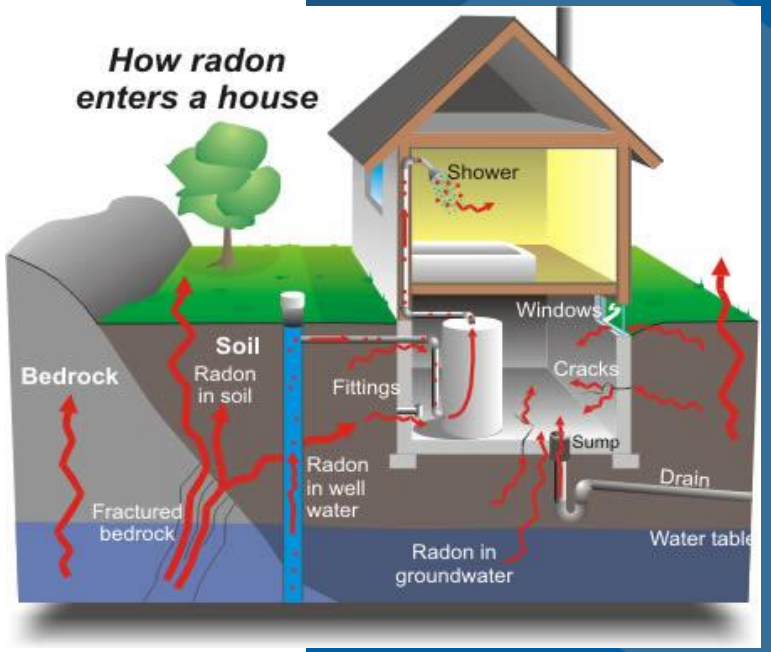
Progress of the Task Group on Radon and Soil Gas Mitigation 2024

Presented by: Corey Carson, P. Eng., Codes Canada

April 25, 2024



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Outline

Previous Work Presented to CARST

Codes Canada Work Since April 2023

- PCF 1809: Ballast for Ground Cover in Heated Crawl Spaces
- PCF 1713: Passive Stack Radon Mitigation
- PCF 1993: Sealed Overlapping Seams for Air Barriers on Ground

Future Work

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Previous Work Presented to CARST

- Codes Canada presented to CARST on progress at the April 2023 meeting

- Link to presentation:

  https://www.carst.ca/CARST2023

Codes Canada Work Since April 2023

- Recommended adoption of PCF 1809: Ballast for Ground Cover in heated Crawl Spaces for publication in the NBC 2025
- Submittal of PCF 1713: Passive Stack Radon Mitigation for public review
- Submittal of PCF 1993: Sealed Overlapping Barriers on Ground for public review

PCF 1809: Ballast for Ground Cover in Heated Crawl Spaces

PCF 1809:

- Clarifies the requirements for proper ballast to weigh down ground cover in heated crawl spaces as found in 9.18.6.2.

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Current Status: PCF 1809: Ballast in Heated Crawl Spaces

Task Group on Radon and Soil Gas Mitigation (TG) Recommendation:

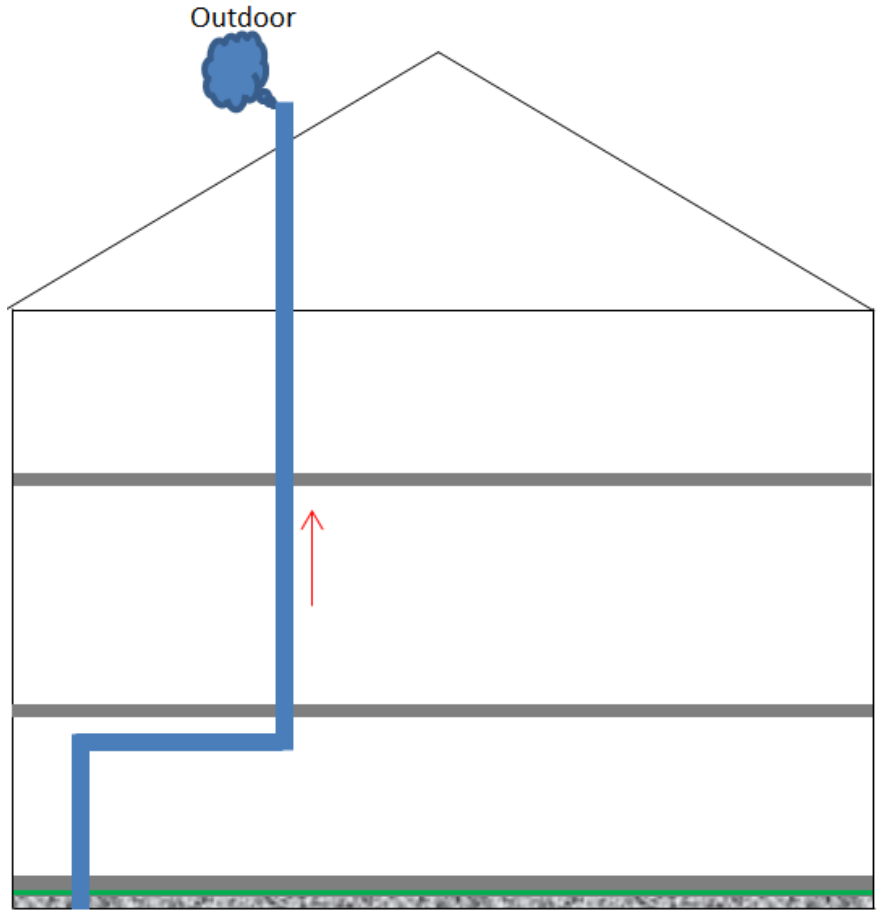
- 50mm of course clean granular for ballast over air barriers not covered by concrete

