

Radon Mitigation

The purpose of this information guide is to inform our applicants about the drawing submission and installation requirements regarding radon gas.

“The information contained within this guide is for convenience only and does not serve to substitute or supersede applicable City Bylaws, governing Provincial / Federal Codes, and laws. Any references to Bylaws, Codes and laws pertain to those effective at the time of this guide’s creation or revision. If the date on this guide exceeds three (3) years, the information contained may be outdated- in such circumstance, refer to the current Bylaws, Codes and laws. Building Owners are responsible for ensuring that any existing or proposed construction, and other works, comply with all applicable Bylaws, Codes and laws.”

Background

What is radon gas? – Radon is an odourless, invisible and tasteless radioactive gas that occurs naturally from the breakdown of uranium in the soil and rocks. This “soil gas” is present across British Columbia but varies in concentration levels depending on the area. Radon is released from the ground and into the atmosphere. The gas can enter a home through any openings along the building structure that is in contact with the ground (i.e., basements and crawl spaces). A high concentration of Radon inside a home can increase the risks of lung cancer.

Implementation – Applicable to building permits applied on or after March 8, 2024. The 2024 British Columbia Building Code (BCBC) addresses this health concern by requiring *radon mitigation* options to reduce the radon concentration to a level below the guideline specified by Health Canada and means to address high radon concentration levels in the future.

Applicability – Provisions for radon gas mitigation is required for all new Part 9 buildings (i.e., houses) with a *conditioned space* that is in contact with the ground. These radon provisions for Part 3 buildings (i.e., commercial) are subject to Parts 5 and 6 of the 2024 BCBC.

Building Permit Requirements

Flowchart Illustration – Please refer to the flowchart illustrated on the following pages for the applicable Building Code requirements related to radon.

INFORMATION GUIDE

Radon Requirement Flowchart

Part 3 Buildings

Performance-Based Approach

[5.4.1.1. and 6.2.1.1. of 2024 BCBC]

Part 9 Buildings

Prescriptive Approach: Subfloor Depressurization System

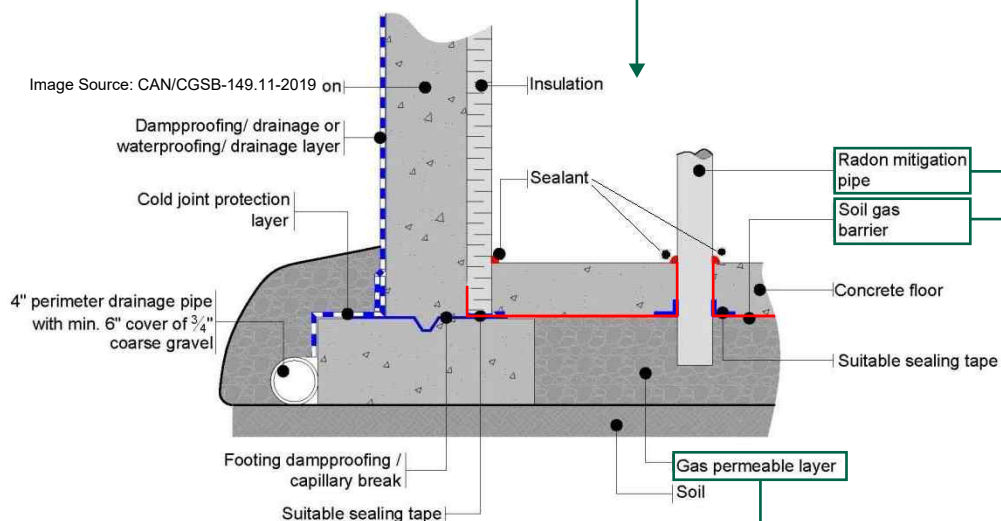
[9.13.4.3. of 2024 BCBC]

Existing Buildings

Testing of existing homes is recommended and follow Health Canada's guidelines for actions based on the results. Refer to CAN/CGSB-149.12 and consult with radon professional.

