PROTECTING CANADIANS FROM LUNG CANCER AT THE START OF OCCUPANCY

BC Building Officials
25 July 2025

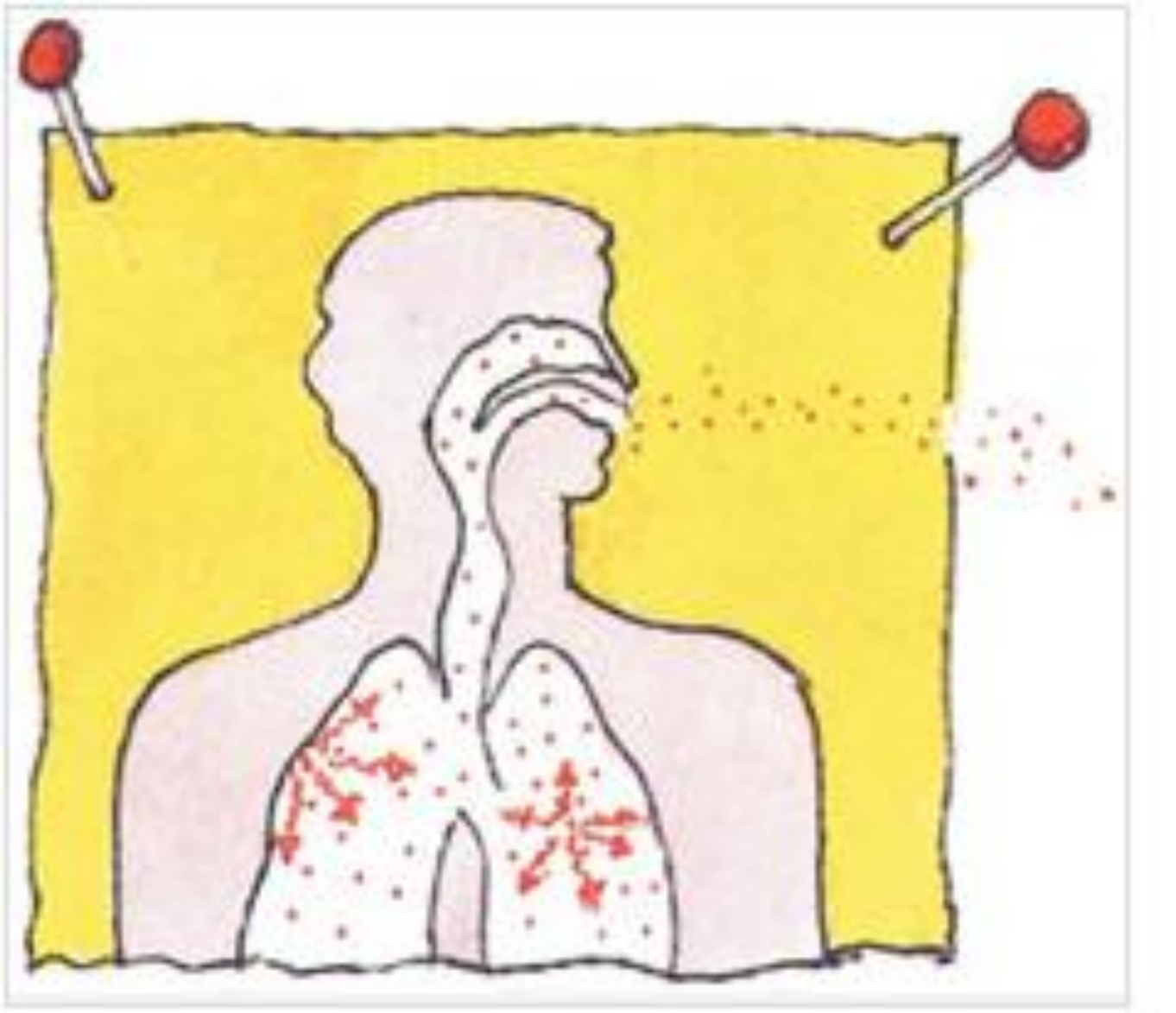
CARST is proud to unite members from across Canada, which encompasses the traditional territory of many First Nations, Métis Peoples, and Inuit whose ancestral footsteps and rights extend beyond the colonial boundaries that exist today. We respectfully honour these Peoples' rights, history, and relationships with this Land.

Dr. Kong Khoo lives in Kelowna.
He is an oncologist at BC Cancer Centre in Kelowna.
Knew about radon, even studied environmental carcinogens, but never tested his home for radon, until he was diagnosed with lung cancer in March 2020.
He tested and his levels were well above 200 Bq/m^3.

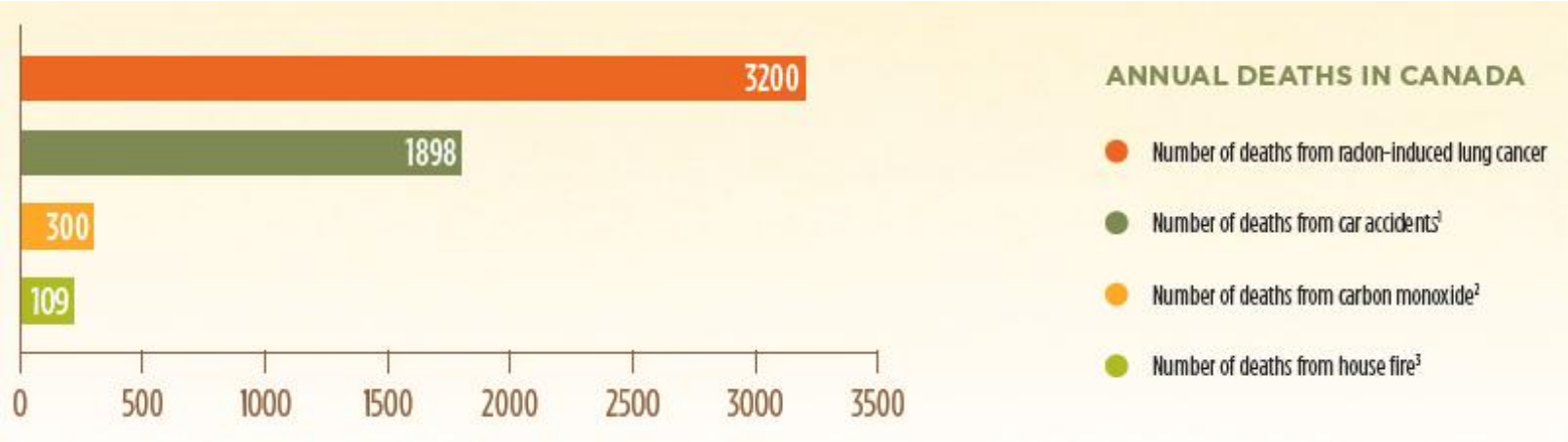
INHALATION OF RADON GAS IS THE

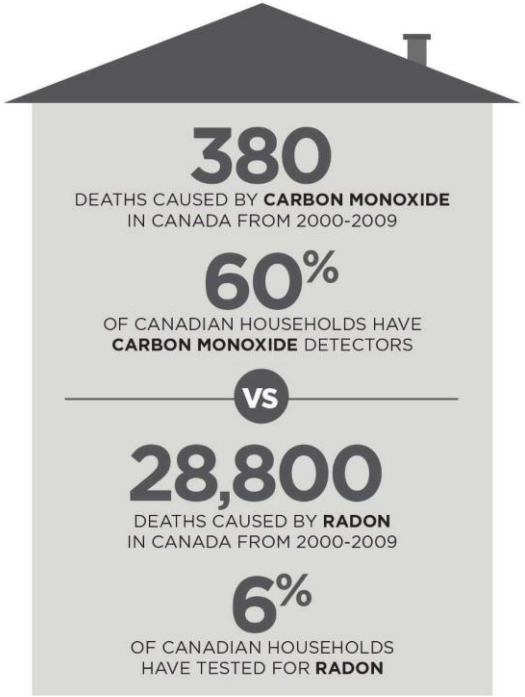
-LEADING CAUSE OF LUNG CANCER IN NON-SMOKERS

- 2ND CAUSE OF LUNG CANCER IN SMOKERS



Radon is the leading cause of lung cancer in non-smokers, leading to over 3000 deaths per year in Canada.





References:
1.www.tc.gc.ca/en/services/road/publications/canadian-motor-vehicle-traffic-collision-statistics-2016.html
2.www.injuryresearch.bc.ca/wp-content/uploads/2017/10/Carbon-Monoxide-Oct-2017-Final-UFV.pdf
3.www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3510019501

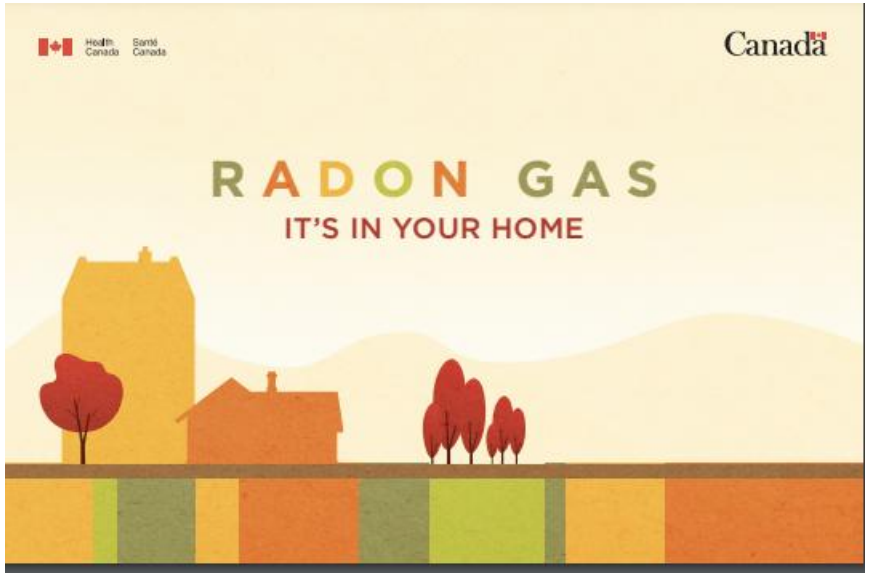
Radon enters a home through contact with the ground and can build up to elevated levels.

- Radon is a carcinogenic radioactive gas that comes from disintegrating uranium in the soil.

- Radon is present in the air everywhere at low concentrations but can accumulate inside buildings to dangerous concentrations.

RADON LEVELS?

- What is the guideline level?
- The **Government of Canada** recommends action when 91-day tests are above 200 Bq/m^3

