

NOVEMBER 2020

20201130

## ADVISORY RADON AND SOIL GAS CONTROL

BUILDING CODE SERVICES



### RADON AND SOIL GAS CONTROL

Radon is a colourless, odorless, radioactive gas that occurs naturally in the environment from the natural breakdown of uranium in soils and rocks. Radon is present at low levels outdoors but may become a problem when it accumulates inside a building. The health risk associated with elevated radon levels is lung cancer.

The Ontario Building Code (OBC) requires new construction to incorporate measures to control ingress of soil gas. Radon mitigation measures are outlined in the Ontario Building Code Supplementary Standard SB9.

Changes to the OBC introduced in 2014 require measures to reduce the movement of air from subgrade soil into a building. The air barrier requirements include sealing the edge of basement concrete slabs, all slab penetrations and installation of a soil gas barrier (polyethylene) on all wall, roof and floor assemblies in contact with the ground including a basement slab (OBC 9.13.4.2.(1) Required Soil Gas Control).

Further OBC changes introduced in 2017 require mandatory installation of a heat recovery ventilator (HRV) in all dwelling units, providing frequent air change which reduces the potential for increased radon concentration.

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.

Builders may voluntarily adopt additional radon mitigation measures during construction as a proactive approach against the possibility of higher measured radon levels following occupancy. Additional measures may include partial rough in of future soil gas venting components to full installation of a complete radon/soil gas venting and mitigation system.

Non residential buildings also require installation of a soil gas barrier which may require professional design of soil gas barriers and ventilation equipment.

#### SOIL GAS CONTROL

A soil gas barrier is required to be installed beneath a concrete slab (at or below grade) for all construction regulated under Part 9 of the Ontario Building Code. A soil gas barrier must include the following requirements;

- Polyethylene sheet complying to CAN/CGSB-51.34-M
- Joints in the soil gas barrier shall be lapped not less than 300mm (12")
- Perimeter of slab shall be sealed to the inner surface of adjacent walls using flexible sealant
- Slab penetrations shall be sealed against soil gas leakage

Alternatively, a soil gas barrier may be applied to the top of the slab, provided a separate floor is installed over the slab.

- Where the soil gas barrier is installed above a slab-on-ground~ joints in the barrier shall be sealed.
- Where installed in conjunction with a framed floor-on-ground, the soil gas barrier shall be installed in accordance with air barrier requirements.

Exceptions to installation of a soil gas barrier are permitted for garages and unenclosed portions of buildings (see 2012 OBC Div B 9.13.4.2.) or for houses containing a sub-slab depressurization system designed in accordance with OBC supplement SB-9.

### BUILDING PERMIT REQUIREMENTS

Building permit applications incorporating a concrete slab in contact with the ground must include soil gas barrier design details.

A building permit is not required to undertake radon mitigation in existing buildings where the work involved is non- structural, does not affect HVAC or plumbing systems or fire protection and the mitigation work does not interfere or pose a threat to the health and safety of the occupants.

Should a permit applicant wish to voluntarily obtain a building permit for radon mitigation in existing buildings, Building Code staff will review and issue a permit where appropriate and undertake inspection of the work.

Where elevated radon levels are confirmed (by testing) in new homes with an active or open building permit, radon mitigation measures require site inspection.

### RADON MITIGATION

The OBC requires basement concrete slab perimeter, penetrations and cracks to be sealed to meet air barrier requirements for all new construction. Where a soil gas barrier has not been installed Supplementary Standard SB9 provides two compliance options,  
Option A - install an additional floor over the basement slab incorporating a soil gas barrier complying with the air barrier requirements  
Option B - install a sub slab depressurization system and test for radon levels. Mandatory radon testing is required where the builder chooses option B.

### TESTING FOR SOIL GAS

For new construction, compliance with SB9 of the OBC is required where testing has determined the threshold of 200 bq/m<sup>3</sup> is exceeded. Health Canada recommends testing a minimum of 3 months to 12 months to accurately assess radon levels. Refer to Health Canada Pub. 4171, "Guide for Radon Measurements in Residential Dwellings (Homes), 2008".