PROTECTING CANADIANS FROM LUNG CANCER AT THE START OF OCCUPANCY

BC Building Officials
May, 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.

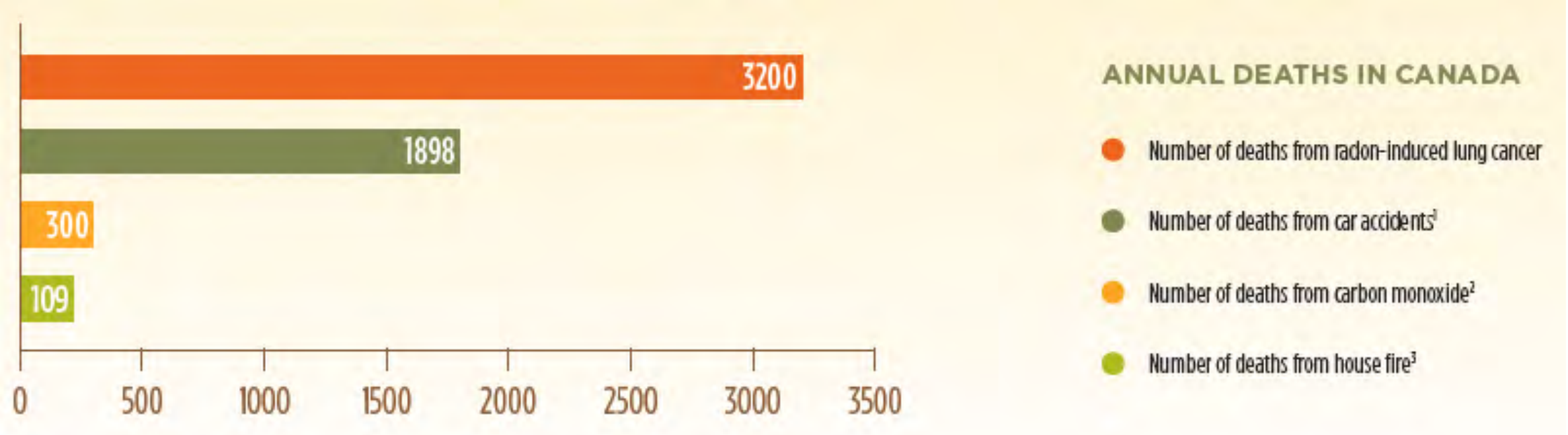
Dr. Kong Khoo lives in Kelowna.
He is an oncologist at BC Cancer Centre in Kelowna.
Knew about radon, even studied environmental carcinogens, but never tested his home for radon, until he was diagnosed with lung cancer in March 2020.
He tested and his levels were well above 200 Bq/m^3.