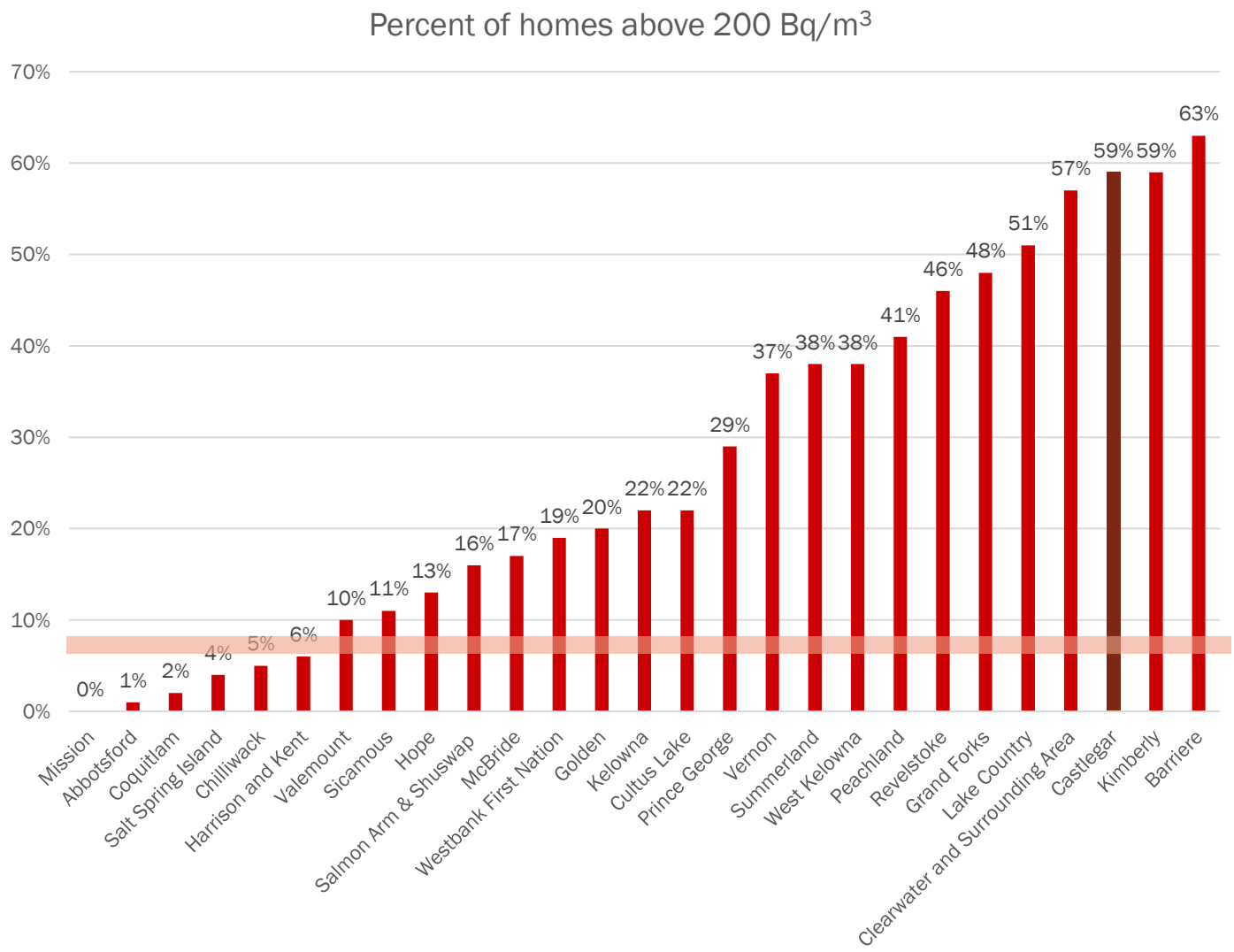


HEALTH IMPACT OF RADON

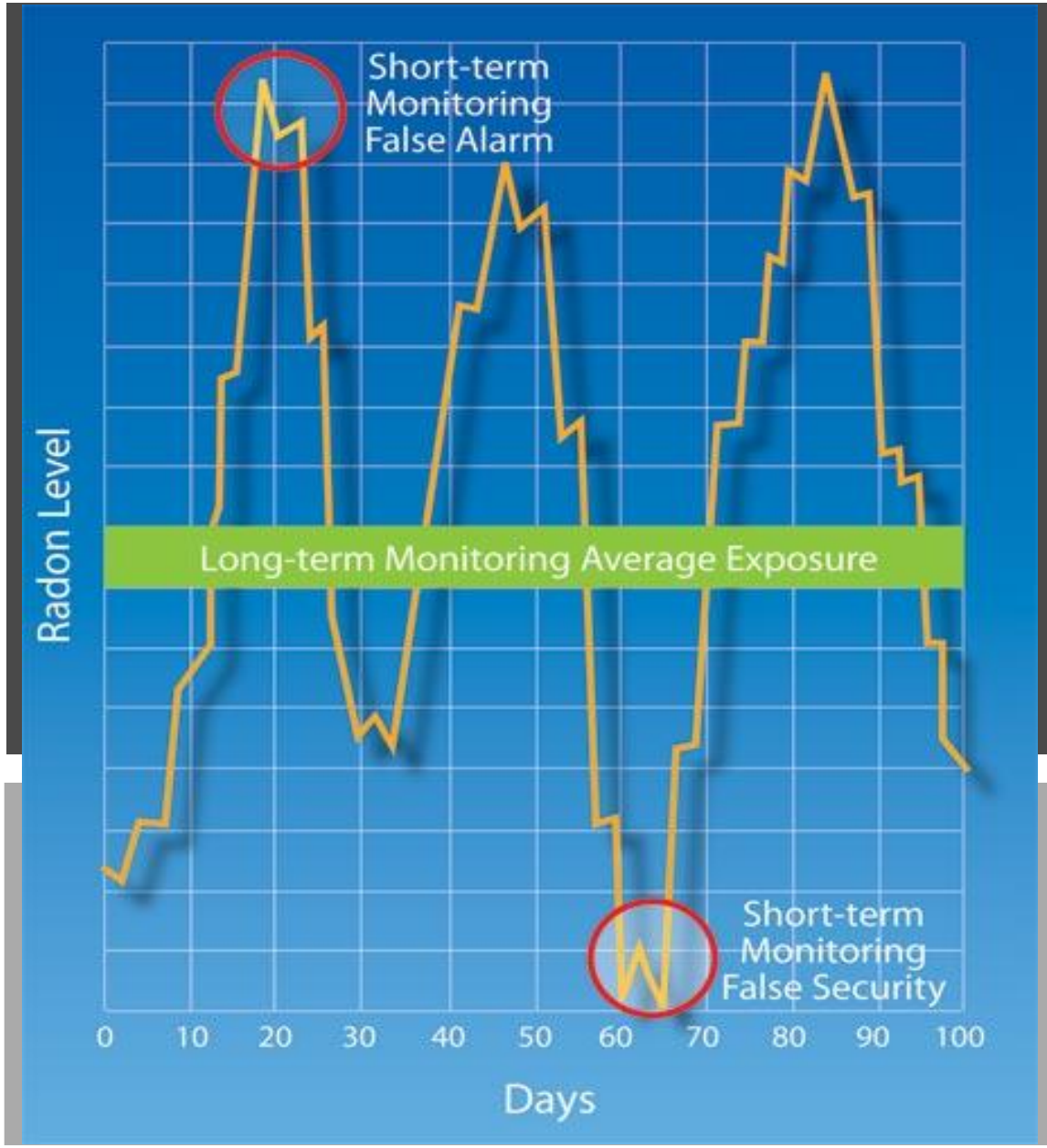
Radon Level	Lifetime Risk of Lung Cancer	Lifetime Risk of Lung Cancer if you Smoke
100 Bq/m³ & under	1%	12%
101-200 Bq/m³	1.5%	15%
201-600 Bq/m³	2%	17%
over 600 Bq/m³	4%	26%

RADON IN BC

- Estimated provincial average from 2012 Cross-Canada Survey
- Data from 100 Radon Test Kit Challenge Communities, 2020-2024



TESTING FOR RADON



Radon Testing

- Indoor radon levels vary greatly, even over a 24-hour period
- Several factors including building design, building condition, occupancy pattern etc. influence radon levels in a house
- Two houses built side-by-side can have different indoor radon levels
- Measurements gathered over a longer period of time will provide a better estimate of the annual average exposure

Alpha Track devices

Electret Ion (E-Perm)

Continuous Radon Monitors

C-NRPP has a list of approved devices for professionals.

Approved devices include:

- **Alpha Track devices**
- **Electret Ion (E-Perm)**
- **Continuous Radon Monitors**

Reviewed and include Quality Assurance/Quality Control requirements.

Canadian National Radon Proficiency Program

2024/25 Consumer-grade Electronic Radon Monitor Performance Report

Over the past few years, electronic radon monitors have become increasingly available and popular with consumers. In order to provide Canadian consumers with an unbiased performance-based comparison of these monitors, the Canadian National Radon Proficiency Program (C-NRPP) regularly conducts a series of performance tests. Details of the testing process can be found here.

Radon levels vary from day to day and week to week. Although the electronic radon monitors listed in this report provide results quickly, it is important to **leave them in place for at least 3 months to get an accurate representation** of your average radon level.

Short-term radon measurements can be misleading (either much lower or much higher than your actual average radon level).

Follow these guidelines when testing your home for radon:

- Place your radon monitor in a room that is occupied for at least 4 hours each day. For detailed instructions on placing your radon monitor, click here.
- Test your home for a minimum of 3 months, preferably during the heating season when indoor radon levels are typically the highest.
- If you only have access to a digital monitor for less than 91 days, we recommend that you follow up with a long-term radon test. You can find a list of online retailers here: https://takeactionradon.ca/test-for-radon/radon-test-kits/.
- Consider the long-term average radon level when deciding whether to mitigate your home. Electronic radon monitors each have a different method of averaging the data; we recommend you read the manufacturer's user guide to determine how to read the long-term average radon level.

The table on the next page summarizes the different devices that have been tested. These devices cannot be professionally calibrated and are **not approved by C-NRPP for use by radon measurement professionals**. To find a list of radon devices for use by professionals you can go here: www.c-nrpp.ca/approved-devices

This report lists radon devices which are intended for homeowners to use to test their own homes.

info@c-nrpp.ca www.c-nrpp.ca

Canadian National Radon Proficiency Program

2024/25 Consumer-grade Electronic Radon Monitor Performance Report

	Make/Model	Manufacturers stated Accuracy	Frequency of Reading	Digital Display or cell-phone app	Battery or Plug-in	Approved For more details click here.
	Airthings Corentium Home	±10% (after 7 days at 200 Bq/m³), ±5% after 2 months of monitoring	12 hours 24 hours 7 days (first reading will take 24 hrs)	Short-term and long-term average shown on monitor display.	Battery	✓
	Airthings View	After 30 days at 200 Bq/m³, ±10% on the 7 day average and +/- 5% on the 2 month average	Hourly	Short-term average shown on monitor display; long-term average shown on app.	Battery or plug in (USB-C)	✓
	Aranet RN+	±8% Accuracy of 24 h, 7 d, 30 d averages	Can be adjusted to show 10 min, 24h, 7 d or 30d	Display on device shows either short-term or long-term level depending on setting. Long-term shown on app.	Battery	✓
	Ecosense EcoQube	±10% at 370 Bq/m³ after 10 hours of measurement	Measures every 10 minutes and displays an hourly rolling average.	Hourly levels are displayed on LED; short-term and long-term averages, and hourly data points on the mobile app.	Plug in	✓
	Ecosense RadonEye	±10% at 370 Bq/m³ after 10 hours of measurement	Takes measurements every 10 minutes; displays an hourly rolling average	Hourly levels are shown on the OLED display; short-term and long-term averages are available in the mobile app	Plug-in	✓
	SunRadon Luft	±10% (after 7 days at 200 Bq/m³)	Hourly, (Initial reading takes 90 mins)	Long-term and short-term averages shown on the app. Color coded indication of levels on monitor display.	Plug-in	✓

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Canadian National Radon Proficiency Program

2024/25 Consumer-grade Electronic Radon Monitor Performance Report

The following devices are NOT recommended by C-NRPP

	Manufacturer / Brand	Model / Link to Health Canada recall (when applicable)	NOT APPROVED
	**Air Steward**	Recalled by Health Canada	✗
	**Bootu**	RN-80	✗
	**Boyd Gresham**	Radon Detector – Recalled by HEALTH CANADA	✗
	**CRADTEC**	PRM-02H	✗
	**CRADTEC**	PRM-03H	✗
	**Funny Kitchen**	HRDM-02 - Recalled by HEALTH CANADA	✗
	**HAKINAKU**	Smart Radon Gas Detector	✗
	**Hanchen**	Home Radon Detector- Recalled by Health Canada	✗
	**INKBIRD**	Home Radon Meter – Recalled by Health Canada	✗
	**INKBIRD**	INK-RD2 –Recalled by Health Canada	✗
	**LifeBasis**	LCARM001 – Recalled by Health Canada	✗
	**LifeBasis**	RN-55 – Recalled by Health Canada	✗
	**Radon Guard**	Recalled by Health Canada	✗
	**Spolehli**	Radon Detector – Recalled by Health Canada	✗

C-NRPP CERTIFICATION

CANADIAN - NATIONAL RADON PROFICIENCY PROGRAM

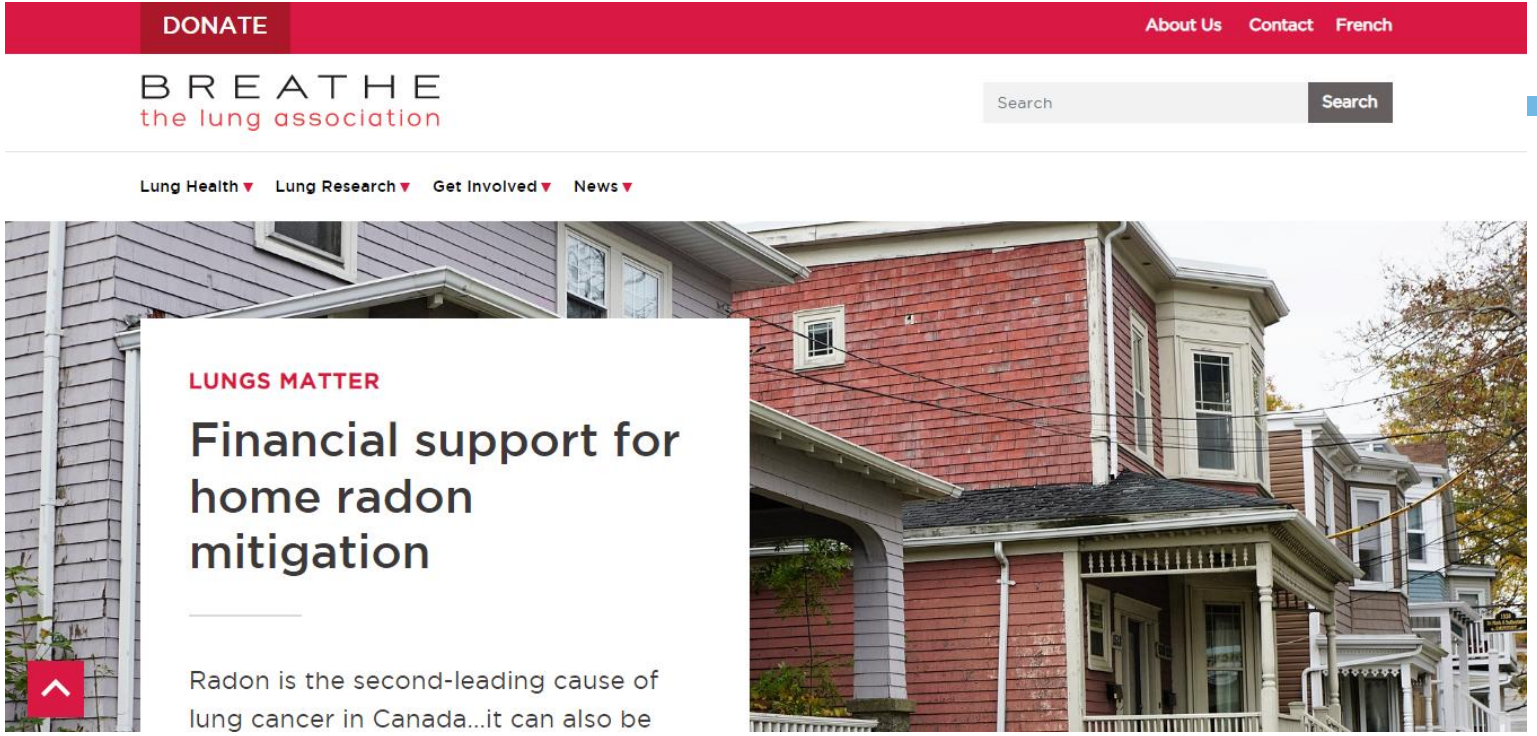
- C-NRPP Measurement Certification – 16hrs course work (available in French and English; online)

- C-NRPP Mitigation Certification – 24hrs course work, plus full hands-on mitigation install; (available in French and English; online and in-person); measurement is a pre-requisite

- C-NRPP CRNCH (Controlling Radon in New Canadian Home) course for New Construction – 4-6hrs course work; (available in French and English; online and in-person)

