Public Review
BC Building Code 2023

Proposed change to harmonize with National Building Code 2020

Topic: Soil Gas Control – Radon

Code change number: BCBC2023-PR-05-RD

Code reference: BC Building Code 2018 – Section 9.13. of Division B

Related code reference(s): Table C-4 of Appendix C of Division B

Description of the proposed change

Previously, British Columbia data suggested that there were areas of the province with low probability to experience elevated indoor radon levels. Based on this information, certain areas of the province only required a soil gas barrier to protect homes but did not have to provide a rough-in for a subfloor depressurization system.

This proposed change eliminates the exemption in certain areas in British Columbia from the requirement of a radon rough-in for a subfloor depressurization system. Table C-4 in Appendix C of Division B is discontinued. This proposed change also updates the technical provisions for the design and installation of a radon rough-in. The CAN/CGSB-149.11, "Radon control options for new construction in low-rise residential buildings," standard is referenced to provide further explanation for the radon rough-in and the system it is intended to support. The CAN/CGSB-149.11 standard can be accessed for free online here.

Justification

Radon is an invisible, odorless gas that exists in various levels in the ground and is the leading cause of lung cancer in non-smokers in Canada. Where radon enters a building and exposes occupants, it presents health risks. With no safe levels of radon exposure, Health Canada has recommended radon mitigation actions for occupants based on the levels of radon measured.

New data shows that radon exists in many areas of British Columbia where it was not previously known to result in elevated indoor levels. There is no longer reliable evidence to justify exempting certain areas from the radon rough-in requirement. The National Building Code, upon which the British Columbia Building Code (BCBC) is based, requires a radon rough-in be installed in all small residential buildings.

The BCBC is a design and construction code that does not apply post-occupancy. BC Lung, Health Canada, and other radon advocates broadly, recommend occupants test the levels of radon in their home in the lived-in conditions and follow Health Canada's guidelines for action based on the results.

Impact analysis

British Columbia is updating the provisions for a radon rough-in for a subfloor depressurization system so that the design and materials used for the rough-in are compatible with mitigation systems designed and installed in accordance with CAN/CGSB-149.11, "Radon control options for new construction in low-rise residential buildings." This update helps ensure that future installation of a subfloor depressurization system is cost effective and requires minimal effort due to preparations made at the initial construction stage.

The rough-in consists of a pipe that extends from (typically) a gravel layer beneath the floor slab or crawl space and terminates outside the building. The cost of a radon rough-in is reported to be less than $1000 at the time of construction. For a breakdown of costs and a full impact analysis, the national code development system refers to the document "Impact Analysis of Installing Passive Radon Stacks in Part 9 Residential Occupancies". For information on national code development, how to participate, and how to view the impact analysis document, visit the code development system website.

This change particularly impacts locations that were previously exempt from installing a radon rough-in for a subfloor depressurization system. Changes to the specific requirements for the radon rough-in will help provide clarity on appropriate materials and methods.

Proposed B.C. specific code content

Legend

Black Text – 2020 National Building Code content

Green Text – B.C. new and existing content

Deletions to the 2020 National Building Code content are not displayed

9.13.4. Soil Gas Control

(See Note A-9.13.4.)

9.13.4.1. Application and Scope

1) This Subsection applies to

a) a *conditioned space* that has a wall, roof or floor assembly, or part thereof, that is in contact with the ground, and

b) the protection of the *conditioned space* described in Clause (a).

2) This Subsection addresses the leakage of *soil* gas from the ground into the *building.*

9.13.4.2. Protection from Soil Gas Ingress

1) All wall, roof and floor assemblies, or parts thereof, separating *conditioned space* from the ground shall be protected by an *air barrier system* conforming to Subsection 9.25.3.

2) Unless the space between the *air barrier system* and the ground is designed to be accessible for the future installation of a subfloor depressurization system, *buildings* shall

a) be provided with the rough-in for a radon extraction system conforming to Article 9.13.4.3., or

b) conform to Parts 5 and 6 for the protection from radon ingress and the means to address high radon concentrations in the future (see Articles 5.4.1.1. and 6.2.1.1.).

9.13.4.3. Rough-in for a Subfloor Depressurization System

(See Note A-9.13.4.3.)

1) Floors-on-ground shall accommodate the future installation of a subfloor depressurization system by installing a radon vent pipe, and a contiguous gas-permeable layer between the *air barrier system* and the ground consisting of

a) a material or materials that allow effective depressurization of that space (see Sentence 9.16.2.1.(1)), or

b) not less than 100 mm of coarse clean granular material containing not more than 10% of material that would pass a 4 mm sieve.

2) The radon vent pipe required by Sentence(1) shall

a) be sealed to maintain the integrity of the *air barrier system*, with no perforations along the pipe above the *air barrier system*,"

b) have one or more inlets that allow for the effective depressurization of the gas-permeable layer (See Note A-9.13.4.3.(2)(b) and (3)(b)), and

c) permit connection to depressurization equipment,

d) where it passes through *conditioned space*, wholly located in the *conditioned space*,

e) consist of pipe and fittings in accordance with 7.1.3 of CAN/CGSB-149.11, "Radon control options for new construction in low-rise residential buildings,"

f) terminate outside the *building* in a manner that does not constitute a hazard,

g) be installed to prevent the accumulation of moisture and away from locations where snow and ice accumulate, and

h) be clearly labeled every 1.8 m and at every change in direction to indicate that it is intended only for the removal of radon from below the floor-on-ground.

3) A radon vent pipe shall be deemed to comply with

a) Clause (2)(b) where its inlet or inlets below the *air barrier system* are located at or near the centre of the floor-on-ground with gas-permeable material extending not less than 100 mm beyond any inlet, and

b) Clause (2)(f) where it terminates outside the *building*, not less than 1.8 m from a property line, in accordance with 7.2.4.6 of CAN/CGSB-149.11, "Radon control options for new construction in low-rise residential buildings," with the opening of the pipe fitted with a low pressure drop screen conforming to Sentence 6.3.2.9.(4).

Notes

A-9.13.4.3.

Providing Performance Criteria for the Depressurization of the Space Between the Air Barrier and the Ground

Article 9.13.4.3. contains two sets of requirements: Sentence (2) describes the criteria for subfloor depressurization systems using performance-oriented language, while Sentence (3) describes one particular acceptable solution using more prescriptive language.

In some cases, subfloor depressurization requires a solution other than the one described in Sentence (3), for example, where compactable fill is installed under slab-on-grade construction.

Completion of a Subfloor Depressurization System

The completion of a subfloor depressurization system may be necessary to reduce the radon concentration to a level below the guideline specified by Health Canada.

Further information on protection from radon ingress can be found in the following Health Canada publications:

- "Radon: A Guide for Canadian Homeowners" (CMHC/HC), and
- "Guide for Radon Measurements in Residential Dwellings (Homes)."

A-9.13.4.3.(2)(b) and (3)(b) Effective Depressurization. To allow effective depressurization of the space between the air barrier and the ground, the extraction opening (the pipe) should not be blocked and should be arranged such that air can be extracted from the entire space between the air barrier and the ground. This will ensure that the extraction system can maintain negative pressure underneath the entire floor (or in heated crawl spaces underneath the air barrier). The arrangement and location of the extraction system inlet(s) may have design implications where the footing layout separates part of the space underneath the floor. If an area is segregated by a footing (for example), a through-footing pipe can join the area so that a single suction point can depressurize both areas. However, for large buildings, it may be preferable to have multiple suction points.