Option 1 [9.13.4.2.(2)(b) of 2024 BCBC]

Option 2 [9.13.4.2.(2)(a) of 2024 BCBC]



Gas-Permeable Layer

Option 1 [9.13.4.3.(1)(a) of 2024 BCBC]

→ A material or materials that allow effective depressurization of that space

Option 2 [9.13.4.3.(1)(b) of 2024 BCBC]

→ Min. 100 mm (4") of coarse granular material containing not more than 10% of material that would pass a 4 mm sieve

Air Barrier System

Meet Subsection 9.25.3. of 2024 BCBC [9.13.4.2.(1) of 2024 BCBC]

Radon Vent Pipe [9.13.4.3.(2) & (3) of 2024 BCBC]

Subfloor Requirement

Continued to next page

Above Slab Requirement

Continued to next page

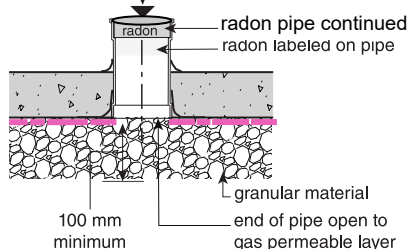
Radon Vent Pipe (cont.) [9.13.4.3.(2) & (3) of 2024 BCBC]

Subfloor Requirement

Above Slab Requirement [9.13.4.3.(2)(f) & (3)(b) of 2024 BCBC]

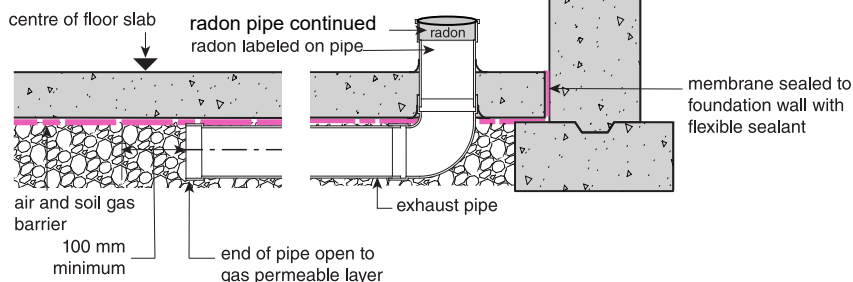
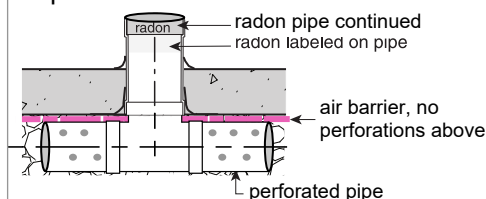
Option 1 [9.13.4.3.(3)(a)]

Centred at or near
centre of slab



Option 2 [9.13.4.3.(2)(b)]

Perforated pipe or
equivalent



Option 1 [7.2.4.6 of CAN/CGSB-149.11]

Level 2 Full passive
vertical radon stack
(Rooftop discharge)

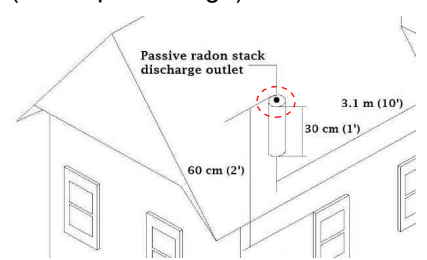


Image Source: Figure 7.2.4.6 of CAN/CGSB-149.11
Refer to Table 7.2.4.6 next page for termination clearances

Option 2 [7.3.4 of CAN/CGSB-149.11]

Rough-in for Level 3 Full
active soil depressurization
system

Options Available

[Code reference]

Rooftop termination

Option 1
[7.3.4 & Figure 7.4.3a
of CAN/CGSB-149.11]

