

Building Standards Advisory

Promoting construction of safe, healthy, habitable buildings

Radon

Question

“What is radon?”

“What do I need to do to make my home safe?”

Answer

Radon is a naturally occurring radioactive gas that is produced by the decay of uranium-bearing minerals in rocks and soils. During the decay, radioactive alpha particles are given off. These particles are detrimental to our health. Radon is odorless, tasteless, and colorless.

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 National Building Code 2010 (NBC 2010) Part 9 requires the application of certain measures in all dwellings. These measures are:

- low in cost,
- easy to install at time of *construction*, and
- provide other benefits.

The principal method of limiting radon from entering a home is to seal all potential points where radon can enter.

Background

The Human Concern

Radon gas breaks down or decays to form radioactive elements that can be inhaled into the lungs. In the lungs the process of decay continues creating radioactive particles that release small bursts of energy. This energy is absorbed by nearby lung tissue, damaging the lung cells. When damaged cells reproduce they may cause cancer.

Why Should We Pay Attention?

- 52% of exposure comes from radon inhalation.
- Health Canada estimates 16% or 1,900 lung cancer deaths per year are related to radon.
- We spend more time indoors, and the use of basement space has increased.
- Building envelopes are sealed against leakage which may result in an accumulation of gases.
- Some geographical areas are known for high risk of radon in the ground.
- Health Canada reduced the permissible radon level from 800 Bq/m³ to 200 Bq/m³, making the Canadian guideline on radon more stringent.

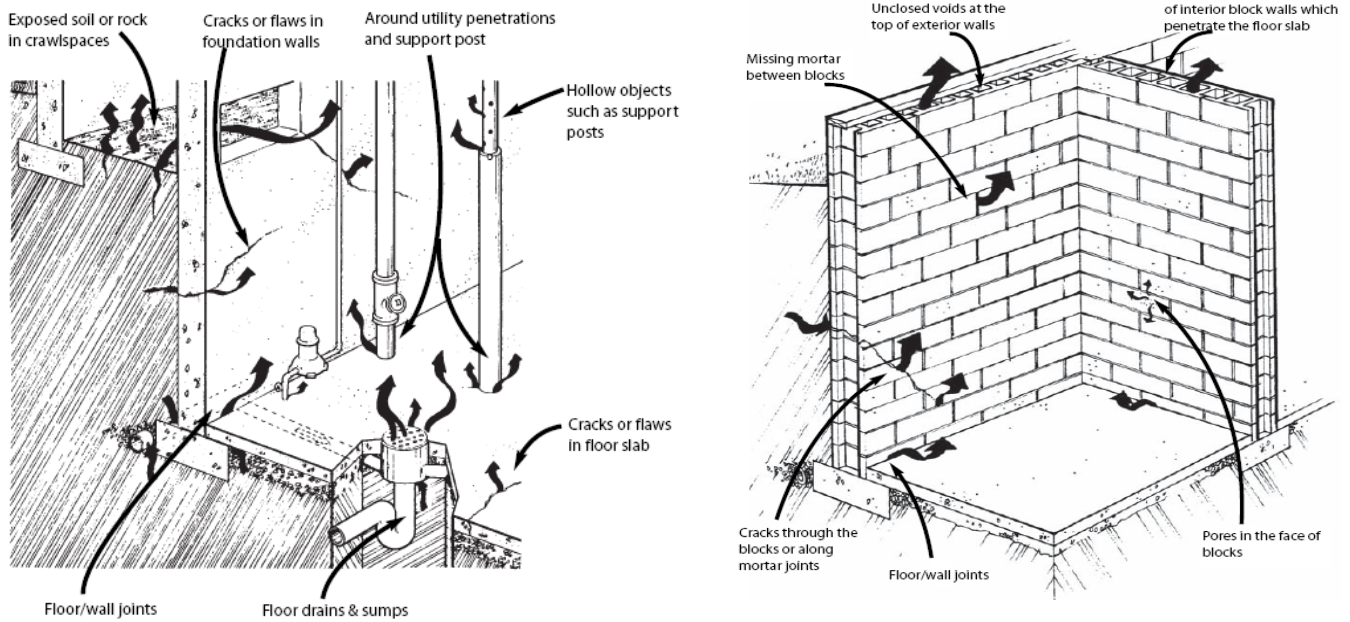
Compliance with *The Uniform Building and Accessibility Standards Act, Regulations and the National Building Code of Canada 2010 (NBC 2010)* is addressed in this advisory. Words in italics, other than Act titles, are defined in the NBC 2010.

Radon

The Provincial Concern

In Saskatchewan, recent studies by Health Canada revealed the raw percentage of homes testing above the current acceptable radon guidelines ranged up to 25.5%. The survey confirmed that Saskatchewan is among the provinces with the highest percentage of indoor radon levels.

Where Does Radon Come From?



Source: Radon – A Guide for Canadian Homeowners published by Canada Mortgage and Housing Corporation (CMHC)

Some examples of how radon can penetrate include:

- cracks in walls
- open perimeters between slabs and walls
- pipes
- openings to unprotected soil
- unsealed floor drains
- gaps between masonry blocks

Radon has been a concern of Health Canada and the National Research Council and is addressed in the prescriptive requirements of the NBC 2010, which includes provisions to enhance the protection of *building* occupants by addressing:

- new Health Canada Guidelines for acceptable indoor concentration of radon;
- basic protection of houses and buildings; and,
- specific provisions for houses and small buildings that require more than basic protection.

The NBC 2010 (applicable to new buildings)

9.13.4.2. Protection from Soil Gas Ingress

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

9.25.3.2. Air Barrier System Properties

- 2) Where polyethylene sheet is used to provide airtightness in the air barrier system, it shall conform to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction."