- Real Estate Certificate Course – 2 1-hr sessions

www.c-nrpp.ca



Lungs Matter

Home Radon Mitigation Grant Program

BREATHE
the lung association

In Partnership with

CARST ACSTR

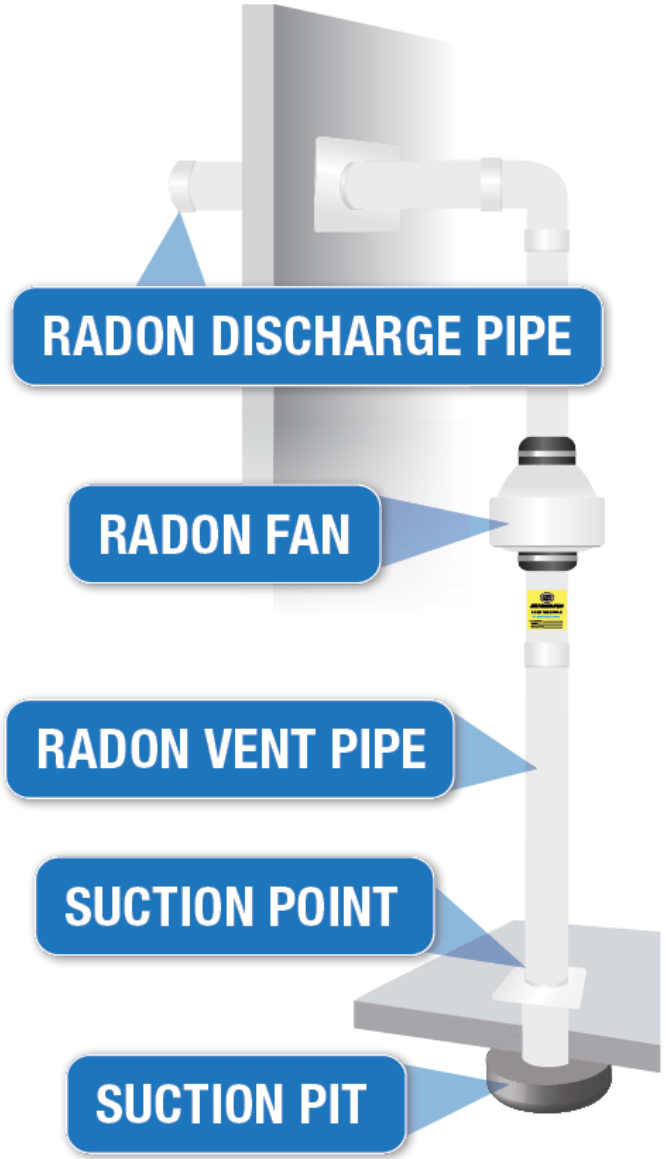
TAKE ACTION ON RADON

The Canadian Lung Association has recently launched a new grant program to help people across Canada afford radon mitigation services. The Lungs Matter Grant Program aims to provide financial support to individuals who have been diagnosed with lung cancer and individuals considered a low-moderate income households with priority given to the low-income households.
https://www.lung.ca/lungs-matter-radon-mitigation-support

NOTE: In order to apply for the grant a homeowner needs:

- 91 day long-term test ***(not a digital monitor)***
- Quote from a C-NRPP Mitigation Professional ***(before work is started)***
- Confirmation of qualifying for the grant, ***(household income or proof of lung cancer diagnosis)***

REDUCING RADON LEVELS

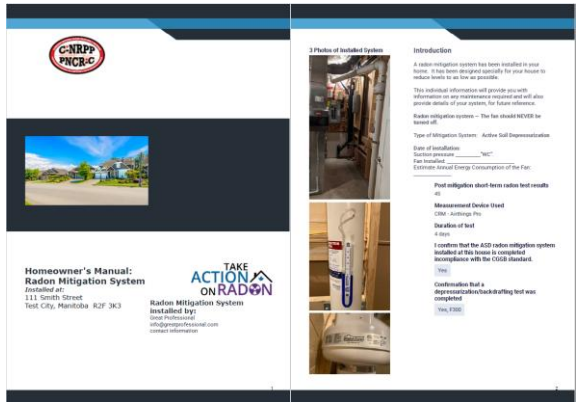


- Health Canada recommends reducing radon levels to as low as possible.
- The most common (& effective) radon mitigation system is a sub-slab depressurization system.
- Sub-slab depressurization systems reduce radon levels by an average of over 90%
- Average cost range of $3,000 to $4,000
- Generally installed in one day
- C-NRPP Radon Mitigation Professionals

Canadian General Standards Board – Radon Mitigation options for EXISTING HOMES

(CGSB 149.12)

- includes existing buildings, not just low-rise residential buildings
- Includes information for both:
  - Active soil depressurization – the preferred method for reducing radon levels in existing buildings.
  - Ventilation – an alternative method for reducing radon levels that may be more feasible when active soil depressurization is not possible for a particular building.
- **Note: Sealing of potential entry points is considered a prerequisite for both of the above methods.**
- A more comprehensive step-by-step description of fan-sizing and system design has been included; sections have been rearranged; definitions updated.



Radon Mitigation Systems:

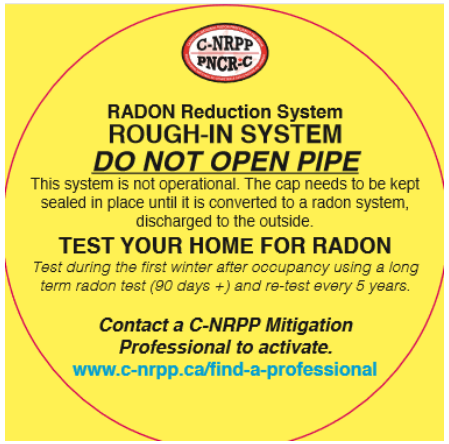
Understand what goes into the install

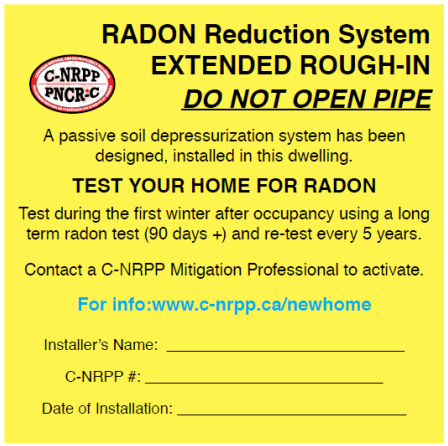
FINISHING THE INSTALLATION:

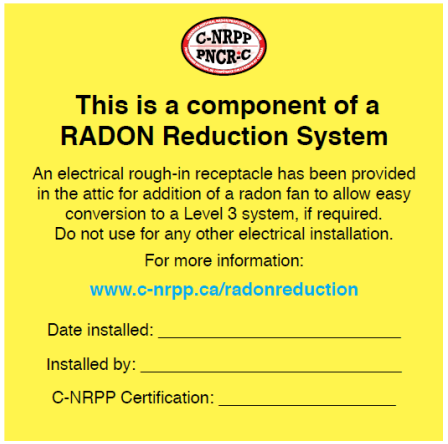
- Inspect the pipe with a camera to see potential for use
- Inspect the pipe at the roof for icing (and for mistakenly installed cap)
- properly sizing the fan to ensure it is effective and energy efficient
- noise proofing the system
- proper materials used for the system (type of pipe; pipe adhesions; elbows(fittings);
- proper discharge clearances and considerations

SUB-MEMBRANE DEPRESSURIZATION

Labelling Considerations







Includes consideration for:

Level 1 labels include labels for:
- Air membranes
- Sump pits
- Pipe labels

Level 2 labels include above, plus must include wording and must be applied every 1.8m (6')
- Includes label on electrical panel circuit

Label 3 includes all above plus must include
- fan label
- Active system pressure label

All three levels must also include homeowner radon reduction system package; radon maintenance and information sheets.

BUILDING CODES

BC Building code includes radon control measures:

- Gravel under the slab
- Well-sealed liner
- Sealed sump pit
- EXTENDED Radon rough-in for future installation (Level 2)
- Extended to outside of the building envelope

THIS DATA IS CURRENT TO NOVEMBER 2024.

CGSB Standard

Level 1
- granular layer
- Poly liner
- rough-in for active soil depressurization;

Level 2
- Level 1
- full passive vertical radon stack

Level 3
- Level 1
- Level 2
- full active soil depressurization system

BC Building Code - 2024

BRITISH COLUMBIA

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BC Codes

- **BC Codes 2024**
- BC Codes 2018
- Errata & Revisions
- Technical Bulletins
- Code Interpretations
- Other Code Resources
- Letters of Assurance
- BC Public Review
- National Model Codes

BC Codes 2024

Last updated on March 8, 2024

BC Codes 2024 are now in effect, except for adaptable dwellings and earthquake changes which take effect March 10, 2025.

An updated version of the BC Codes 2024 is now available, offering code users new interactive features.

New technical bulletins for the 2024 BC Building Code are now available.

About the BC Codes 2024

BC Codes 2024 are largely based on the National Codes 2020 with some BC-specific variations to reflect the province's geography, climate, local government needs, industry practices, and provincial priorities. Book I (General) and Book II (Plumbing Systems) together form the BC Building Code 2024.

National Code changes incorporated into BC Building Code 2024:

- Enabling mass timber construction
- Requiring rough-ins for radon safety province-wide

BC-specific changes effective March 2024:

- More complete and specific language for constructing extended rough-ins for radon subfloor depressurization systems
- Adopting cooling requirements to provide one living space that does not exceed 26 degrees Celsius
- Retaining existing ventilation requirements for systems serving single dwelling units

BC-specific changes effective March 2025:

- Requiring 100% adaptable dwellings in large condominium and apartment buildings and the first floor dwelling units in new small apartments and condominiums to be adaptable
- Reinforcement of bathroom walls to allow future installation of grab bars
- Early adopting national provisions to improve earthquake design changes for housing and small buildings with high seismic hazard values

BRITISH COLUMBIA
www.gov.bc.ca

Information Bulletin
Building and Safety Standards Branch
PO Box 9844 Stn Prov Govt
Victoria BC V8W 9T2
Email: building.safety@gov.bc.ca
Website: www.gov.bc.ca/buildingcodes

No. B24-03-R
Original Publication: March 8, 2024
Revised: January 8, 2025

Radon Rough-in Requirements

This bulletin provides information about changes in the British Columbia Building Code (Building Code) 2024 regarding the new requirements relating to radon rough-in provisions for Part 9 buildings. These new Building Code 2024 requirements apply to projects for which a building permit is applied for on or after March 8, 2024.

Background

Radon is an invisible, odorless gas that exists in various levels in the ground because of the breakdown of uranium within soil, rock, and water. When radon enters and is contained in a building, it can present serous health risks if exposed to the occupants. Health Canada recommends radon mitigation based on the levels of radon measured within the building.

An effective method for protecting houses from elevated indoor levels of radon is to incorporate a subfloor depressurization system consisting of a gas-permeable layer under a continuous and sealed air barrier, and a radon vent pipe with a fan that exhausts soil gases from the gas-permeable layer to the exterior of the home. A rough-in consists of a gas-permeable layer, separated from the conditioned space, connected to a pipe that is ready for the installation of a fan.

CHALLENGES WITH CURRENT NATIONAL BUILDING CODE

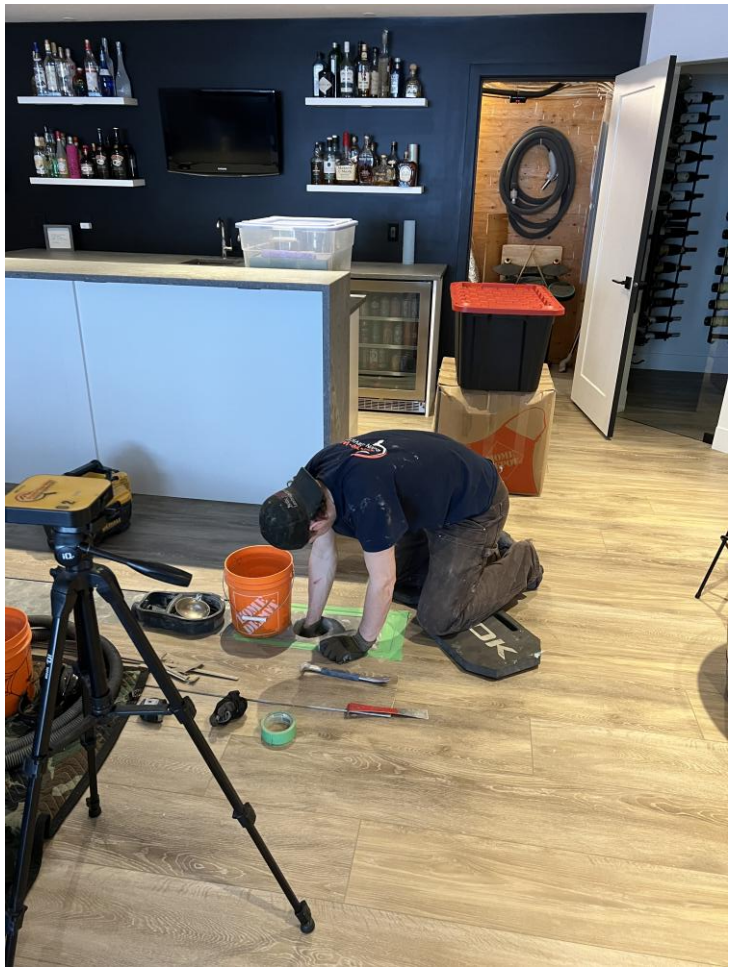
- Poor sealing of membrane
- Poor location of rough-in
- Poor installation of rough-in
- Poor labelling of rough-in
- Rough-in not sealed
- Improper pipe used

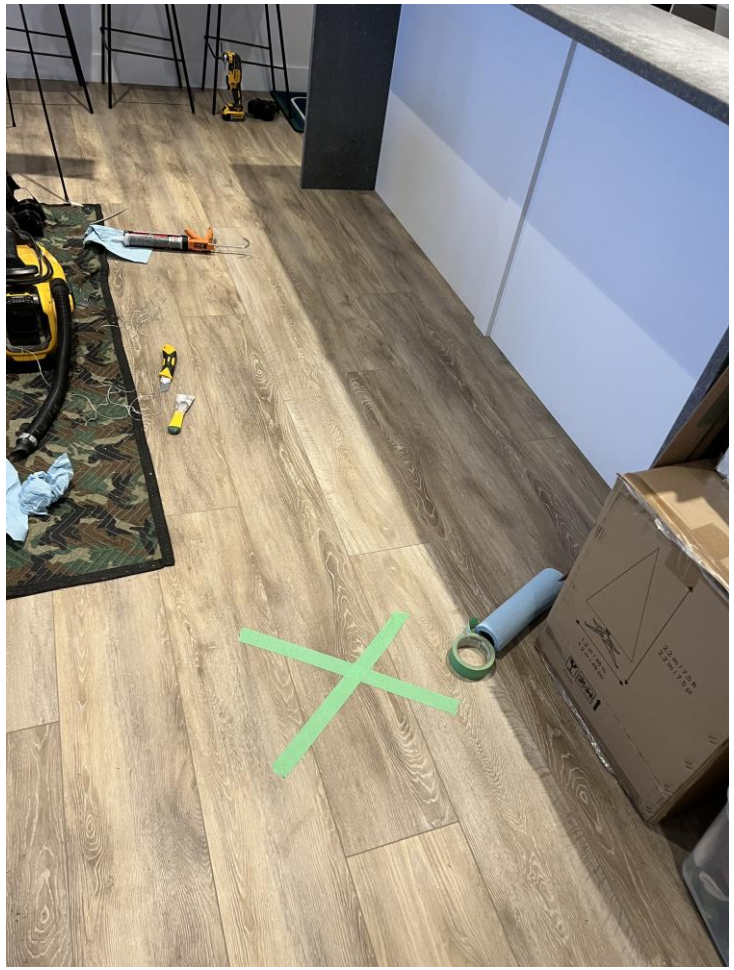
Radon Demonstration:
Application of Building Code Changes in Winnipeg New Home Construction