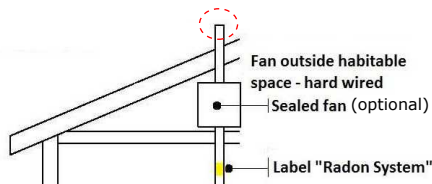


Image Source: Partial Figures 7.3.4a, 7.3.4b, and 7.3.4c of CAN/CGSB-149.11

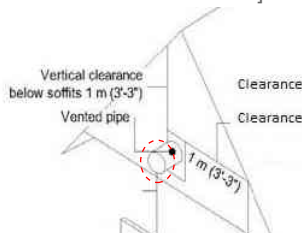
Notes:

An active fan is not required for the Level 3 rough-in stage, but should allow sufficient means to install one in the future. A cylindrical space 1.2 m high and 500 mm in diameter around the pipe, and dedicated electrical receptacle or electrical box within 1.8 m of the anticipated fan location should be provided.

Exterior termination required, > 1.8 m from property line and comply with Table 7.3.4.3 next page for clearances for all 3 options.
See Clause 9.13.4.3.(3)(b) for outlet corrosion-resistant screen or grille requirements.

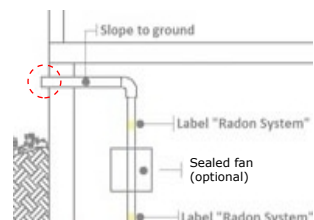
Gable end termination

Option 2
[7.3.4 & Figure 7.4.3b
of CAN/CGSB-149.11]



Side-wall discharge

Option 3
[7.3.4 & Figure 7.4.3c
of CAN/CGSB-149.11]



Excerpt from CAN/CGSB-149.11-2019

Table 7.2.4.6 — Minimum passive radon stack termination clearances for roof top discharge

Location	Minimum dimension (m)
Vertical clearance above the roof at the point of penetration	0.30
Vertical clearance <u>above</u> windows or doors	0.60
Vertical clearance <u>above</u> mechanical air supply inlet (air intake)	0.90
Horizontal clearance from windows, doors or mechanical air supply inlet	3
Clearance horizontally from a vertical wall that extends above the roof penetrated	3

Table 7.3.4.3 — Clearance distances for active radon reduction systems

Locations	Suggested clearances (m)	Required minimal clearances (m)
Clearance to a mechanical air supply inlet	3	2
Clearance to permanently closed window	1	0.60
Clearance to a openable window	2	2
Clearance from a door that may be opened	2	1
Clearance to outside corner	0.30	0.30
Clearance to inside corner	0.30	0.30
Clearance above paved sidewalk or paved driveway located on public property	2	2
Clearance above grade, veranda, porch, deck, or balcony	1	0.30
Vertical Clearance below soffits or from any attic venting component	1	1
Horizontal clearance from an area directly below the discharge where there is a risk of injury from ice fall	2	1

7.3.4.3.1 The pipe shall be located where the discharged air and moisture will not directly strike surfaces on the property or adjacent properties.

Drawings – Owners and builders must comply with the governing Building Code. It is paramount for the applicant to provide sufficient details at the time of building permit application to coordinate the proper subfloor and above slab installation.

Part 3 Buildings

On the mechanical drawings, specify the *radon mitigation system* and the design standard where provided.

Part 9 Buildings

If performance-based radon design is provided, documents with *radon mitigation* design are required to be sealed by a Registered Professional with specification on which standard is considered for *radon mitigation* and clarify the system(s) implemented. If the prescriptive requirements are being provided, the following information is required to be shown on the building permit drawings to demonstrate compliance with Subsection 9.13.4:

- Details (i.e., slab on grade, basement foundation, etc.) indicating the *gas-permeable layer* material, air barrier details, and radon pipe subfloor arrangement, and radon pipe riser penetration.
- The radon vent pipe above slab (i.e., riser location(s) on plans).
- Location of termination to the exterior and applicable clearances.

Inspection Requirements

Performance-Based Design – If the *radon mitigation system* is designed by a Registered Professional, then the Registered Professional is responsible for the *radon mitigation system* provided.