Current status:

- Recommended for publication by the Standing Committee on Housing and Small Buildings (SC-HSB) in the NBC 2025
- SC recommended research into other ballast methods

PCF 1713: Passive Stack Radon Mitigation

- The addition of passive vertical stack radon mitigation systems to dwelling units and home type care occupancies in contact with the ground.



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PCF 1713: Significant Changes Since April 2023

- Active Soil Depressurization (ASD) prescriptive provisions have been removed from PCF 1713.

- Request from SC-HSB for research into a potential future code change for an ASD option.

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PCF 1713: Significant Changes Since April 2023 (Cont.)

- Revisions to Code provisions to allow a fan in conditioned space.

- Provision allows for and ASD fan installation in conditioned space where there is no suitable unconditioned space.

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PCF 1713: Significant Changes Since April 2023 (Cont.)

- Coordination with CGSB related to:
  - Table for radon exhaust pipe insulation in unconditioned space
  - Minimum radon stack termination clearances for roof top discharge

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PCF 1713: Significant Changes Since April 2023 (Cont.)

New Provision:

Where it is not possible to install a passive vertical radon stack entirely in the vertical direction, the stack is permitted to include a horizontal offset on each *storey*, including the *basement*, provided each offset

a) is not more than 3.6 m long,
b) is connected using 22.5° to 90° fittings, and
c) has a slope not less than 1 in 50. (See Note A-9.13.4.4.(2).)

PCF 1993: Sealed Overlapping Seams for Air Barriers on Ground

PCF 1993:

This proposed change requires that air barriers in contact with the ground have overlapping seams that are sealed.

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PCF 1993: Provision Changes

9.18.6.2.:

2) The ground cover required in Sentence (1) shall have its joints lapped not less than 1~~3~~00 mm, be sealed, and

a) be ~~sealed and~~ evenly weighted down, or

b) be covered with concrete not less than 50 mm thick.

PCF 1993: Provision Changes (cont.)

9.25.3.6.: Air Barrier Systems in Floor-on-Ground

3) Where the air barrier installed below a floor-on-ground is flexible sheet material, joints in the barrier shall be ~~lapped not less than 300 mm. (See Note A-9.25.3.6.(2) and (3).)~~

a. --) lapped not less than 100 mm,

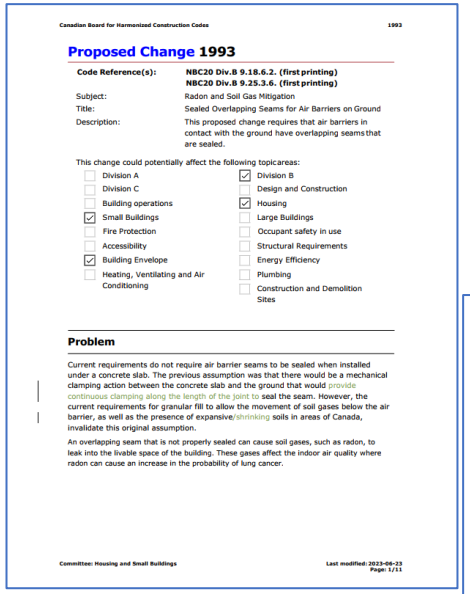
b. --) sealed across all penetrations and junctions to foundation walls, footings, and adjacent air and soil gas barriers, and

c. --) sealed with flexible sealant in compliance with Article 9.27.4.2.

PCF 1713 and 1993: Current Status

- PCFs 1713 and 1993 are out for public review now
- Public review ends April 29
- Link to public review:

https://cbhcc-cchcc.ca/en/public-review-of-proposed-changes-to-the-2020-national-model-codes/



Canadian Board for Harmonized Construction Codes 1993

Proposed Change 1993

Code Reference(s): NBC20 Div.B 9.18.6.2. (first printing)
NBC20 Div.B 9.25.3.6. (first printing)

Subject: Radon and Soil Gas Mitigation
Title: Sealed Overlapping Seams for Air Barriers on Ground
Description: This proposed change requires that air barriers in contact with the ground have overlapping seams that are sealed.