Radon

9.13.4.3. Providing for the Rough-in for a Subfloor Depressurization System

- 1) Floors-on-ground shall be provided with a rough-in for subfloor depressurization consisting of:
 - a) a gas-permeable layer, an inlet and an outlet as described in Sentence (2), or
 - b) clean granular material and a pipe as described in Sentence (3).
- 2) The rough-in referred to in Clause (1)(a) shall include:
 - a) a gas-permeable layer installed in the space between the air barrier and the ground to allow the depressurization of that space,
 - b) an inlet that allows for the effective depressurization of the gas-permeable layer and
 - c) an outlet in the conditioned space that:
 - i) permits connection to depressurization equipment,
 - ii) is sealed to maintain the integrity of the air barrier system, and
 - iii) is clearly labelled to indicate that it is intended only for the removal of radon from below the floor-on-ground.
- 3) The rough-in referred to in Clause (1)(b) shall include
 - a) clean granular material installed below the floor-on-ground in accordance with Sentence 9.16.2.1.(1), and
 - b) a pipe not less than 100 mm in diameter installed through the floor
 - i) its bottom end opens into the granular layer required Clause (a) at or near the centre of the floor and not less than 100 mm of granular material projects beyond the terminus of the pipe measured along its axis (see A-9.13.4.3.(2)(b) and (3)(b)(i) in Appendix A),
 - ii) its top end permits connection to depressurization equipment and is provided with an airtight cap, and
 - iii) the pipe is clearly labelled near the cap and, if applicable, 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.

A-9.13.4.3.(2)(b) and (3)(b)(i)

Division B

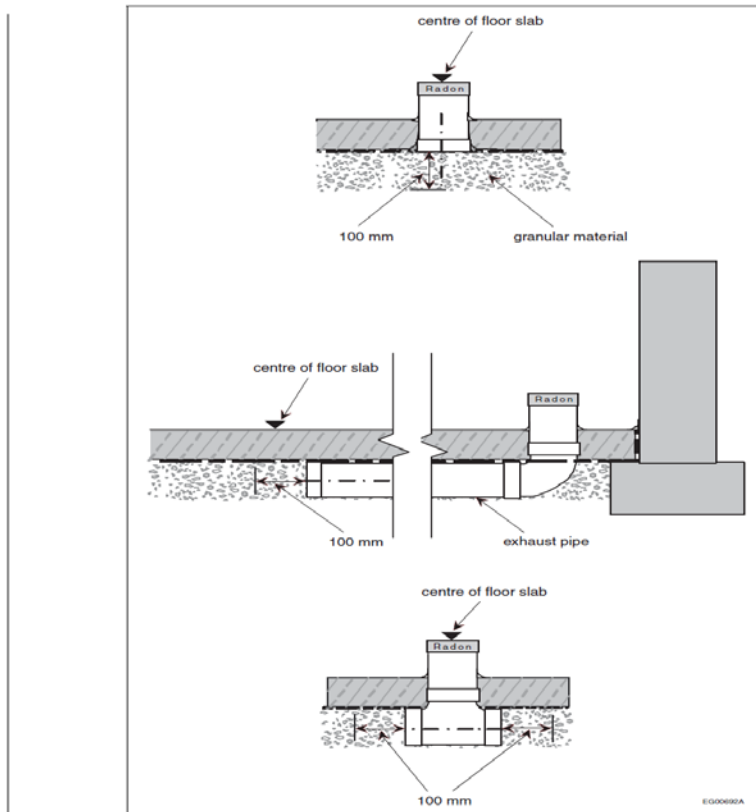


Figure A-9.13.4.3.(2)(b) and (3)(b)(i)
Acceptable configurations for the extraction opening in a depressurization system

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Existing Homes and Buildings

How do you remove high levels of radon?

- If tests find a high level of radon, reducing radon infiltration can be achieved by:
 - Sealing cracks in all surfaces (foundation walls and basement floors) in contact with the soil.
 - Providing sub slab depressurization and venting to reduce the level of radon below the basement floor slab or from crawl spaces.
 - Using a contractor competent in the radon remediation is recommended.

What to do if you suspect or want to have your building tested for radon?

- Health Canada recommends that all homes be tested for radon levels.
- You can hire a qualified tester to do the test, or you can use a do-it-yourself test kit. You can buy radon test kits on the internet or from home improvement stores. You can also contact the the SRC Environmental Analytical Laboratories at the Saskatchewan Research Council for advice and test kits by contacting 1-800-240-8808 or analytical@src.sk.ca. There are two types of tests. Both measure radon levels in the air.
 - The **short-term test** kit stays in your home or office for 2 to 90 days. Radon levels vary daily and from season to season. So you may want to follow up the first short-term test with a second test.
 - The **long-term test** kit stays in your home or office for more than 90 days. A long-term test will give more accurate results.
- If you have questions about radon in your house, you can get help from the Canada Mortgage and Housing Corporation by calling 1-800-668-2642.

Radon Links

- CMHC Guide
website: <http://www.cmhc-schl.gc.ca/odpub/pdf/61945.pdf>
- Health Canada - Environmental and Workplace Health
website: <http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/index-eng.php>
- The Lung Association
Email: info@sk.lung.ca
Tel: 1-306-343-9511
- U.S. Environmental Protection Agency
website: <http://www.epa.gov/radon>
- Canadian-National Radon Proficiency Program – professional listings and path to professional standing
website: <http://c-nrpp.ca/>

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This advisory is published by the Saskatchewan Ministry of Government Relations for purposes of providing information to users on the topic contained herein. In case of conflict between *The Uniform Building and Accessibility Standard Act* (the UBAS Act), the National Building Code of Canada 2010 (NBC 2010) and this advisory, provisions of the UBAS Act and NBC 2010 shall apply.