C-NRPP Technical Bulletin: for Residential Builders and Building Officials

Understanding best practices for installing radon control measures in new construction

PUBLISHED: August 2024

The Canadian National Radon Proficiency Program (C-NRPP) sets the national standards for radon training and certification.

C-NRPP operations are overseen by Health Canada.

What is Radon?

Radon is a naturally occurring, radioactive gas formed by the breakdown of uranium in soil, rock, and water. Radon is invisible, odourless, and tasteless, making it undetectable without proper testing equipment. **All regions of Canada have some level of radon, and it is found in all homes at varying levels.**

Why is Radon Harmful?

Exposure to elevated levels of radon is the leading cause of lung cancer in non-smokers and is responsible for over 3000 deaths each year[1]. Health Canada recommends that all homes and buildings should be tested for radon. If the radon level in a building is above the Canadian guideline level of 200 Bq/m^3, action should be taken to reduce the radon levels to as low as reasonably achievable.

Radon and Newly Constructed Residential Homes

The level of radon in a newly constructed home cannot be predicted ahead of time or measured during construction. It is therefore imperative that all homeowners test their homes for radon by conducting a long-term (91 day) test[2] during the first heating season after completion and occupation of their home. Also, because of the changes that occur in the building envelope during the first three years after construction (due to shrinking concrete and other shifts in the building envelope), we recommend that new homes should be tested for radon a second time during the heating season three years after construction. Links to approved test kit suppliers, electronic radon monitor performance reviews[3], and radon professionals[4] are found at the end of this document.

Understanding Building Codes versus Best Practices

The National Building Code (NBC2020) is a MINIMUM standard that all new homes need to meet. As of 2024, the NBC2020 is applicable in all provinces except for Ontario and only regionally in PEI and Newfoundland and Labrador. The NBC2020 addresses the fact that potentially high radon levels need to be mitigated, but it doesn't provide a method to reduce radon levels. Instead, it provides for a rough-in for future radon reduction in all new homes. The Canadian General Standards Board (CGSB) has developed a best practice document called *Radon control options for new buildings:* CAN/CGSB 149.11-2024[5] which provides extended information to help builders.

Radon Control Measures in the NBC2020

NBC2020 includes the following measures with respect to radon control:

- Granular drainage layer (Section 9.14.4)
- Sealed sub-slab membrane with all cracks/joints sealed, sealed to the foundation wall with flexible sealant (Sections 5.4, 9.13.4.2, and 9.25.3)

- Rough in pipe (open to the granular sub-slab layer, ends above the slab in the interior of the home and is capped and sealed) (Section 9.13.4.3)
- Sealed sump pit (Section 9.14.5.2)

CAN/CGSB 149.11-2024 includes best practices above the NBC2020:

- Perimeter seal - proper sealing of the foundation is important, especially the perimeter. The floor to wall joint is of key importance in preventing radon from entering a home; sealing measures should be done in such a way to accommodate for concrete shrinkage. (Section 7.1.4.6)

- Location of the rough-in - Pipes must be installed in a location which considers the future installation of the full mitigation system (if required), including the discharge locations for the pipe to exit the building, space to allow installation of a fan (14" diameter or 7" radius), and ideally to allow for a system with the fewest number of bends in the pipe to ensure an efficient system. (Section 7.1.2)

- Properly capped and sealed rough-in with clear labelling - The rough-in pipe is a direct conduit from the ground into the home, therefore a sealed cap is extremely important. In addition, the rough-in must be properly labeled to ensure the current and future occupants understand the purpose of the pipe. Labels for radon control systems are available from C-NRPP. Purchase proper labels for radon control systems here.[6]

- Piping below the slab - could be perforated or solid, depending on its application or use. Solid pipe should be installed in such a way that prevents the end of the pipe being plugged either from gravel or concrete. The sub-slab pipe should be installed in such a way to collect soil gas/radon from the full footprint of the slab all areas including across sub-slab barriers such as strip footings **(Section 7.1.1.5).**

- Pipe used for the rough-in stub pipe – This pipe must be appropriate for above ground use. PVC pipes installed completely or in part above grade shall comply with Schedule 40 specifications regarding wall thickness, inside and outside diameters and pressure ratings. (Section 7.1.2.2)

What Builders Can Do?

- Use stickers to properly label radon rough-ins (stickers available here)
- Add an "About Radon" document to your new home binder for homeowners.
- Consider including a long-term radon test with new home purchases.
- Work with a C-NRPP radon professional to sell homes with a low-radon guarantee.

Additional References: (see QR Code for links)

1. Radon exposure leads to an estimated 3000 deaths per year: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radon-what-you-need-to-know.html
2. Radon control options for new buildings: CAN/CGSB 149.11-2024
3. To test for radon, homeowners may purchase a single-use kit (available online from multiple retailers in Canada – complete listing linked here),
4. Continuous electronic radon monitor (available online from multiple retailers – performance reviews linked here).
5. Homeowners may also consult a certified radon measurement professional from C-NRPP
6. Purchase proper labels for radon control systems here.

Find references links here.