

JANUARY 2025

**ADVISORY
RADON AND SOIL GAS CONTROL
LOW RISE RESIDENTIAL AND SMALL BUILDINGS**

BUILDING CODE SERVICES



**RADON AND SOIL GAS CONTROL
LOW RISE RESIDENTIAL AND SMALL BUILDINGS**

This advisory is intended to outline radon and soil gas mitigation for low rise residential and small buildings in compliance with the Ontario Building Code.

LIMITATIONS

This advisory applies to construction for a building permit subject to the 2024 Ontario Building Code. This advisory replaces a previous version, 20201130 issued November 2020.

This advisory applies to low rise residential and small buildings regulated under Part 9 of Division B of the Ontario Building Code.

- Three or fewer storeys in building height,
- Building area not exceeding 600 m², and
- Major occupancies classified as,
 - Group C, residential occupancies other than buildings used for retirement homes,
 - Group D, business and personal services occupancies,
 - Group E, mercantile occupancies, or
 - Group F, Divisions 2 and 3, medium hazard industrial occupancies and low hazard industrial occupancies.

SCOPE AND APPLICATION

The soil gas and radon mitigation measures apply to all new low rise residential and small building construction including additions.

The Ontario Building Code requires all new construction to incorporate the following measures to control ingress of soil gas.

1. Installation of a soil gas barrier
2. Rough in for a subfloor (basement) depressurization system and
3. Installation of a whole house ventilation system

This document focuses on the minimum Ontario Building Code requirements to control soil gas ingress. Passive and fully active subfloor depressurization systems are not outlined in this document or prescribed by the Ontario Building Code. For more information on installation of active or passive subfloor depressurization systems refer to the following Health Canada guideline.

WHAT IS RADON

Radon is a colourless, odorless, radioactive gas that occurs naturally in the environment from the breakdown of uranium in soils and rocks.

Health Canada advises radon exists everywhere and presents low risk outdoors or in well ventilated areas but can accumulate in buildings causing elevated levels which may result in an increased risk of lung cancer.

ROLES AND RESPONSIBILITIES FOR DESIGNERS AND BUILDERS

Designers are required to provide details describing the type of radon mitigation rough in (sub slab or above slab), the placement of a soil gas barrier, placement of soil gas collection piping, location of the soil gas vent(s), and soil gas piping labeling OR details for the installation of an active or passive sub slab radon mitigation system.

Builders are required to install soil gas/radon mitigation measures (air, soil gas barrier, collection piping, radon vent pipe, labelling) in accordance with the Ontario Building Code OR install a fully active or passive radon venting system in accordance with Health Canada's guideline [Radon - Reduction Guide for Canadians - Canada.ca](#).

SOIL GAS BARRIER

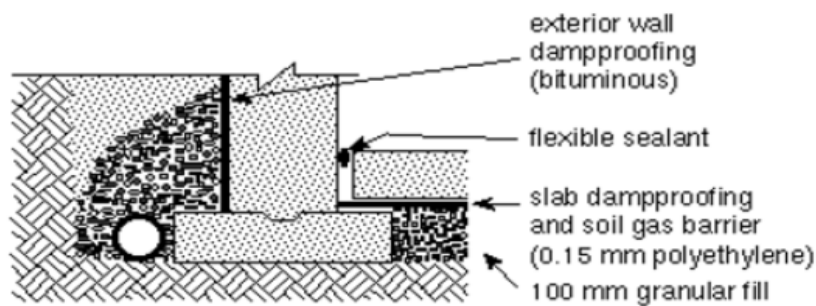
A soil gas barrier is required to be installed in all low-rise residential and small building construction. Refer to the limitation noted earlier in this document. A soil gas barrier shall be installed in conformance with Ontario Building Code Div B 9.25 (air barriers) or Supplementary Standard SB9.

SOIL GAS CONTROL AND AIR BARRIERS

A soil gas barrier consists of the installation of a membrane installed below or above a floor in contact with ground or soil. A soil gas barrier must comply with the following requirements.

Soil Gas Barrier - Slab on ground

- Polyethylene sheet complying to CAN/CGSB-51.34-M
- Joints in the soil gas barrier shall be lapped not less than 300mm (12") but joints do not require to be sealed in accordance with Div B 9.13.2.6. and 9.25.3.3.
- Perimeter of slab shall be sealed to the inner surface of adjacent walls using flexible sealant
- All concrete slab penetrations shall be sealed with a flexible sealant against soil gas leakage including structural elements, plumbing piping, sump pump pits that penetrate through the soil gas barrier and floor slab.



DAMPPOOFING AND SOIL GAS CONTROL ONTARIO BUILDING CODE SUPPLEMENTARY STANDARD SB9

Soil Gas Barrier – Above Floor

Joints in a soil gas barrier installed above a slab on ground or other floor system PWF (permanent wood foundations) are required to be sealed.

SOIL GAS BARRIER ALTERNATIVES

Use of other soil gas barrier material may be considered provided they have been evaluated for use as an acceptable air barrier.

Extruded polystyrene foam insulation or medium density polyurethane spray foam may substitute as an acceptable soil gas barrier where the material characteristics are suitable for application as a soil gas barrier as determined by a material evaluation report from an accredited agency.

