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September 19, 2014

## **New Radon Rough-in Requirements**

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On December 19, 2014, new requirements for protection from soil gases become effective. BC Building Code provisions for the rough-in for a subfloor depressurization system now require installation of a radon vent pipe which extends through, and terminates outside, the building.

The new requirements provide a more adaptable substructure for future radon mitigation and require the designer to account for routing of the radon vent pipe during the design stage. This change applies to Part 9 dwelling units and buildings containing residential occupancies where floor assemblies separate conditioned space from the ground. There are no changes to building exemptions based on location and building occupancy.<sup>1</sup>

The potential for high levels of radon infiltration can be challenging to evaluate prior to construction and a radon problem may only become apparent once the building is completed and occupied. Radon mitigation systems are proven to reduce the likelihood of adverse health effects from radon, such as lung cancer. There are links provided in Appendix A of the BC Building Code for information on testing for radon in your home and guidelines for when mitigation is recommended. Those links, as well as sources for more information on radon, are included in the Appendix to this bulletin. It is the owner's responsibility to test their home, and it is recommended that the home be tested again after installation of a radon mitigation system.

The most common and efficient radon mitigation method is soil depressurization. A soil depressurization system requires:

- a. space for the movement of soil gases between the ground and the air barrier system (see the gas permeable layer in Figure 1) into which a radon vent pipe is inserted;
- b. the radon vent pipe then extends to the exterior of the building and terminates in a safe location (as shown in Figure 1); and
- c. the radon vent pipe to be mechanically assisted, typically by means of a fan installed along the pipe, to create a negative pressure in the space between the air barrier system and the ground and exhaust soil gases outside the building.

The BC Building Code does not require installation of a fan during initial construction, although designers should consider the future installation of a fan (which will require access and electrical supply) somewhere along the radon vent pipe.

The BC Building Code refers to material that creates the space allowing the movement of soil gases between the air barrier system and the ground as a gas permeable layer<sup>2</sup> (see Figure 1). The gas permeable layer allows for effective depressurization of that space, and functions as the drainage layer required in Article 9.16.2.1. A typical solution is to install coarse clean granular material below the floor on the ground. This allows compliance with 9.16.2.1.(1)

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<sup>1</sup> Exceptions are listed in Article 9.13.4.2. and Table C-3 in Appendix C of the BC Building Code.

<sup>2</sup> The gas permeable layer described in Clause 9.13.4.3.(3)(a) consists of not less than 100 mm of clean granular material containing not more than 10 % of material that will pass a 4 mm sieve.

through either the performance language in 9.13.4.3.(2) or the prescriptive language in 9.13.4.3.(3).

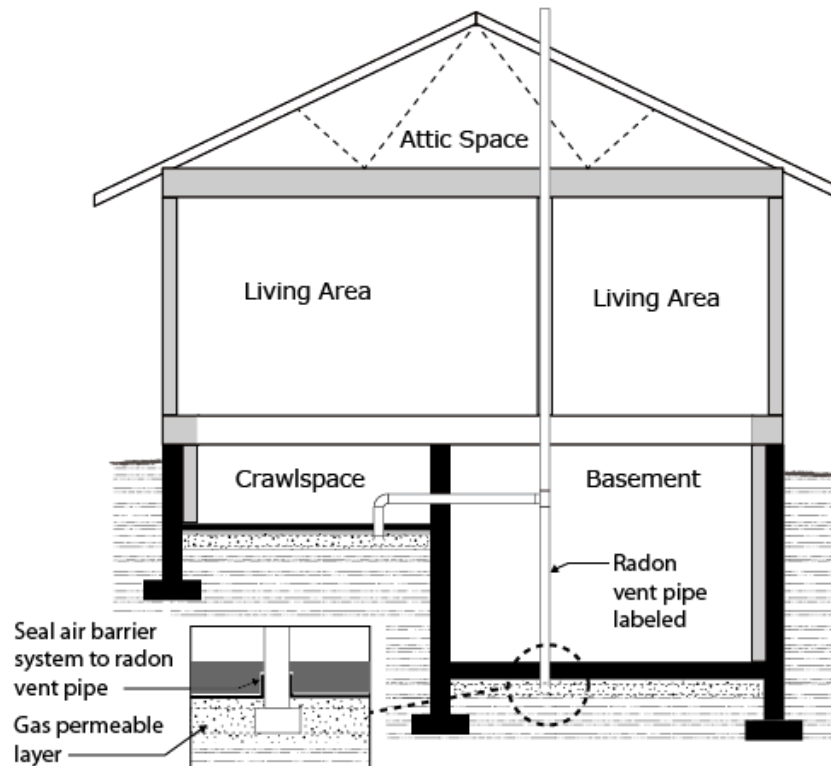


Figure 1

The designer has the performance option in 9.13.4.3.(2) to terminate the radon vent pipe outside the building in a manner that does not constitute a hazard, or use the prescriptive option in 9.13.4.3.(3) and follow the requirements for the location of the termination. The prescriptive termination requirements are similar to the requirements for the termination of plumbing vents<sup>3</sup> and will be familiar to designers and builders.