This change could potentially affect the following topicareas:

- ☐ Division A
- ☐ Division C
- ☐ Building operations
- ☑ Small Buildings
- ☐ Fire Protection
- ☐ Accessibility
- ☑ Building Envelope
- ☐ Heating, Ventilating and Air Conditioning
- ☑ Division B
- ☐ Design and Construction
- ☑ Housing
- ☐ Large Buildings
- ☐ Occupant safety in use
- ☐ Structural Requirements
- ☐ Energy Efficiency
- ☐ Plumbing
- ☐ Construction and Demolition Sites

Problem

Current requirements do not require air barrier seams to be sealed when installed under a concrete slab. The previous assumption was that there would be a mechanical clamping action between the concrete slab and the ground that would provide continuous clamping along the length of the joint to seal the seam. However, the current requirements for granular fill to allow the movement of soil gases below the air barrier, as well as the presence of expansive/shrinking soils in areas of Canada, invalidate this original assumption.

An overlapping seam that is not properly sealed can cause soil gases, such as radon, to leak into the livable space of the building. These gases affect the indoor air quality where radon can cause an increase in the probability of lung cancer.

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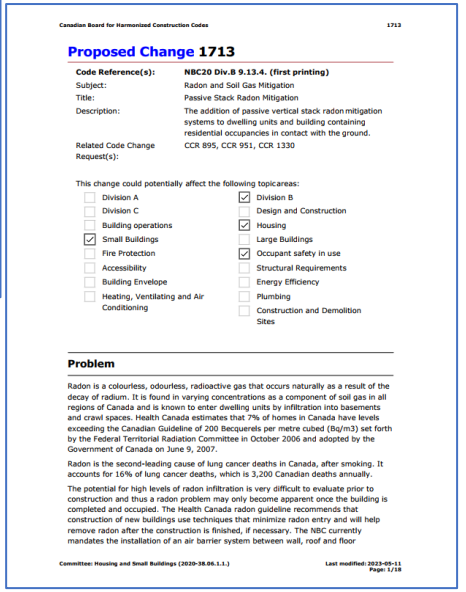

Canadian Board for Harmonized Construction Codes 1713

Proposed Change 1713

Code Reference(s): NBC20 Div.B 9.13.4. (first printing)
Subject: Radon and Soil Gas Mitigation
Title: Passive Stack Radon Mitigation
Description: The addition of passive vertical stack radon mitigation systems to dwelling units and building containing residential occupancies in contact with the ground.
Related Code Change Request(s): CCR 895, CCR 951, CCR 1330

This change could potentially affect the following topicareas:

- ☐ Division A
- ☐ Division C
- ☐ Building operations
- ☑ Small Buildings
- ☐ Fire Protection
- ☐ Accessibility
- ☐ Building Envelope
- ☐ Heating, Ventilating and Air Conditioning
- ☑ Division B
- ☐ Design and Construction
- ☑ Housing
- ☐ Large Buildings
- ☑ Occupant safety in use
- ☐ Structural Requirements
- ☐ Energy Efficiency
- ☐ Plumbing
- ☐ Construction and Demolition Sites

Problem

Radon is a colourless, odourless, radioactive gas that occurs naturally as a result of the decay of radium. It is found in varying concentrations as a component of soil gas in all regions of Canada and is known to enter dwelling units by infiltration into basements and crawl spaces. Health Canada estimates that 7% of homes in Canada have levels exceeding the Canadian Guideline of 200 Becquerels per metre cubed (Bq/m3) set forth by the Federal Territorial Radiation Committee in October 2006 and adopted by the Government of Canada on June 9, 2007.

Radon is the second-leading cause of lung cancer deaths in Canada, after smoking. It accounts for 16% of lung cancer deaths, which is 3,200 Canadian deaths annually.

The potential for high levels of radon infiltration is very difficult to evaluate prior to construction and thus a radon problem may only become apparent once the building is completed and occupied. The Health Canada radon guideline recommends that construction of new buildings use techniques that minimize radon entry and will help remove radon after the construction is finished, if necessary. The NBC currently mandates the installation of an air barrier system between wall, roof and floor

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Future Work

- 6 mil and 10 mil Poly
- Prescriptive ASD in Part 9
- Options for ballast for ground cover in heated crawl spaces

Future Work: 6 Mil and 10 Mil Poly

- Research has been conducted at the NRC comparing the reduction in radon ingress between 6 mil and 10 mil poly installed as a foundation radon barrier
- Research expected to be reviewed within current or next code cycle

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Future Work: Prescriptive ASD

- Request by SC-HSB to perform research into methods to install an ASD with prescriptive provisions.
- Research is being discussed.
- Research expected to be conducted and reviewed in next code cycle

Future Work: Options for Ballast

- Request by SC-HSB to determine if there are additional options for ballast for ground cover in heated crawl spaces
- Options and how to determine their effectiveness are being discussed
- Results to be reviewed in next code cycle

Thank You

Contact: Corey Carson
corey.carson@nrc-cnrc.gc.ca

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