April 2014

CONCERNS WITH IMPLEMENTATION

- Gravel and fill
- Multiple footings
- Blocked or ineffective soil gas collector (pipe under the slab)
- Gaps in the foundation
- Location of pipe and room for fan
- Electrical outlet for fan
- Elbows and horizontal runs
- Incorrect pipe used
- Labelling
- Insulation and Freezing
- Termination of pipe;






P/N. 004043
CANADA
IPEX


This is a component of a
RADON REDUCTION SYSTEM
DO NOT TAMPER WITH OR DISCONNECT
RADON
REDUCTION SYSTEM
Do not tamper with or disconnect. Fan should be on at all times. Contact the below with questions.
INSTALLED BY: Point-The-Way Radon Services
DATE INSTALLED: Jan/19/2024
LIC/CERT #: CRNT#202270
PHONE: 250-870-6711
ESTIMATED FAN ELECTRICAL COST/YEAR:
INITIAL VACUUM PRESSURE: 1.1
Vacuum pressure is an indicator that the fan is functioning. This device does not measure radon levels and does not guarantee system effectiveness.
SYSTEM MAINTENANCE
Routinely check Pressure Gauge. The fan is active if oil level on the left is different from the right. If the fan appears to be off (1) Check hose connection on gauge (2) Check electrical switch or breaker. If gauge is still indicating a problem, call for service.
It is recommended to test for radon every 2 years or as required or suggested by state/federal agencies.
Radon systems should be serviced by qualified professionals only.
Visit www.epa.gov/radon to learn more about radon.
Point-The-Way
RADON SERVICES
RADON SYSTEM MANOMETER

CHALLENGES WITH PIPE LOCATION

INCORRECT PIPE

BEST PRACTICE – CGSB STANDARDS

CANADIAN GENERAL STANDARD BOARD CAN/CGSB-149.11-2024

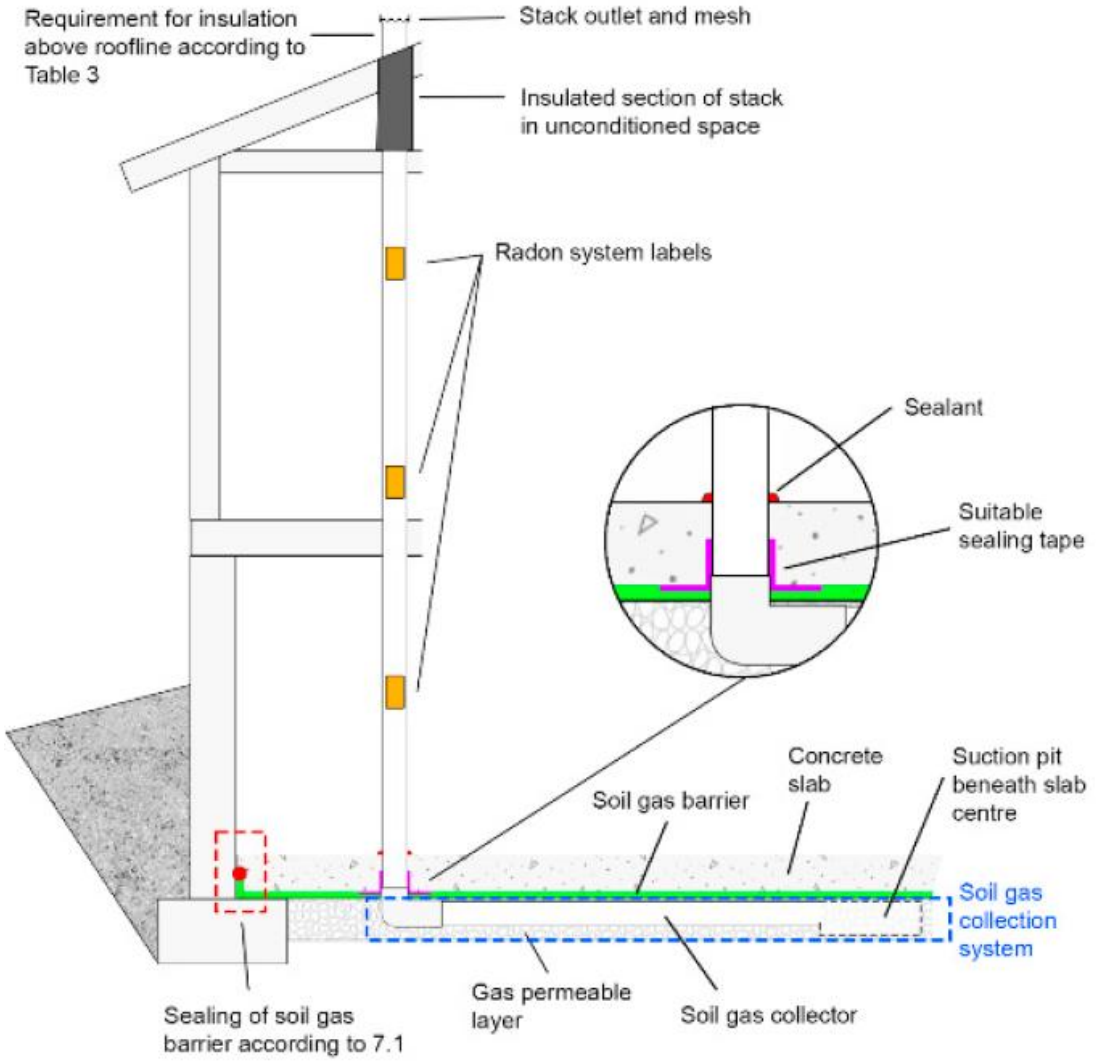
RADON CONTROL OPTIONS FOR NEW BUILDINGS

CAN CGSB-149.11 Requirements

1. Gas permeable layer (clear stone, gas mat)
2. Soil gas barrier system (10mil)
3. Suction pit (pipe, cage, excavated pit)
4. Sealing entry points
5. Rough in / vent pipe (100mm dia)
6. Fan if home tests over

CGSB LEVEL 2 RADON ROUGH IN SYSTEM)FIGURE 10)

Preferably no bends



MULTIPLE DETAILS PRESENTED

Figure 4 – Installation of soil gas barrier on concrete foundation (without insulation)

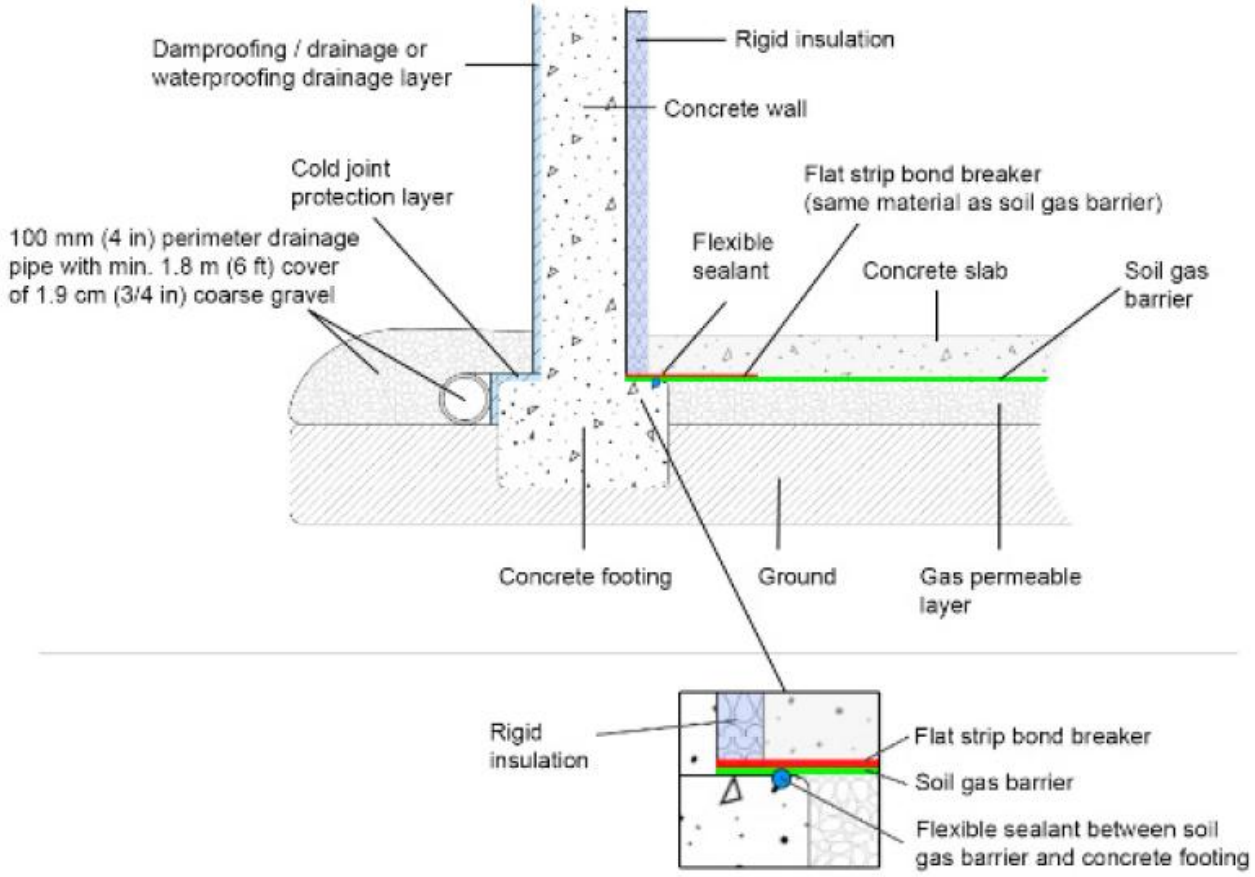
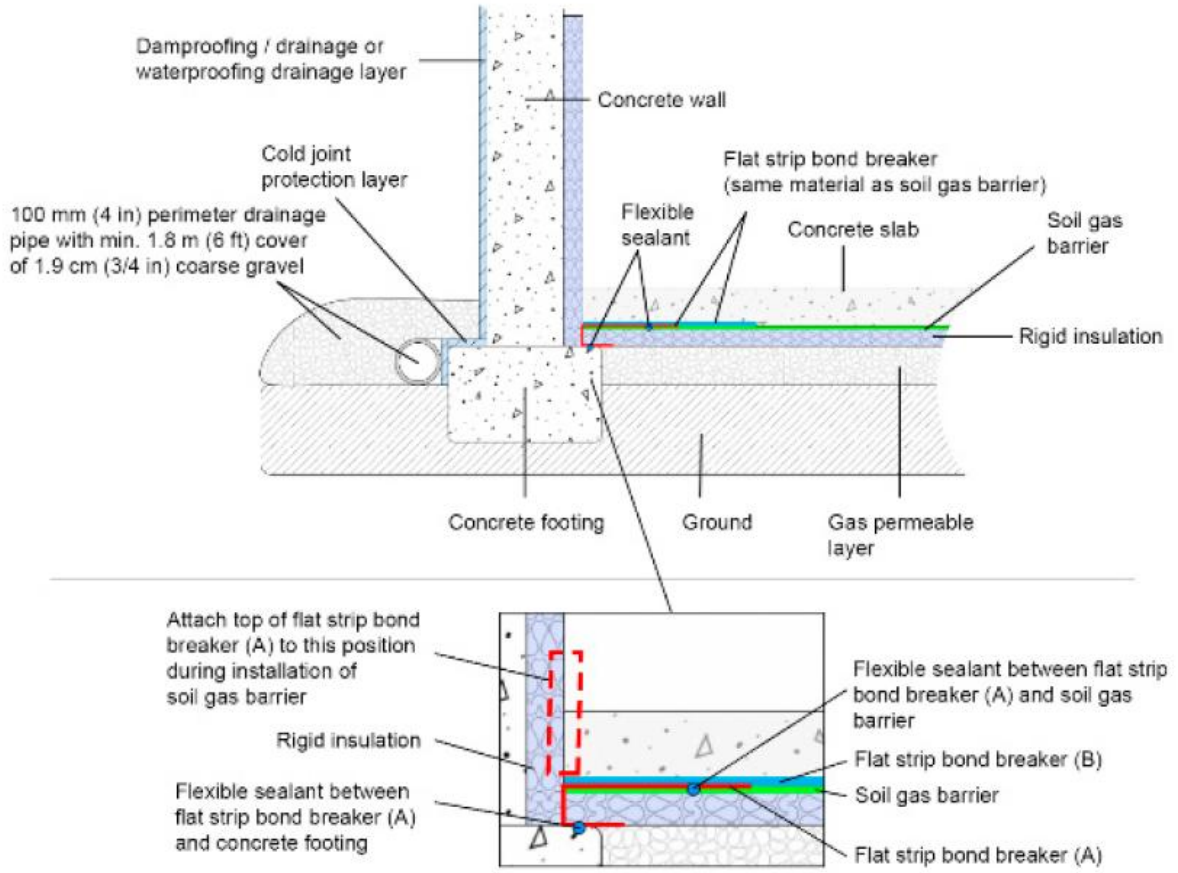


Figure 5 – Installation of soil gas barrier on concrete foundation (with insulation)



MULTIPLE DETAILS PRESENTED

Figure 6 – Installation of soil gas barrier on concrete foundation (with insulation - alternative)

