studs or ceiling joists. Their responses are then included in the CCMC Report for decision-making by the local building official.
- The full-room test procedures, ULC/ISO 9705, are then to be conducted on the proposed intumescent coating to meet or exceed the protection (i.e. time to flashover) provided by the interior finishes specified by the Regulators. For example, some Regulators choose the Code-minimum as the benchmark (resulting in one to three minutes to flashover) which CCMC raised to 10-minutes as a minimum, while some Regulators choose 12.7-mm gypsum board which provides 20-minute protection. The manufacturer of the intumescent coating thus would need to test thicknesses of their proprietary coating to meet these two levels of performance.
- To make sure that the intumescent coating performance is not dependent on the specific spray urethane, the intumescent coating on several spray urethane products would need to be tested. If

it cannot be confirmed that the performance applies to all spray urethane foams, only those tested would be specified as suitable substrates.

Insulation Mechanical Damage Protection

- As the NBC requires that an interior finish provide protection of the cavity insulation where there is a potential for mechanical damage, the capability of the intumescent coating to provide this protection needs to be assessed.
- The ASTM E 661 is the test protocol to be conducted and is a large-scale test procedure for floor panels. Both resistance to a concentrated load and proof load following impact are to be conducted.
- A 62.5-mm diameter steel ball is also dropped at increasing heights in 150-mm intervals to simulate impacts on an interior finish in an occupied space (i.e. basement).
- These protocols are used to evaluate the equivalency to gypsum board as the minimum Code-specified mechanical damage protection (i.e., 9.5-mm) and thicker (i.e., 12.7-mm) for the local building officials seeking a higher protection level.
- In addition, the full-room fire test is conducted with damaged product. (Ref.: Table 4.1.3, No. 6.).

CCMC COMMENTS

Editor's Note: The CCMC wishes to add the following information about the testing of a specific product:

The above mentioned steps were followed in evaluating intumescent coatings for IFTT's DC 315 over SPF by CCMC:

The CCMC Evaluation Report CCMC 14036-R outlines the process that was followed and the findings on the

performance of the Code-specified thermal barriers and the DC315 performance. This, and other, CCMC Evaluation Reports are then published in the CCMC Registry of Product Evaluations for use by building officials in their decision-making for product acceptance and building permit issuance. This CCMC 14036-R report is attached in the digital edition via link or available upon request. In addition, as per the CCMC process, this CCMC evaluation provided the details of the consultation with the regulators across Canada as a differing level of performance resulted for some jurisdictions.

As NRC is also the custodian of Codes Canada, we take our responsibility to public safety and to evidence-based decision-making quite seriously. Moreover, NRC works with all provinces and territories, as well as building authorities as part of our recommendation process. This ensures code compliance across all jurisdictions. Hopefully this clarifies NRC's role in evaluating compliance of alternative solutions, and particularly the reasoning behind the DC315 intumescent coating's designation as an alternative solution in its specified use. Should installers or anyone have questions regarding products and codes in their jurisdiction, we strongly recommend contacting the appropriate building authority for more information. ▶

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