INHALATION OF RADON GAS IS THE

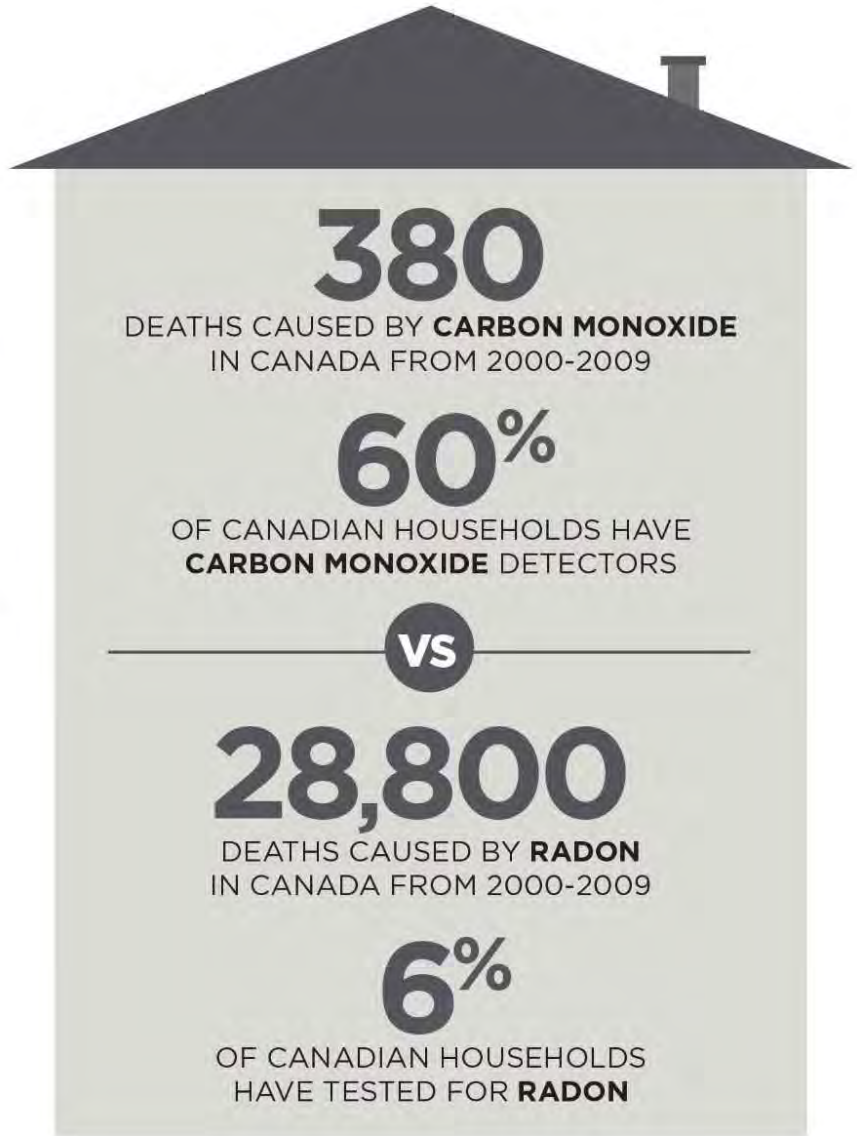
-LEADING CAUSE OF LUNG CANCER IN NON-SMOKERS

- 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


380
DEATHS CAUSED BY **CARBON MONOXIDE**
IN CANADA FROM 2000-2009
60%
OF CANADIAN HOUSEHOLDS HAVE
CARBON MONOXIDE DETECTORS
VS
28,800
DEATHS CAUSED BY **RADON**
IN CANADA FROM 2000-2009
6%
OF CANADIAN HOUSEHOLDS
HAVE TESTED FOR **RADON**

- 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

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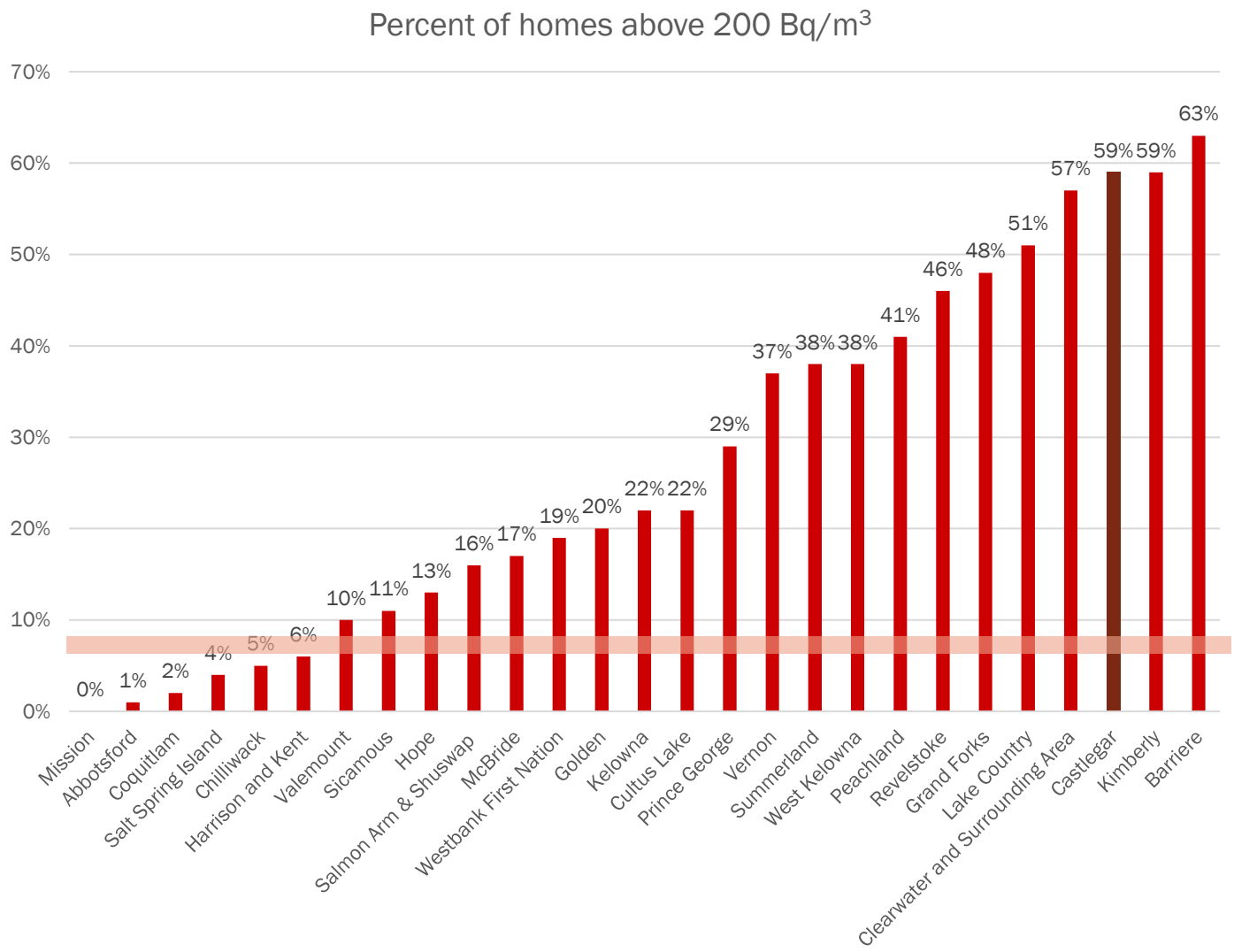
cevkqp'vq'TGFWEG'tcf qp'hgxgnu
y kvj kp'qpg"{gct0