Installing a gas permeable layer and radon vent pipe after initial construction can be costly and invasive. Extending a pipe through the building to the exterior after initial construction can be problematic if the building design did not account for radon mitigation. The provisions for a radon rough-in during initial construction require a small cost and effort at the time of construction to reduce the much larger cost of retrofitting a radon mitigation system after construction. The requirements provide added benefits of improved sub-slab drainage and integrity of the air barrier system.

<sup>3</sup> The termination of plumbing vents is described in Article 2.5.6.5. and illustrated in Appendix note A-2.5.6.5.(4) of the BC Plumbing Code.

## Frequently Asked Questions

Question 1: What was wrong with the old provisions?

Answer: The old provisions required the pipe to be capped in the interior of the building. The capped pipe did not permit soil gases to leave the building and stakeholders expressed concerns that the location and condition of the rough-in were not always suitable for future connection of a radon mitigation system. The Building and Safety Standards Branch consulted with the Canadian Codes Center, the Ministry of Health, BC Lung Association, as well as industry advocates for radon mitigation to inform improvements to the existing code requirements.

Question 2: Is every home at risk of radon infiltration?

Answer: Radon gas, a result of the decay of uranium, is found in varying degrees as a component of soil gas in all regions of Canada. Health Canada guidelines recommend mitigation when exposure levels exceed 200 becquerels per cubic meter. Table C-3, "Locations in British Columbia Requiring Radon Rough-Ins," in the BC Building Code classifies locations demonstrated to have an elevated risk of the presence of indoor radon levels which exceed 200 Bq/m<sup>3</sup> as Radon Area 1. Radon rough-ins are required in Radon Area 1 locations. The remaining locations listed in Table C-3 are simply not known to have an elevated risk, and are classified as Radon Area 2. The geographical separation of Radon Areas 1 and 2 generally follows the Coast Mountains as shown in Figure 2.

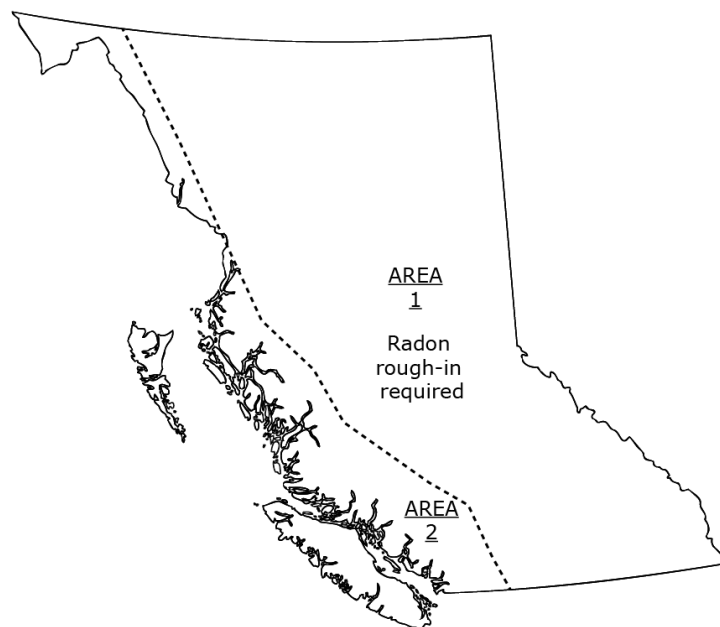


Figure 2

Question 3: Can I use perforated pipe below the air barrier system?

Answer: Yes, you may have multiple inlets on the same radon vent pipe and the perforations act as inlets. The material that serves as the gas permeable layer should project beyond the perforations to facilitate effective depressurization. The pipe must be sealed where it penetrates the air barrier system to maintain its integrity and must be air tight from that joint until termination.

Question 4: If I install a fan during initial construction, what are the code requirements for that fan?

Answer: Because the BC Building Code does not require a fan, there are no requirements specific to radon mitigation that the fan must comply with other than to be air tight. A fan installed along the radon vent pipe must maintain the air-tightness of the radon vent pipe and maintain the integrity of the air barrier system in order to limit leakage from the radon vent pipe into the building.

Question 5: How are buildings other than dwelling units protected against radon?

Answer: Buildings that do not conform to the provisions discussed in this bulletin must conform to environmental separation and ventilation requirements which are found in Parts 5 and 6 of the BC Building Code.

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## Appendix

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The following sources can provide more information on radon in homes:

**British Columbia Ministry of Health** ([health.gov.bc.ca](http://health.gov.bc.ca))

**RadonAware**, British Columbia Lung Association ([radonaware.ca](http://radonaware.ca))

**The Canadian Cancer Society** ([cancer.ca](http://cancer.ca))

Canadian Mortgage and Housing Corporation and Health Canada publication

- **Radon: A Guide for Canadian Homeowners 2007** ([publications.gc.ca](http://publications.gc.ca))

Health Canada publication

- **Guide for Radon Measurements in Residential Dwellings (Homes) 2008** ([publications.gc.ca](http://publications.gc.ca))
- **Radon – Reduction Guide for Canadians** ([hc-sc.gc.ca](http://hc-sc.gc.ca))