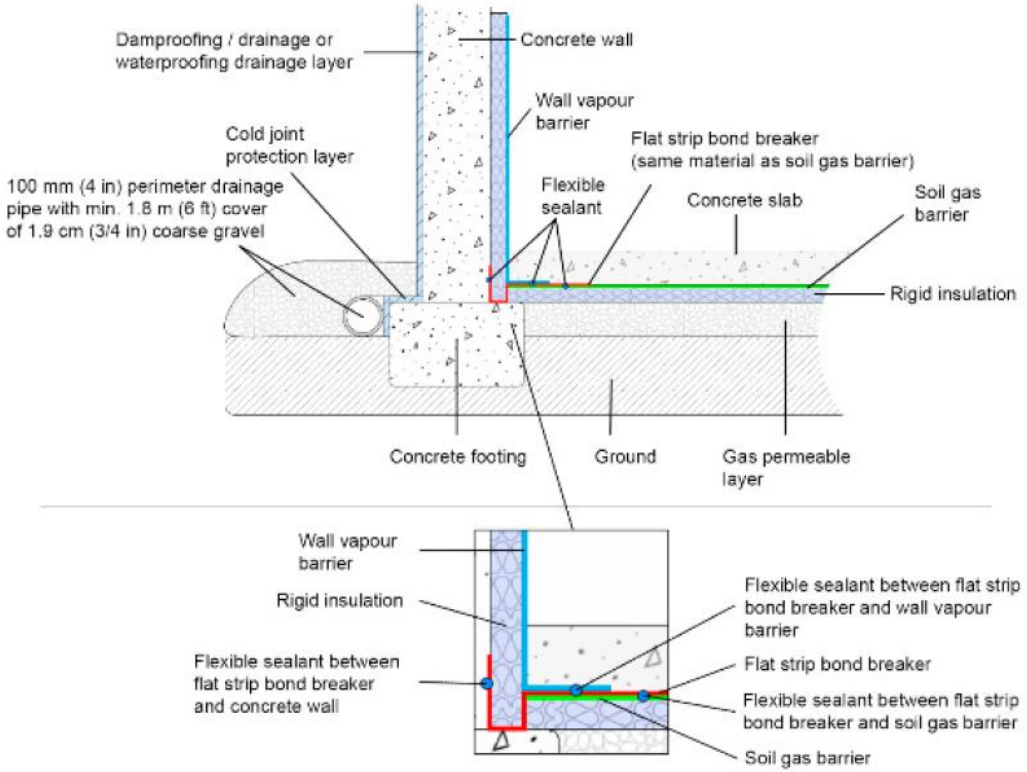
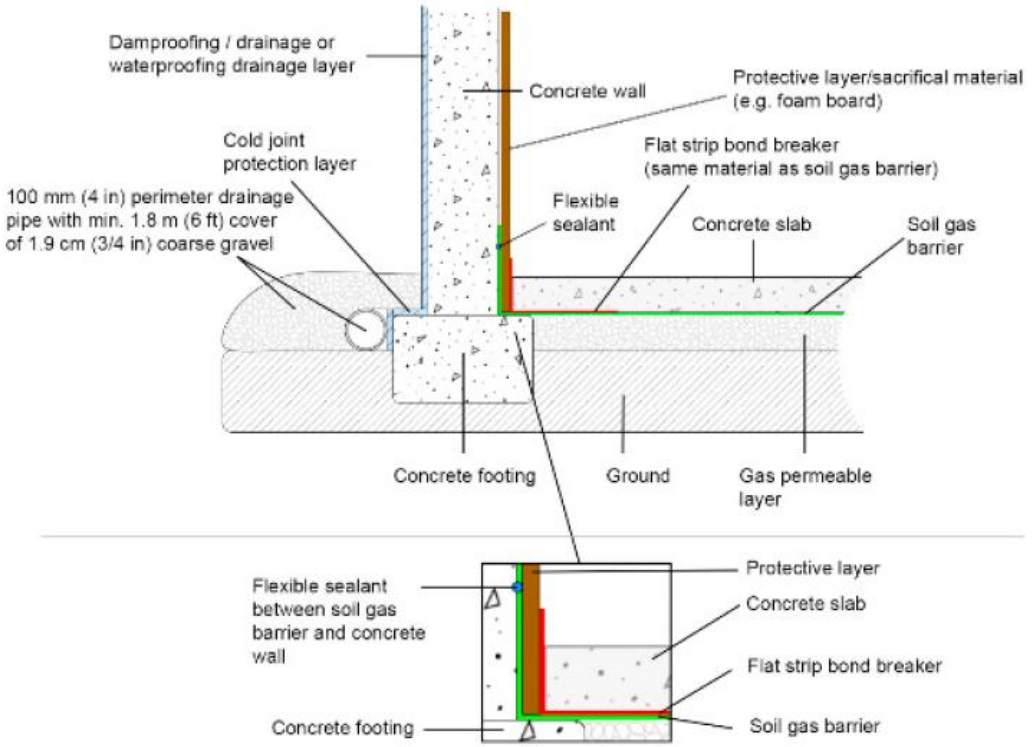


Figure 7 – Installation of soil gas barrier on concrete foundation (without insulation - alternative)



MULTIPLE DETAILS PRESENTED

Figure 8 – Installation of soil gas barrier on ICF foundation

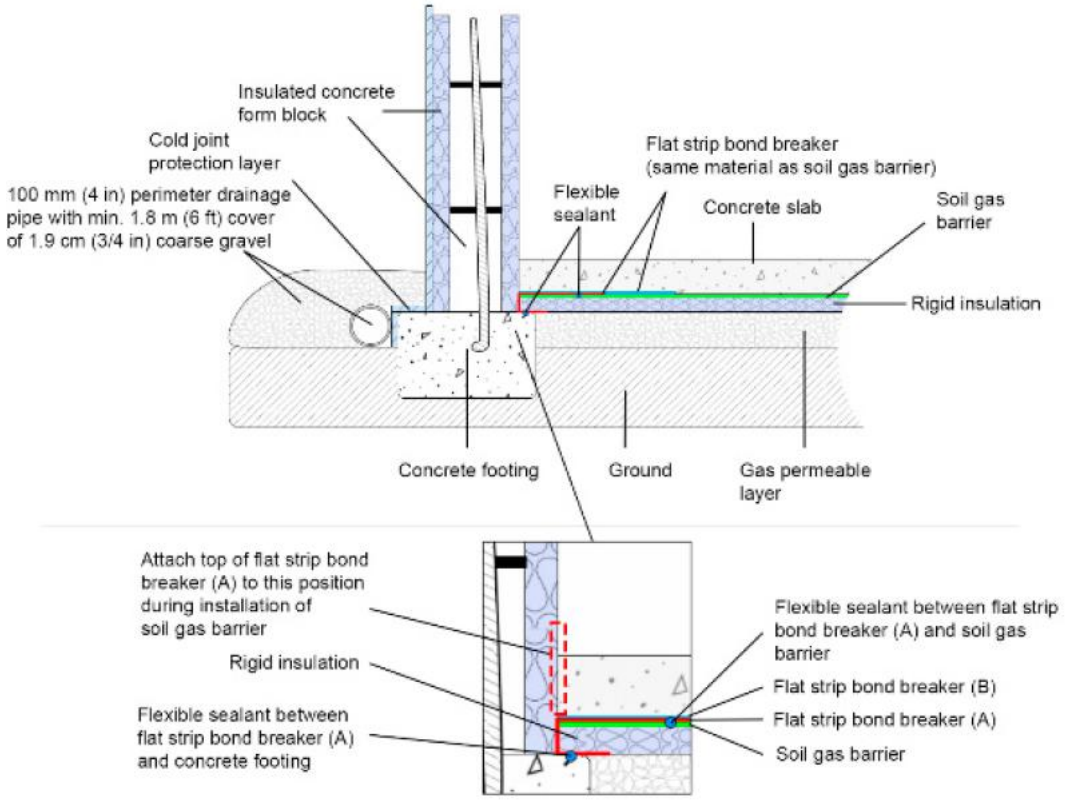
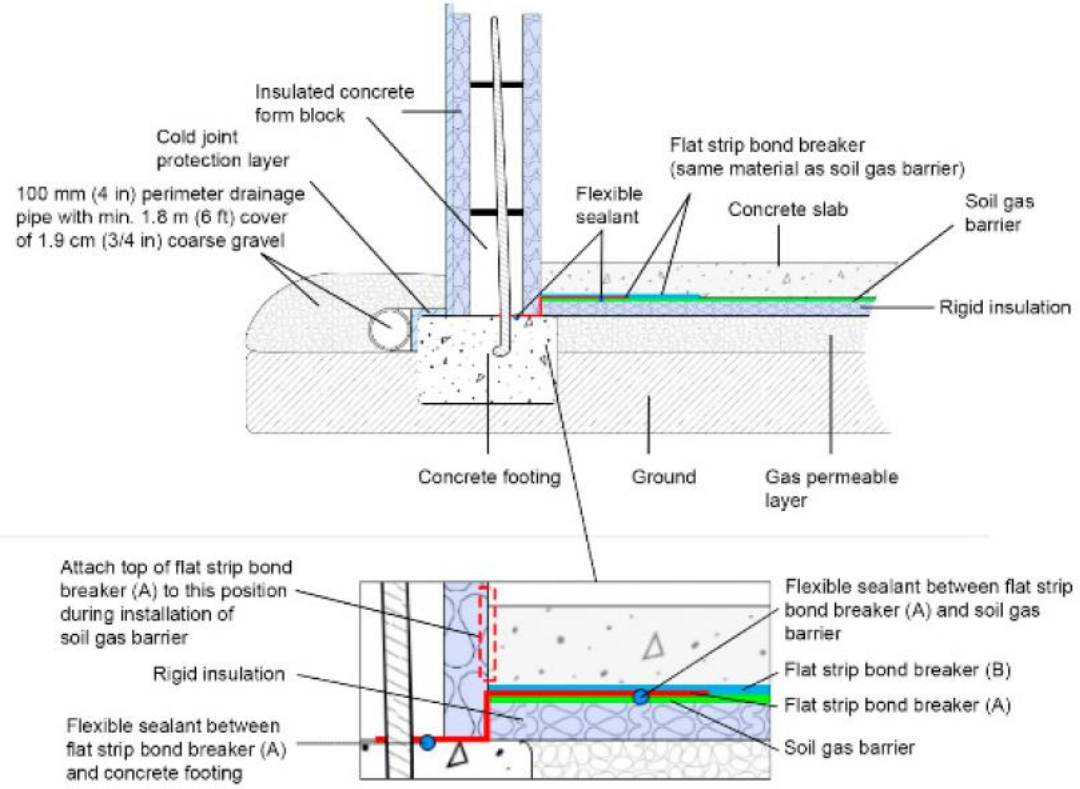
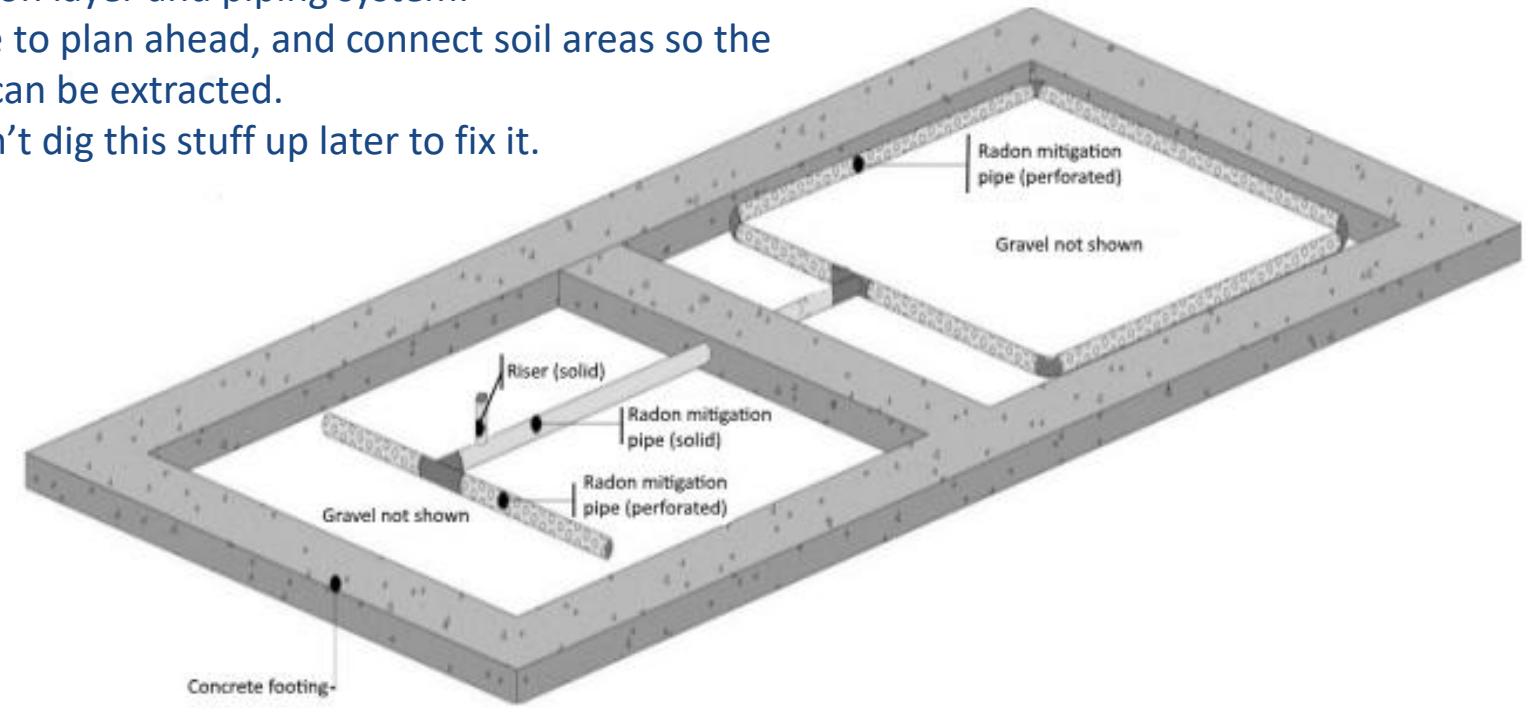


Figure 9 – Installation of soil gas barrier on ICF foundation prior to block pour (alternative)