HEALTH IMPACT OF RADON

Tcf qp'Ngxgn	Nkhgvko g'Tkum qh'Nwpi 'Ecpegt	Nkhgvko g'Tkum'qh'Nwpi Ecpegt'kh'{qw'Uo qmg
322'Ds 1o ì (wpf gt	3'	34'
323/422'Ds 1o ì	307'	37'
423/822'Ds 1o ì	4'	39'
qxgt'822'Ds 1o ì	6'	48'

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.

Comparison of Consumer-Grade Electronic Radon Monitors

Journal of Radiological Protection

PAPER • OPEN ACCESS

A comparison of consumer-grade electronic radon monitors

Pam Warkentin[1], Erin Curry[2], Oghenekome Michael[1] and Brian Bjorndal[3]

Published 21 October 2020 • © 2020 Society for Radiological Protection. Published on behalf of SRP by IOP Publishing Limited. All rights reserved

Journal of Radiological Protection, Volume 40, Number 4

Citation Pam Warkentin *et al* 2020 *J. Radiol. Prot.* **40** 1258

Article PDF

Canadian National Radon Proficiency Program

2023 Intercomparison Report

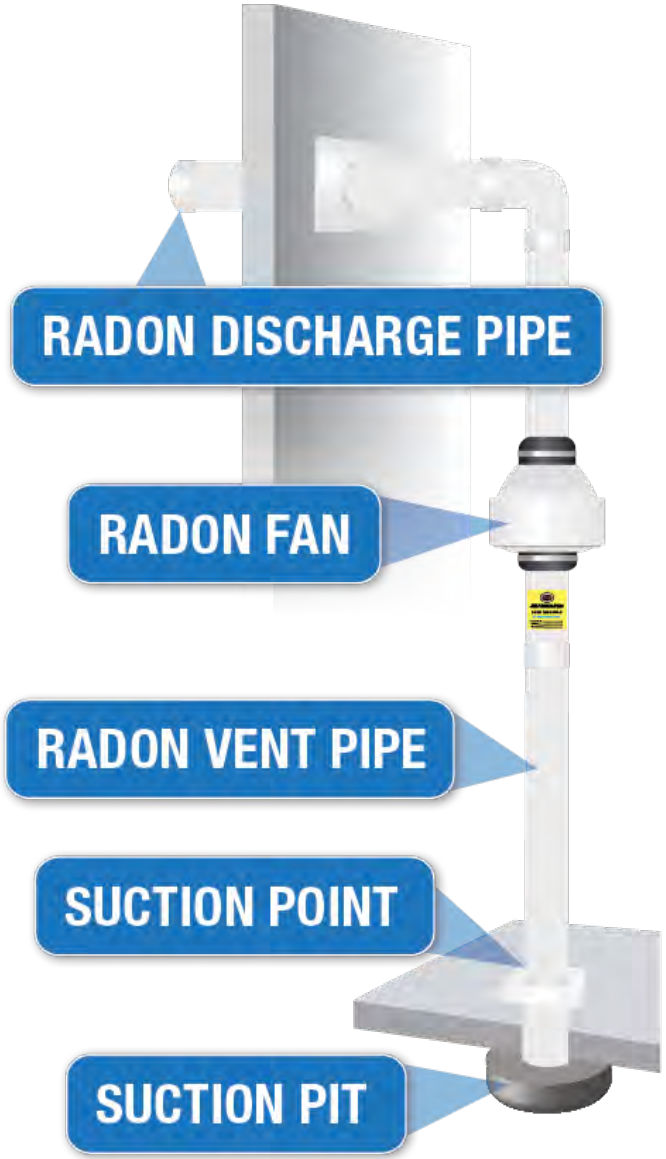
		Manufacturers stated Accuracy	Frequency of Reading	Digital Display or cell-phone app	Battery or Plug-in	Passed C-NRPP Performance Test For more details click here.
	Airthings Corentium Home	±10% (after 7 days at 200 Bq/m³), ±5% after 2 months of monitoring	12 hours 24 hours 7 days (first reading will take 24 hrs)	Short-term and long-term average shown on monitor display.	Battery	✓
	Airthings Wave Plus	±10% (after 7 days at 200 Bq/m³), ±5% after 2 months of monitoring	Hourly	Long-term average shown on cell phone app. Color-coded indication of levels on monitor.	Battery	✓
	Airthings View Plus	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)	✓
	EcoSense EcoQube	+/-10% at 370 Bq/m³ after 10 hours	Measures every 10 minutes and displays an hourly rolling average.	Hourly level shown on display, long term average available on the app.	Plug in	✓
	EcoSense EcoQube Blue	+/-14% at 370Bq/m³	10 mins	Device displays 1 hour, 1 day, 1 week and 1 month rolling averages.	Plug in	✓
	EcoSense Radon Eye RD200	±10% at 370 Bq/m³ after 10 hours	10 mins	Displays 1 hour rolling average; long-term display on app.	Plug-in	✓
	SunRadon Luft	±10% (after 7 days at 200 Bq/m³)	Initial reading takes 90 mins, hourly.	Long-term and short-term averages shown on the app. Color coded indication of levels on monitor display.	Plug-in	✓

