

Starting in January, 2024, upon the adoption of The 2020 National Building Code of Canada (NBC), spray foam on the underside of roof decks will only be accepted when an Alternative Solution sealed by a licensed architect or engineer is provided in compliance with NBC Div. C Section 2.3. A sealed ventilation design must also be submitted. PBI already accepts non-ventilated attic space designs when sealed in conformance with the NBC.

Since Saskatchewan does not have a variance for the Province, such as the Alberta's Standata, a site-specific sealed design in conformance with Part 5 of the NBC is the appropriate method of showing compliance.

Background:

This document is being published to provide notice of a proposed change to our applications when spray foam is applied to a roof deck.

PBI had adopted a process that followed an opinion, where as long as the spray applied product met the requirements of a vapour barrier, it could be sprayed to the underside of the roof deck if certain ventilation practices were followed.

Throughout the years following this process, it was identified that most spray applied products used in ceiling spaces were typically applied to the underside of roof deck. The difficulty with requiring mechanical ventilation was that:

- There are no specific requirements within the NBC, and
- If you used the same ventilation system that was connected to the living space of the home, the air adjacent to the spray foam would be circulated back throughout the house and would require a thermal barrier
- Additional costs for installing the mechanical systems and/or thermal barrier

Applicable code articles:

- Article 9.19.1.1 – Requires venting, with the specific requirements for amount of venting discussed in Article 9.19.1.2. It is noted that venting is not needed “where it can be shown to be unnecessary”
- Article 9.19.1.3 – Requires not less than 63 mm of space be provided between the top of the insulation and the underside of the roof sheathing.
- Article 9.10.17.10 – Requires that foamed plastics be protected by a thermal barrier where they form part of a wall or ceiling assembly adjacent to other spaces in the building
- Sentences 9.33.6.4.(6) & (7) – Requires that foamed plastic be separated from return air plenums by a proper thermal barrier.

Findings through research:

- A CUFCA report re-affirmed PBI's conclusion that spraying underside of roof decks is a Part 5 design from NBC (which requires design professionals based on Saskatchewan's legislation).

An RDH Building Science Laboratories report called “Engineered Solutions for Part 9 Unvented Roof Assemblies in Alberta” (report referenced in Alberta Standata variance 19-BCV-022) states “In Canada, a vented roof assembly is the only roof assembly currently prescriptively allowed in Part 9 buildings. Engineering reports that can demonstrate that ventilation is unnecessary are considered by the building code official as per Sentence 9.19.1.1.(1) of the NBC”

- o This same RDH report states that in Alberta, every Part 9 construction project that has an unvented roof assembly is required to provide a sealed engineering judgement.

- The RDH report explains a number of considerations for the design of unvented roofs, including:
 1. Interior Relative Humidity (RH): it needs to be controlled so that RH meets Code requirements (not higher than 35% RH).
 2. Fire Code: Protection of foamed plastic (drywall on ceiling can achieve this).
 3. Vapour Permeance of Framing: not a concern as wood is less than 60 ng/ Pa*s*m2 however, at wood-to-wood interfaces the gaps would need to be sealed with spray foam or with another method so that air/moisture cannot move through the joint.
 4. Spray foam to meet CAN/ULC-S705.1 and be installed by a certified contractor.
 5. Roof underlay in sloped roofs (concerns with traditional felt paper breaking down quickly on unvented roofs).
- A University of Waterloo report was also reviewed (BEGHut Cathedral Ceiling Report) that noted the following:
 - It confirms that attics that are following Part 9 acceptable solutions (vented) work well in all climate zones including Winnipeg when properly built (Regina grouped with Winnipeg in this report regarding climate).
 - For unvented closed-cell designs (sprayed to underside of roof deck), the report says there would be good performance, as long as certain conditions were met. These are the types of conditions/requirements that should be addressed in a sealed design from an architect/engineer. Some of these excerpts from the report are provided below:
 - The field testing in Waterloo concluded that there was no risk for 40% to 50% indoor RH in Waterloo. This was followed-up with computer modeling so that expected performance could be studied in other climate zones.
 - The computer modeling concluded that that unvented closed-cell “worked well in every location except for the extreme north of Canada when the interior relative humidity was reasonable and recommended. In the cities of St. John’s, Calgary, Quebec City, and Winnipeg, there were some predicted elevated sheathing moisture contents at interior relative humidities that are higher than recommended.” The report went on to say that the modeling intended to be a “worst-case scenario” and therefore the risk is low. While this is understood, these still remain as conditions that should be addressed by a professional designer in their design for this type of Part 5 design.
- A BC Appeal Boards decision was reviewed (BCAB #1762). They determined that a sprayed roof deck proposed as an alternate to required vents and an unobstructed air space, must be able to demonstrate performance that the system will not lead to deterioration of the roof assembly. In this appeal, the BC Building Code Appeal Board accepted the spray foam on the underside of the roof deck of the house in question based on Article 9.19.1.1; as they determined there was adequate information to show ventilation between insulation and roof deck was “unnecessary”.
- Alberta Standata 19-BCV-022 accepts roof assemblies in Part 9 residential buildings that conform to M-25608.000: ACC – Alberta Unvented Roofs Evaluation Report (RDH Building Science Laboratories report called “Engineered Solutions for Part 9 Unvented Roof Assemblies in Alberta”).