MULTIPLE FOOTINGS NEED TO BE CONSIDERED

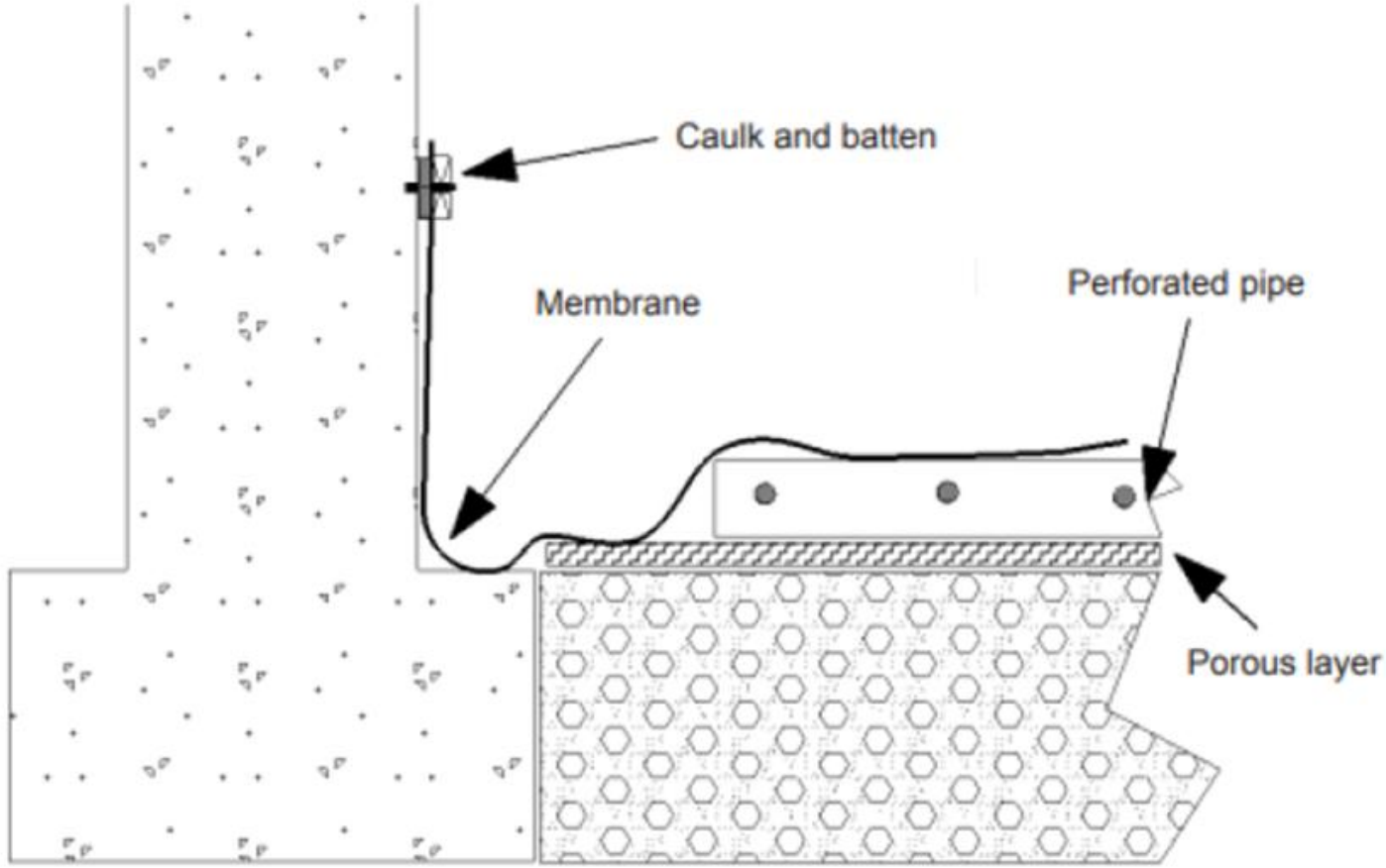
- Footing strips can effectively break up a soil collection layer and piping system.
- Be sure to plan ahead, and connect soil areas so the radon can be extracted.
- You can't dig this stuff up later to fix it.



CRAWLSPACES

- An exposed dirt crawl space shall be covered with a soil gas barrier at least meeting the requirements and properties of type 2 CAN/CGSB-51.34-2022 0.25 mm (10 mil) thick polyethylene.
- a piece of perforated pipe should be placed on the dirt floor prior to installing the soil gas barrier membrane
- The soil gas barrier installed over a dirt crawl space shall be completely sealed and mechanically fastened to the foundation wall
- All joints in the sheets of the soil gas barrier covering a dirt crawl space shall be lapped by 300 mm (12 in.) and sealed

Figure 2 — Membrane/wall detail




HOMEOWNER'S GUIDE
RADON
REDUCTION SYSTEM
RADON
REDUCTION SYSTEM
CAUTION

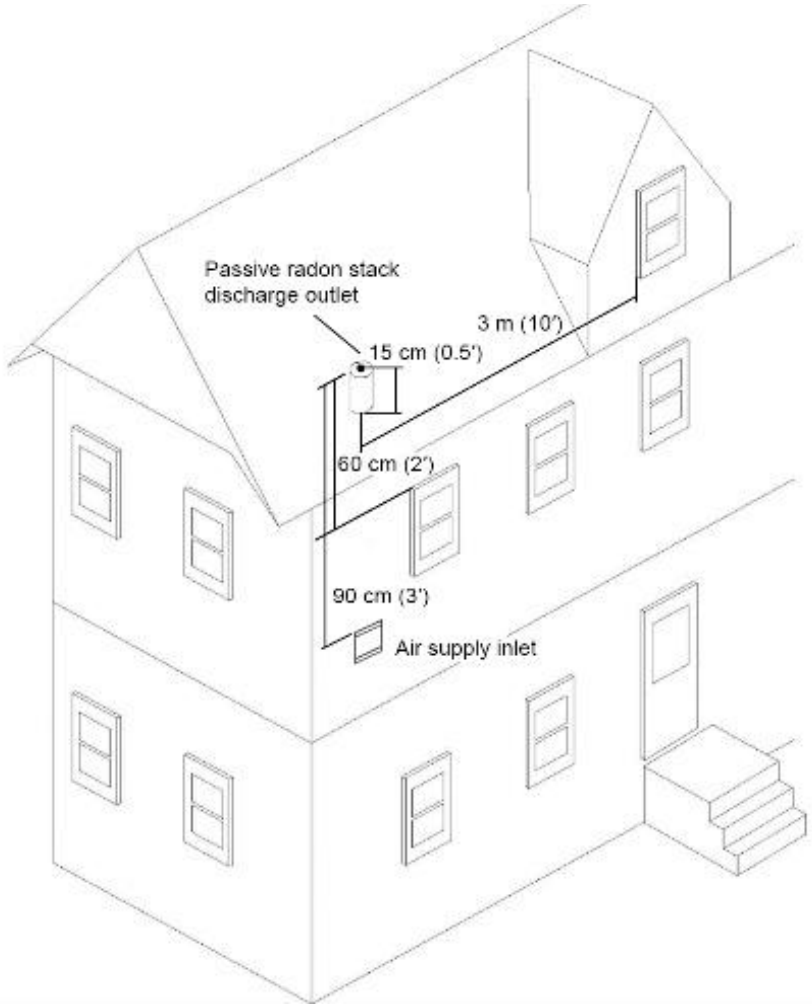
CGSB – PIPING REQUIREMENTS

- Pipes shall have a nominal internal diameter of not less than 100 mm (4”).
- Schedule 40
- No water traps
- Various materials are allowed
  - PVC, ABS, Stainless Steel, Cast Iron, Copper
- Sloped min 1% to drain water below the slab
- 22.5° fittings preferred to maintain stack effect and draw
- Insulated in unconditioned spaces.
- Pressure/Leak test vertical stacks for Level 2 installs (air or water) DANGER – Do not pressure test sewer pipe!

PASSIVE STACK DISCHARGE GEOMETRY

Table 4 – Minimum passive radon stack termination clearances for roof top discharge

Location	Minimum dimension (m)
Vertical clearance above the roof at the point of penetration[a]	0.15
Vertical clearance above windows or doors	0.6
Vertical clearance above mechanical air supply inlet (air intake)	0.9
Horizontal clearance from windows, doors or mechanical air supply inlet	3
Clearance horizontally from a vertical wall that extends above the roof penetrated	3



DISCHARGE CLEARANCES ASD CAN/CGSB-149.012-2024

Table 4 – Table of clearances required for the exhaust end of an ASD mitigation system

Locations	Required minimum clearances (m)	Suggested clearances (m)
Clearance from a mechanical air supply inlet	1.8	3
Clearance from a permanently closed window	0.3	1
Clearance from an openable window	1	2
Clearance from a door that may be opened	0.3	1

Locations	Required minimum clearances (m)	Suggested clearances (m)
Clearance from a door that has an openable window	1	2
Clearance from outside corner	0.3	0.3
Clearance from inside corner (outlet of pipe shall not face inside corner)	1	1
Clearance above paved sidewalk or paved driveway located on public property	2.1	2.1
Clearance from a veranda, a porch, a deck, or a balcony	0.3	1
Vertical clearance above grade	0.3	1
Vertical clearance below soffits or from any attic venting component	1	1
Horizontal clearance from an area below the discharge where there is a risk of injury from ice falling	1	2
Horizontal clearance from the vertical line (from the ground to the roof) aligned with a natural gas relief valve termination	1	1
Horizontal clearance from the vertical line (from the ground to the roof) aligned with a propane relief valve termination	1	1
Note: The selection of the outlet point should be made considering maximal available clearances from building openings and from outdoor occupancy areas.		

- This is where Level 1 interior terminated rough-ins usually go horribly wrong!!!.

LABELLING

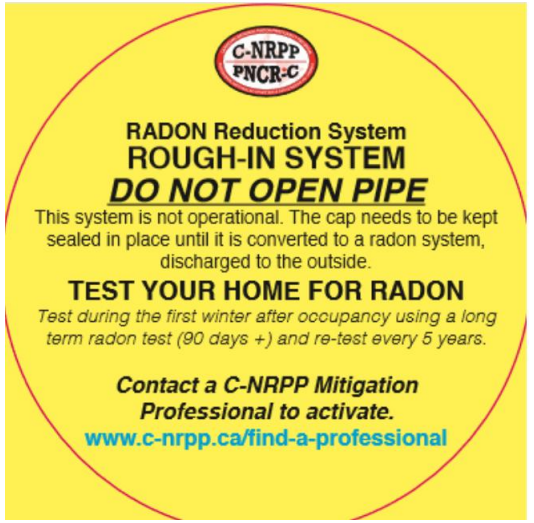
- **There are five label types:**

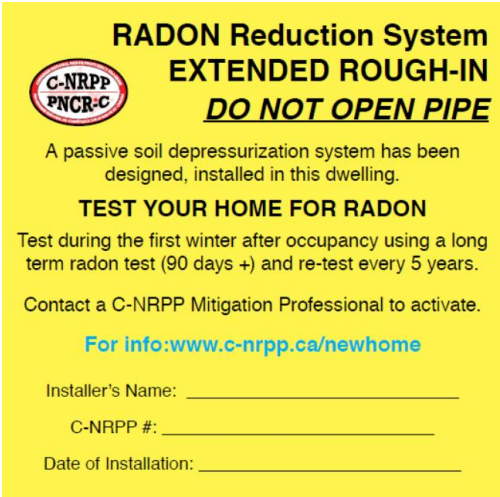
1. soil gas barrier labels,
2. soil gas collector (pipe) labels,
3. radon rough-in pipe labels,
4. sump labels, and
5. electrical panel labels

- **Six if you activate the system:**
- 6. Radon fan label

Labels Shall:

- be durable.
- be in both official languages.
- be applied to clean dry surfaces
- use lettering that is in a contrasting colour to the background





https://c-nrpp.ca/c-nrpp-mitigation-labels/

SPECIALTY PRODUCTS AND SYSTEMS

RADON X – BY IPEX

- Radon specific piping by IPEX
- Conforms to all CGSB requirements

CUFCA RCS

The Canadian Urethane Foam Contractors Association Inc. (CUFCA)

- Radon Control System (RCS®)
- Spray foam is the radon barrier, air barrier and vapour barrier
- Provides thermal break between foundation wall and basement floor slab
- Very effective at controlling diffusion and mass transport of radon
- Unit cost is more than some materials but multifunctionality, simultaneous application and reduced labour costs compared to taping and sealing.
- There are contractors certified in radon and spray foam

System is Listed/Evaluated under

- Canadian Construction Materials Centre - CCMC 14073-R,
- Underwriters Laboratories of Canada - ULC ER-R40284

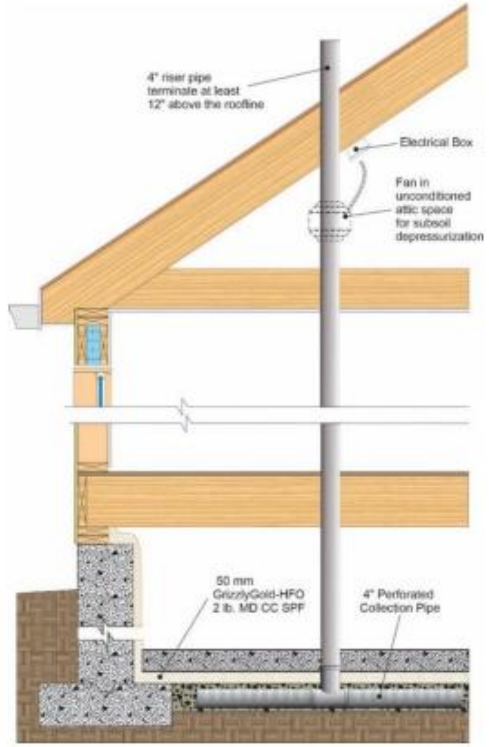
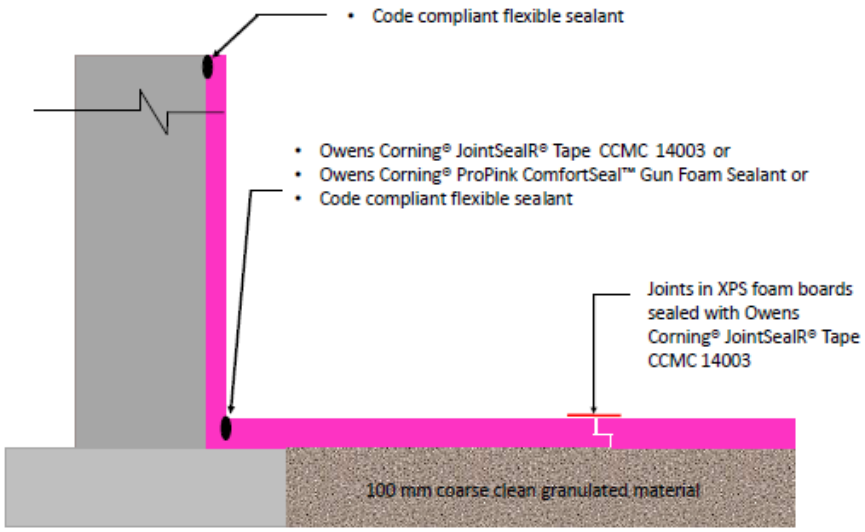
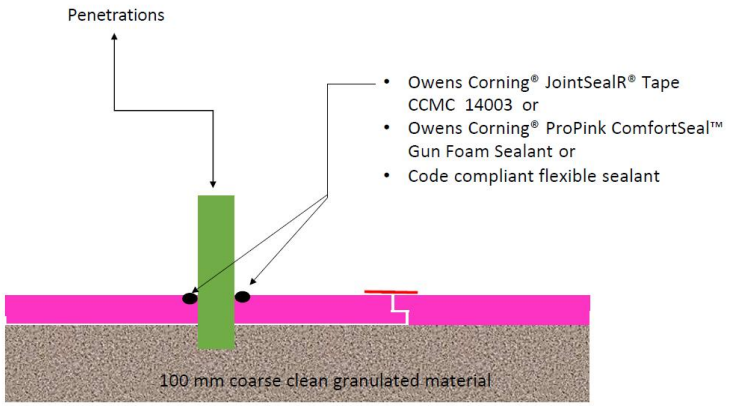