Prescriptive Design – If a subfloor depressurization system is provided based on the prescriptive Part 9 requirements, then the following requirements, but not limited to, will be reviewed as part of the installation on site in conformance with Subsection 9.13.4:

- *Gas-permeable layer* (i.e., Min. 100 mm course clean granular material or equivalent alternative)
- Air barrier to be properly installed
- Location and arrangement of the sub-floor radon vent pipe
- Location and arrangement of the above slab radon vent pipe, and labelled according to Code provisions
- Size and material of radon vent pipe
- If effective depressurization is achieved (i.e., footing-through pipe at locations segregated by footings).
- Radon vent pipe termination and clearances at the exterior, and weather protection.

The subfloor depressurization system requires multiple stages of inspection. The first stage is

required to be booked when the *gas-permeable layer* is filled, radon pipe inlet(s) are set, and under-slab radon piping is laid out (if applicable), but before the air barrier system is installed.

More information regarding inspections can be found at the [Building Inspections Page](#).

Please be advised that a failed inspection or missed inspection will require builder to take corrective action to demonstrate compliance prior to proceeding.

Post-Occupancy and Existing Buildings

Testing is the responsibility of the building owner after the building occupancy has taken place. Homeowners can test their homes and follow [Health Canada's guidelines](#) for action based on the results, such as attaching an active fan or other means to reduce the radon concentration.

Further Information

Glossary – Definitions of the following terms *italicized* used in this information guide:

“Conditioned space” means any space within a building, the temperature of which is controlled to limit variation in response to the exterior ambient temperature by the provision, either directly or indirectly, of heating or cooling over substantial portions of the year. [2024 BCBC]

“Gas-permeable layer” – the layer of gas permeable material installed under the basement sub-slab membrane which facilitates a negative pressure field to extend from the suction point to the foundation walls and footings. [CAN/CGSB-149.11-2019]

“Radon mitigation” – act of repairing or altering a building or building design for the purpose in whole or in part of reducing the concentration of radon in the indoor atmosphere. [CAN/CGSB-149.11-2019]

“Radon mitigation system” – a system, component, design or installation for reducing radon concentrations in the indoor air of a building. [CAN/CGSB-149.11-2019]

Classification

“Level 1 rough-in for active soil depressurization” – provides minimum protection and provides provisions for a radon rough-in stub, as well as provisions for sealing soil gas entry points. Level 1 is not a complete radon reduction system, but allows for easier conversion to one in the future, should it become necessary. [CAN/CGSB-149.11-2019]

“Level 2 full passive vertical radon stack” – provides moderate protection and includes all provisions of Level 1, with the addition of extending the pipe stub to create a full, vertical passive (without a fan) radon stack system that runs upwards through the inside of the building envelope and vents above the roof. Level 2 is a complete passive soil depressurization radon reduction system. [CAN/CGSB-149.11-2019]

“Level 3 full active soil depressurization system” – provides maximum protection and includes all provisions from Levels 1 and 2, with the addition of a radon fan to create an active soil depressurization system (ASD). Level 3 is a complete radon reduction system. For active soil depressurization systems, a radon fan draws air up the vent stack to depressurize the *gas-permeable layer*. A fan driven ASD system will lead to greater radon reductions than the passive system described above. Active Level 3 systems often reduce high radon levels by 90% or more. [CAN/CGSB-149.11-2019]

Referenced Documents – The official documents referenced in this information guide can be accessed via the links below:

- [2024 British Columbia Building Code](#)
- [Building and Safety Standards Branch's Information Bulletin No. B24-03 Radon Rough-in Requirements](#)
- [CAN/CGSB-149.11-2019 Radon Control Options for New Construction in Low-Rise Residential Buildings](#)
- [CAN/CGSB-149.12-2017 Radon Mitigation Options for Existing Low-Rise Residential Buildings](#)
- [EPA 625-R-92-016 Radon Prevention in the Design & Construction of Schools & Other Large Buildings](#)
- [Health Canada Guidelines for Radon](#)

If you have any questions regarding radon requirements, please contact the Building Division at 604-294-7130, or building@burnaby.ca.