Evaluated ABS (radon barrier)

Product description

- Spray foam, XPS panels and PE membrane

Function


- ABS/radon gas barrier

Conditions and limitations – Part 9

- Be continuous (may need accessories such as transition membrane, tape, flexible sealant, air foam sealant, etc.)
- Over 100 mm gravel layer (with adjusted thickness due to foam penetration)
- Rough-in
- Dry service conditions

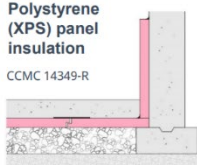
Spray foam insulation

CCMC 14152-R
CCMC 14280-R
CCMC 14445-R



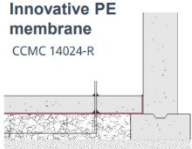
Polystyrene (XPS) panel insulation

CCMC 14349-R



Innovative PE membrane

CCMC 14024-R



NBC 2020 – Soil gas control (floors-on-ground) CCMC evaluations
Presentation to BOABC Conference May 29, 2024 - C St-Onge, P. Eng.

SOIL GAS BARRIER INSTALLATION EXCEPTIONS

Exceptions to installation of a soil gas barrier are permitted for garages and unenclosed portions of buildings.

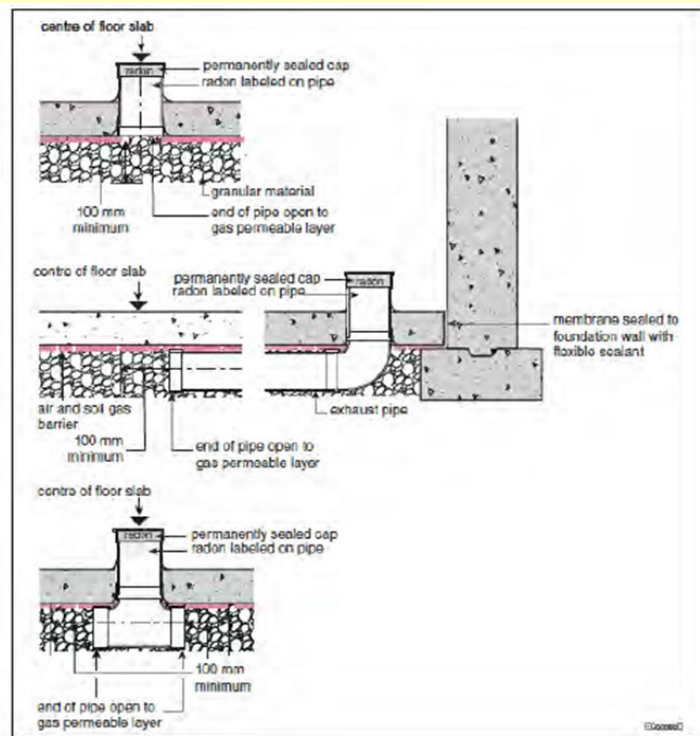
ROUGH IN FOR A SUB SLAB (BASEMENT) DEPRESSURIZATION SYSTEM

New low rise residential and small buildings (including additions) require installation of a subfloor depressurization rough-in equipped for a future extraction system.

The radon rough-in consists of a sub slab gas-permeable layer and a perforated pipe below the air barrier system connected to a radon vent pipe.

The radon rough in shall include the following.

- Piping minimum 100 mm diameter
Piping terminated above slab with an airtight cap.
- Visible piping labeled.
- Perforated collection pipe installed in a clean granular or permeable material.



ACCEPTABLE RADON MITIGATION ROUGH IN CONFIGURATION
OBC SUPPLEMENTARY STANDARD SB9

To ensure effective depressurization, a perforated collection pipe is required to be located and distributed throughout the sub slab area below the air barrier system. Where the excavation is separated by footings, underground plumbing or other obstructions, the portions may be interconnected by perforated drainage piping so that only one radon vent pipe is required. Multiple radon vent pipes may be required where it is not possible to connect the collection piping to all sub slab areas.

RADON PIPE LABELLING

The radon vent pipe shall be clearly labelled to indicate that it is intended only for the removal of soil gas from below the floor-on-ground. Labels shall be installed at the following locations, above the slab, near the cap, at 1.8 m intervals and at changes in pipe direction.

C-NARP - Canadian National Radon Proficiency Program

FOR ADDITIONAL INFORMATION: Use the following link to obtain Pipe Labels free of charge.

www.c-nrpp.ca

WHOLE HOUSE VENTILATION SYSTEM

DILUTION AND VENTILATION

Ontario Building Code changes introduced in 2017 require installation of a heat recovery ventilator (HRV) or energy recovery ventilator (ERV) in all dwelling units, providing frequent air change which reduces the potential for increased radon concentration.

Installation of a HRV/ERV provides balanced whole house ventilation thereby mitigating concentration of radon and soil gases through dilution and exhausting stale indoor air. HRV/ERVs are required to be balanced to ensure the volume of exhausted air is replenished by an equivalent volume of fresh air. A balanced whole house ventilation system prevents indoor negative air pressure which can induce radon and soil gas ingress.

TESTING

Health Canada recommends use of a long-term radon detector with a test duration for a minimum of three months.

Health Canada has produced a series of publications with respect to radon, impact on health and radon mitigation, including recommendations considered a best practice approach. Radon levels may change seasonally or over the life of a building and cannot be predicted in advance of the completion of a building and testing. For more information refer to Health Canada's Guide for Radon Measurements in Residential Dwellings (Homes)

<https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/guide-radon-measurements-residential-dwellings.html>

Where elevated radon levels are confirmed (by testing) in new homes, refer to the Health Canada publication noted above.

TARION

Tarion new home warranty includes coverage for radon levels that exceed the threshold of 200 becquerels per cubic metre set by Health Canada. TARION offers seven-year coverage for radon remediation as part of its statutory new home warranty.

Contact TARION directly for more information.