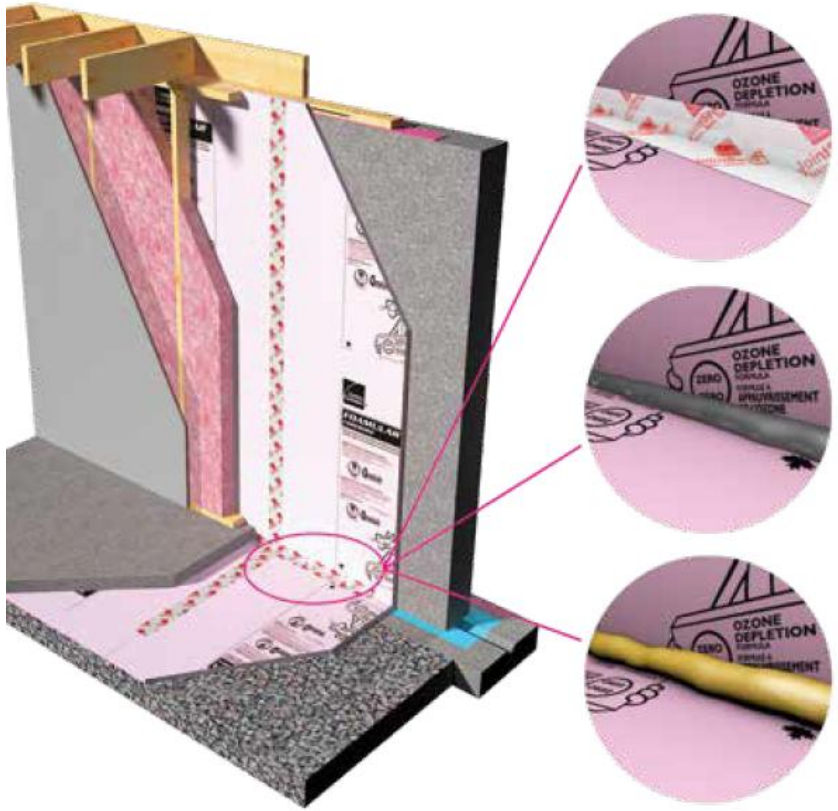
Figure 1:
Installation of CUFCA RCS® for radon control below grade with 100 mm grade bed and roughed-in sub slab radon depressurization system.

CUFCA RCS™
CCMC# 14073-R
RADON CONTROL SYSTEM
IN ONE SEAMLESS APPLICATION

OWENS CORNING – FOAMULAR®



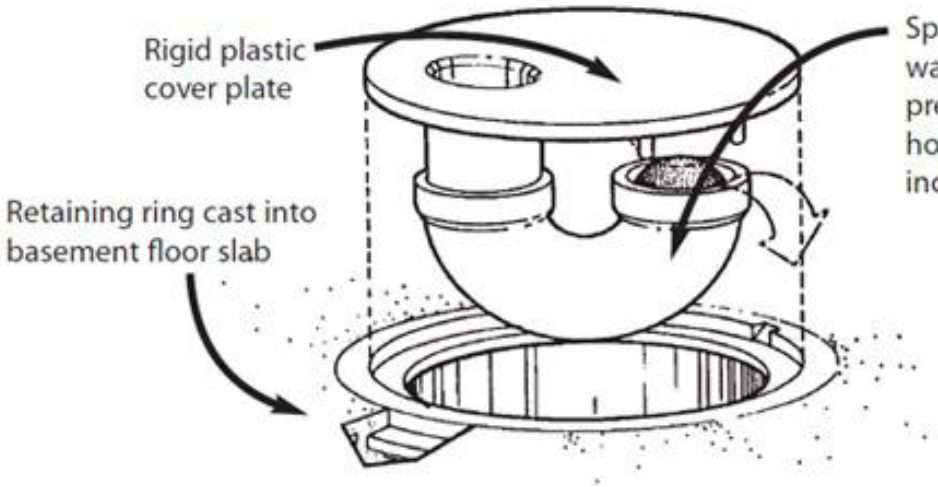


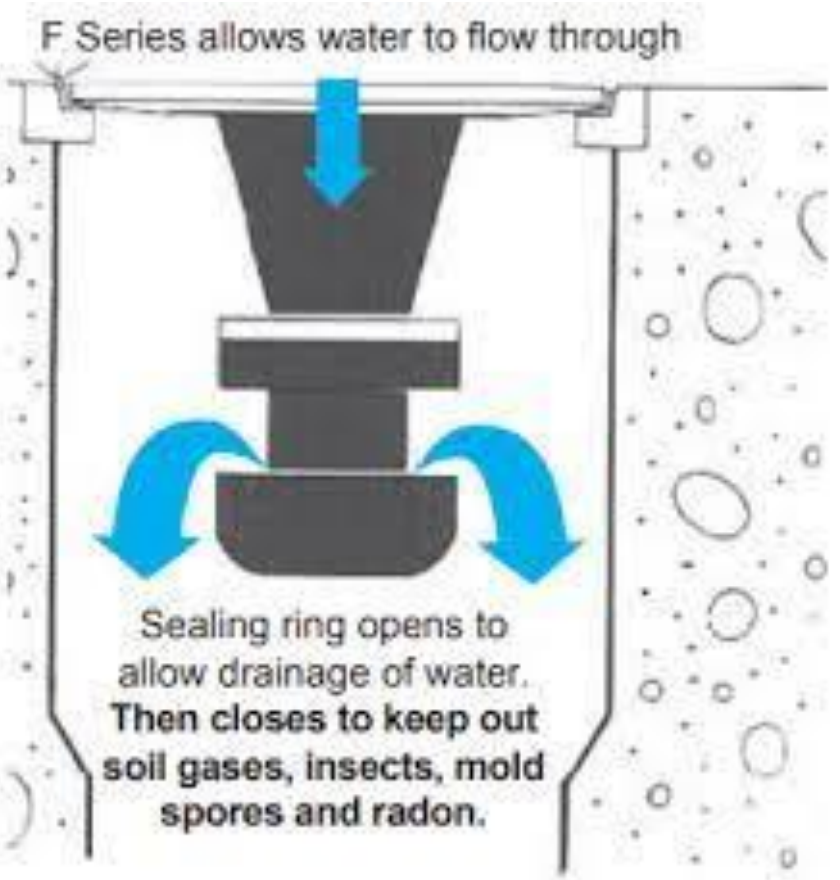


SUCTION PIT CAGES FOR EASY CONSTRUCTION

RadonWest

GAS TIGHT DRAINS





REQUIRING PERMITS FOR RADON MITIGATION SYSTEMS?

- are they required for a C-NRPP professional installing to a CGSB standard?

RENOVATING AN EXISTING BUILDING – REQUIRING RADON SYSTEM:

RESOURCES AVAILABLE

C-NRPP Consumer Bulletins

How do I know that my neighbour's radon mitigation system isn't affecting the radon levels inside my house?

The most accurate way to determine levels inside a home is to test the home for radon using a long-term radon monitor. High radon levels can easily be reduced.

To reduce radon levels, a radon mitigation system can be installed. A C-NRPP Certified Radon Mitigation Professional is trained to install a system in accordance with all pertinent standards and guidelines.

A radon mitigation system consists of a pipe extending from below the basement floor slab or membrane, up through the interior where it connects to a fan, then terminates outside the home in the radon discharge pipe. This method of radon mitigation, if properly installed, creates a negative pressure below the slab and/or membrane thus drawing the soil gases out through the installed system rather than allowing them to move from the soil space beneath the building and into the home.

The radon discharge pipe can be located at the side of a house or through the roof, but there are specifications that must be met in order to prevent the radon gas from re-entering the house or entering the neighbouring houses.

If my neighbour has a radon system installed, and the discharge pipe is pointed at my house, how do I know it's not increasing the radon levels in my house?

Research shows that radon disperses quickly once discharged outdoors. Installations standards have set minimum clearance distances for radon system discharge pipes to further ensure that radon-laden air doesn't re-enter the original house or enter the neighbouring house (see reverse). If you are concerned about the radon levels within your home, you should test your own home for radon. Detectors are easily available.

Radon is a naturally occurri radioactive gas that comes from t ground.

Radon is odourless and invisible; the or way to know your radon level is to test.

Exposure to elevated levels of radon linked to increased chances of developi lung cancer.

16% of lung cancers in Canada are linked radon exposure. Radon is the number cause of lung cancer in non-smokers.

Radon enters buildings through conta with the ground.

Health Canada recommends every hor be tested for radon.

Table 1: Clearances

Minimal clearances for all types of radon discharges

Placement of radon discharge pipes shall follow the required minimal clearances listed in Table 1.

What research is available on side-wall discharge?

Fixing Houses with High Radon – A Canadian Demonstration CMHC March 2008, Scott, A.G.; Fugler, D.

A test case in Kanata in fall 2007 provided an opportunity to test a side wall installation in Canada in a high-radon home.

Depressurization Residential Radon Mitigations at Kitigan Zibi Anishinabeg: Comparison of Above Ground Level (RIM JOIST) and Above Roof Line Discharge of Radon Mitigation SUB-SLAB Systems; Health Physics 2012 Brossard, M; Brascoupe, M; Brazeau, C; Falcomer, R; Ottawa, B; Scott, A; Whyte, J

Radon Mitigation in Cold Climates at Kitigan Zibi Anishinabeg, Brossard, M; Ottawa, C. B. Falcomer, R; Whyte, J

Locations	Required minimal clearances (m)
Clearance to a mechanical air supply inlet	1.8
Clearance to permanently closed window	0.3
Clearance to an openable window	1.0
Clearance from a door that may be opened	0.3
Clearance from a door that has an openable window	1.0
Clearance to outside corner	0.3
Clearance to inside corner	0.3
Clearance above paved sidewalk or paved driveway located on public property	2.1
Clearance above grade- from a veranda, a porch, a deck, or a balcony	0.3
Vertical clearance below soffits or from any attic venting component	1.0
Horizontal clearance from an area directly below the discharge where there is a risk of injury from ice falling	1.0

NOTE: The selection of the exhaust point should be made considering maximal available clearances from building openings and from outdoor occupancy areas.

Other questions? Feel free to contact C-NRPP Offices:

Ph: 204-798-9649 Toll free: 1-855-722-6777
Email: info@c-nrpp.ca

Homeowner Bulletin:
Draft: March 2024

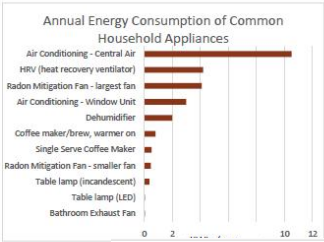
Understanding the **Energy Use of a RADON MITIGATION FAN**

An active mitigation system can lower radon levels in a building, but the fan must run continually. What impact will this have on energy consumption?

This bulletin puts the cost of electricity used by a radon fan into context by comparing its electrical consumption to other commonly used electric appliances.

An active radon mitigation system runs continuously to reduce the radon levels in a building to levels that are as low as reasonably achievable (ALARA). The ALARA concept is important when considering a radioactive gas. All types of radiation exposure are considered using this principal, and radon is no exception. Once a radon mitigation system is installed in a building, ensuring that it runs continuously is critical.

The cost of running an electrical appliance depends on how much electricity the appliance needs (measured in watts [W]), how often the appliance runs (several hours a day or continuously), and the cost of electricity in the region. In the chart to the right and in the table below, we've listed a variety of common household appliances for comparison. The chart provides a comparison of energy use and the table details the energy costs as well. In certain regions of the country, a variety of electricity rates are available: we've used the average rate for each region.



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Homeowner Bulletin:
March 2024

If my house has an HRV/ERV, do I still need to test for radon?

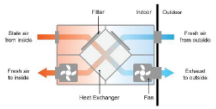
The short answer is yes: if you haven't already tested for radon, it's very important to do so regardless of whether your home has an HRV/ERV. Heat and energy recovery ventilators (HRV/ERV) are systems designed to improve indoor air quality by bringing fresh outdoor air into a home while exhausting stale indoor air. The design of these units allows for some heat (in the case of an HRV) or heat and humidity (in the case of an ERV) to be exchanged between the outgoing indoor air and incoming fresh air, in order to save energy. Depending on how they are functioning, HRV/ERVs could affect your radon levels for better, for worse, inconsistently, or not at all. That's why it's so important to test your home for radon!

HRV/ERVs must be balanced to function properly, which means that the same amount of air is being brought into the home as is being exhausted. When out of balance, a positive or negative pressure can be created in the home. Both situations can have harmful side effects. HRVs and ERVs may be out of balance if they weren't properly installed, if modifications have been made to the ducting or vents, or if the units aren't properly cleaned and maintained. Regular cleaning of the filters is an important part of maintenance that is often neglected.

HRV/ERVs should be cleaned and balanced as per the manufacturer's instructions.

There are simple videos available online, accessible either through the manufacturer's website or YouTube.

Heat Recovery Ventilator



Does your home already have an HRV/ERV?

If your home is already equipped with an HRV or ERV, consulting with a qualified professional to ensure the unit is properly set up and balanced is a good first step in addressing your radon levels. In certain cases, cleaning and adjusting the HRV or ERV has been found to lower radon levels, though this will not be as effective as installing a dedicated radon mitigation system. Even if radon levels aren't reduced, ensuring that your HRV/ERC is functioning properly is a good first step prior to taking further action to reduce your radon levels, such as consulting a C-NRPP radon professional to install a radon mitigation system. **Health Canada recommends every home be tested for radon.**

Continual Radon Monitoring and your HRV/ERV

If you are using an HRV or ERV to manage your radon levels, we recommend that you use a digital radon monitor to continually measure your radon levels. If your HRV/ERV starts to become unbalanced, the digital monitor will alert you to increasing radon levels. The digital monitor will also alert you to season variations in your radon levels. You can find a list of consumer-grade continual radon monitors reviewed by C-NRPP as part of the Consumer Device report here: www.c-nrpp.ca

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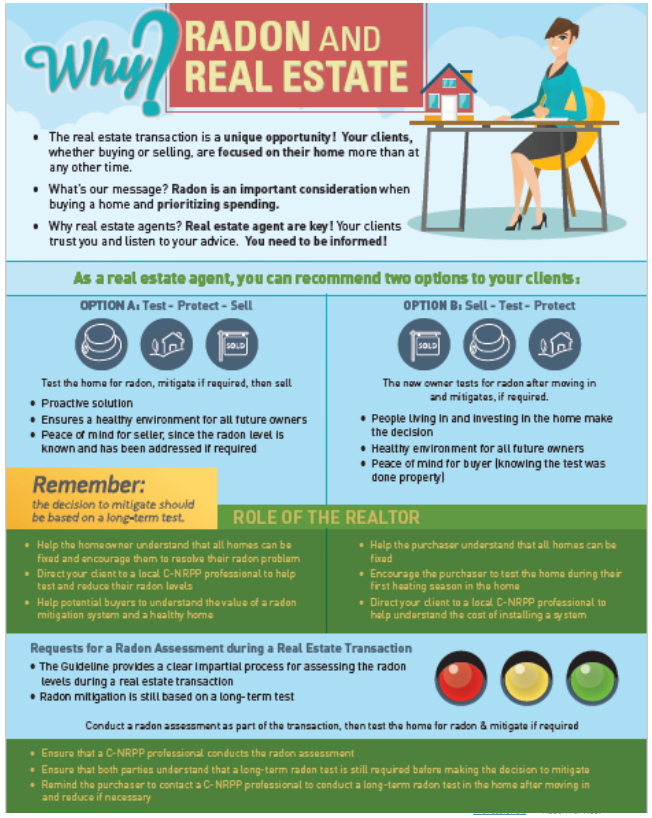
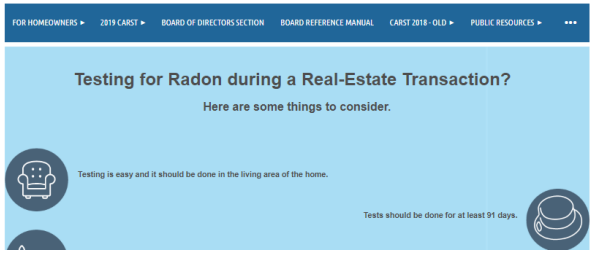
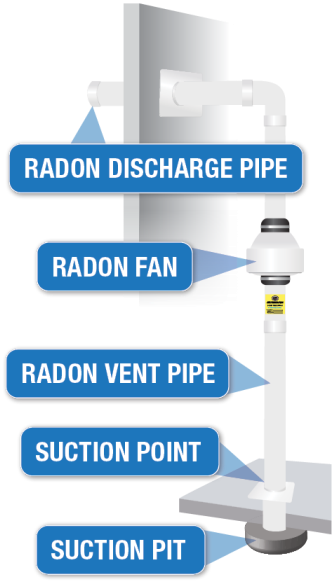
https://c-nrpp.ca/resources-for-certified-professionals/

RESOURCES







Real Estate information

https://carst.ca/radon-for-Real-Estate-Agents

TEST & REDUCE

CARST ACSTR Rn

WWW.CARST.CA

HELPING CANADIANS REDUCE RADON RISK

RESOURCES *FOR* RENTERS

Radon is a naturally occurring, odorless and colourless, radioactive gas that comes from the ground. **Radon** is in every home and type of building in Canada.

Long-term exposure to high levels of radon increases the risk of developing lung cancer. *According to Health Canada, radon is the #1 cause of lung cancer in non-smokers.*

YOU CAN PREVENT EXPOSURE TO HIGH RADON. TO PROTECT YOUR HEALTH, TEST YOUR HOME FOR RADON.

TESTING FOR RADON

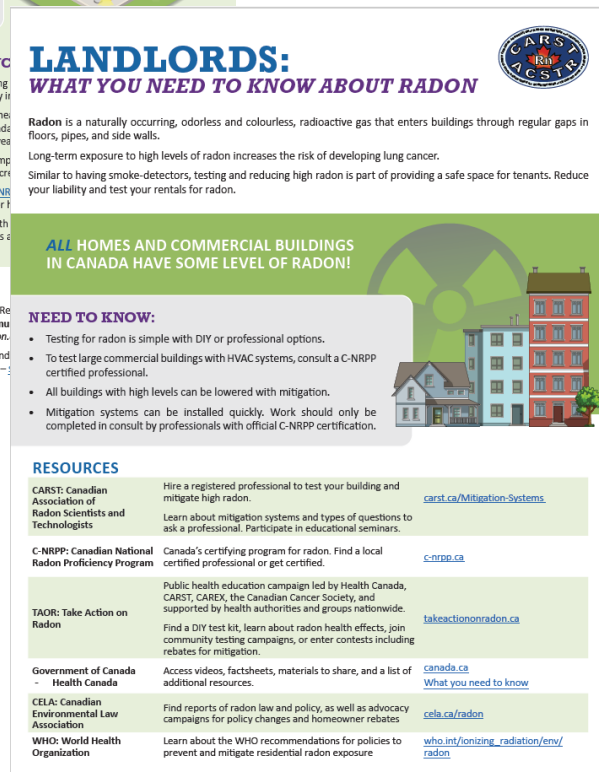
Testing for radon is simple and affordable: takeactiononradon.ca/test

- You can easily test your living space for radon with a DIY test kit (~$60), or request your landlord to hire a professional to test
- Testing is recommended for 3 months (or 91 days) during the winter season or when doors and windows are typically closed
- Test kits are placed in your main living space, then mailed to a lab for analysis. The results are returned directly to you

TALKING TO YOUR LANDLORD

Ask your landlord if they have tested for radon in the past 5 years. Re
they are unfamiliar with radon. Let them know there are commu
support radon testing and mitigation rebates *(see takeact onnradon.*

Most provinces and territories have tenancy legislation requiring land
and comply with health, safety, housing and maintenance standards –



LANDLORDS:
WHAT YOU NEED TO KNOW ABOUT RADON

Radon is a naturally occurring, odorless and colourless, radioactive gas that enters buildings through regular gaps in floors, pipes, and side walls.

Long-term exposure to high levels of radon increases the risk of developing lung cancer.

Similar to having smoke-detectors, testing and reducing high radon is part of providing a safe space for tenants. Reduce your liability and test your rentals for radon.

***ALL* HOMES AND COMMERCIAL BUILDINGS IN CANADA HAVE SOME LEVEL OF RADON!**

NEED TO KNOW:

- Testing for radon is simple with DIY or professional options.
- To test large commercial buildings with HVAC systems, consult a C-NRPP certified professional.
- All buildings with high levels can be lowered with mitigation.
- Mitigation systems can be installed quickly. Work should only be completed in consult by professionals with official C-NRPP certification.

RESOURCES

CARST: Canadian Association of Radon Scientists and Technologists	Hire a registered professional to test your building and mitigate high radon. Learn about mitigation systems and types of questions to ask a professional. Participate in educational seminars.	carst.ca/Mitigation-Systems
C-NRPP: Canadian National Radon Proficiency Program	Canada's certifying program for radon. Find a local certified professional or get certified.	c-nrpp.ca
TAOR: Take Action on Radon	Public health education campaign led by Health Canada, CARST, CAREX, the Canadian Cancer Society, and supported by health authorities and groups nationwide. Find a DIY test kit, learn about radon health effects, join community testing campaigns, or enter contests including rebates for mitigation.	takeactiononradon.ca
Government of Canada – Health Canada	Access videos, factsheets, materials to share, and a list of additional resources.	canada.ca What you need to know
CELA: Canadian Environmental Law Association	Find reports of radon law and policy, as well as advocacy campaigns for policy changes and homeowner rebates	cela.ca/radon
WHO: World Health Organization	Learn about the WHO recommendations for policies to prevent and mitigate residential radon exposure	who.int/ionizing_radiation/env/radon

C-NRPP Technical Bulletin

Mitigation in Multi-Unit Dwellings

November 2021

When mitigating a multi-unit dwelling, ensure you discuss the process with the building owner prior to starting installation.

C-NRPP certified professionals are to reflect high standards and ethics in their work, and comply with recognized standards of practice to protect public health and safety. They communicate clearly and accurately with consumers about their process and the harmful effects of radon gas.

https://c-nrpp.ca/about/

This bulletin is intended to assist mitigation professionals when faced with a mitigation client whose home is part of a multi-unit dwelling.

Multi-unit dwellings include any building used as a residence by more than one family unit, such as town houses and duplexes. Buildings with shared ownership or maintenance such as co-ops, townhouses, condominiums, stratas or vacation timeshare properties may also be considered multi-unit dwellings.

When measuring radon in multi-unit dwellings, whenever possible, best practice is to test the whole building following Health Canada's guidance on public buildings, which includes testing every ground-contact unit.

When mitigating a multi-unit dwelling, ensure you have proper insurance (including adequate liability amounts) and training for the building type. C-NRPP Radon Mitigation training only covers guidance for Part 9 buildings. We recommend you have special training for any commercial buildings.

When installing a mitigation system in a multi-unit dwelling the

1. Remember your client may not be the owner of the building to doing any work; there may be restrictions on work that ca in the exterior or any addition to the structure. Not confirmin time and could result in fines from the ownership group.
2. Buildings must be considered as systems. Many townhouse common foundation, and this is the typical pathway for radc

When mitigating these units, best practice is to access all gr diagnostic testing and to ensure that the mitigation system c effects on other units. You should discuss a strategy for com and explain that the most effective strategy will also benefi

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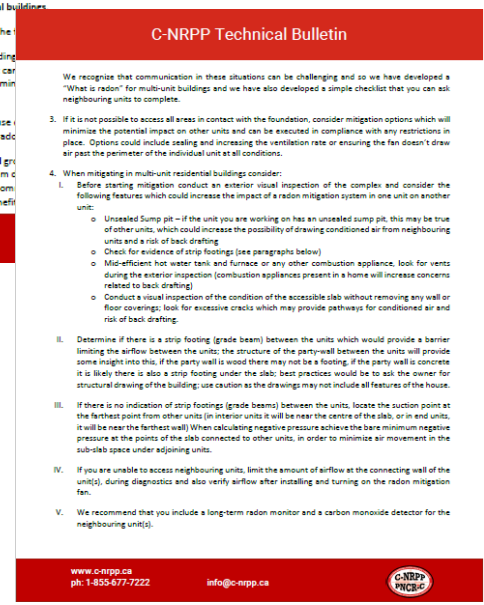

C-NRPP Technical Bulletin

We recognize that communication in these situations can be challenging and so we have developed a "What is radon" for multi-unit buildings and we have also developed a simple checklist that you can ask neighbouring units to complete.

3. If it is not possible to access all areas in contact with the foundation, consider mitigation options which will minimize the potential impact on other units and can be executed in compliance with any restrictions in place. Options could include sealing and increasing the ventilation rate or ensuring the fan doesn't draw air past the perimeter of the individual unit at all conditions.
4. When mitigating in multi-unit residential buildings consider:
   - I. Before starting mitigation conduct an exterior visual inspection of the complex and consider the following features which could increase the impact of a radon mitigation system in one unit on another unit:
     - Unsealed Sump pit – if the unit you are working on has an unsealed sump pit, this may be true of other units, which could increase the possibility of drawing conditioned air from neighbouring units and a risk of back drafting
     - Check for evidence of strip footings (see paragraphs below)
     - Mid-efficient hot water tank and furnace or any other combustion appliance, look for vents during the exterior inspection (combustion appliances present in a home will increase concerns related to back drafting)
     - Conduct a visual inspection of the condition of the accessible slab without removing any wall or floor coverings; look for excessive cracks which may provide pathways for conditioned air and risk of back drafting.
   - II. Determine if there is a strip footing (grade beam) between the units which would provide a barrier limiting the airflow between the units; the structure of the party-wall between the units will provide some insight into this, if the party wall is wood there may not be a footing, if the party wall is concrete it is likely there is also a strip footing under the slab; best practices would be to ask the owner for structural drawing of the building; use caution as the drawings may not include all features of the house.
   - III. If there is no indication of strip footings (grade beams) between the units, locate the suction point at the farthest point from other units (in interior units it will be near the centre of the slab, or in end units, it will be near the farthest wall) When calculating negative pressure achieve the bare minimum negative pressure at the points of the slab connected to other units, in order to minimize air movement in the sub-slab space under adjoining units.
   - IV. If you are unable to access neighbouring units, limit the amount of airflow at the connecting wall of the unit(s), during diagnostics and also verify airflow after installing and turning on the radon mitigation fan.
   - V. We recommend that you include a long-term radon monitor and a carbon monoxide detector for the neighbouring unit(s).

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- **Infographic for Landlords and Tenants**

- **https://carst.ca/rentals**

https://c-nrpp.ca/resources-for-certified-professionals/

Thank you.

Questions, comments?

For more information contact:

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Ph: 204-798-9649

British Columbia
Graeme Cooper,
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info@point-the-way.ca
Ph: 250-870-6711