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

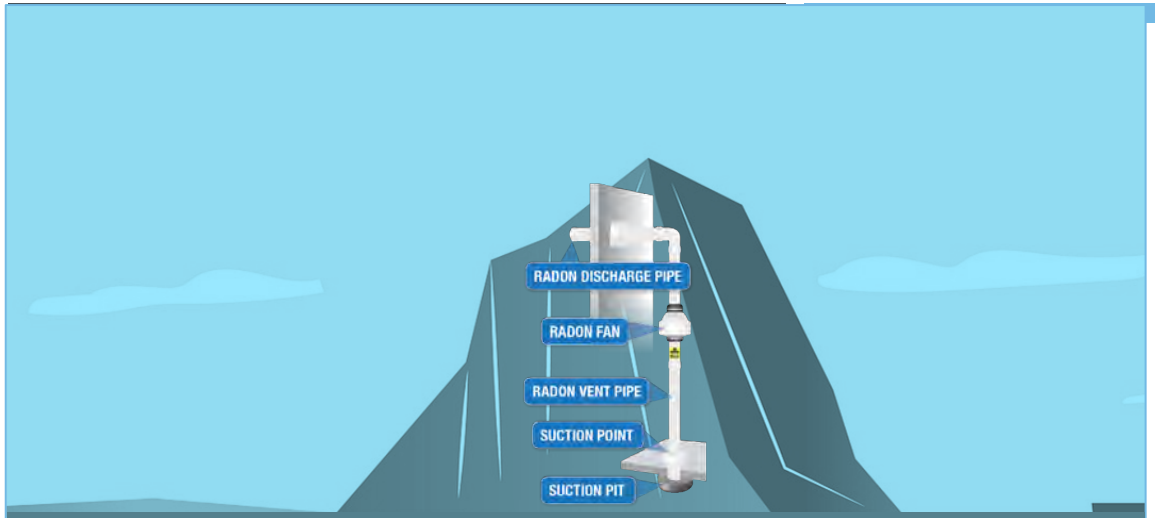
The following devices are not recommended by C-NRPP

Air Steward		Check out the recall at: **Air Steward:** https://recalls-rappels.canada.ca/en/alert-recall/air-steward-portable-radon-monitor-recalled-due-inaccurate-radon-detection
Radon Guard		Check out the recall at: **Radon Guard Monitor** https://recalls-rappels.canada.ca/en/alert-recall/health-canada-warns-elifecity-portable-radon-meter-may-post-health-and-safety-risk-0

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 of $ 3,000
- Generally installed in one day
- C-NRPP Radon Mitigation Professionals



Radon Mitigation Systems:

Understand what goes into the install

Mitigation by active soil depressurization (ASD)

- Steps to install Sub-membrane Systems
- Sump and Drainage System Depressurization
- Steps to install SSD Systems
- Retrofit systems with radon control measures

Components of Installing ASD

- Fan Characteristics
- Pipe and Fittings
- Mitigation System Termination and Clearances
- Sealing
- Pressure Field Extension Test
- System Design and Fan Sizing
- Fan Locations
- Labelling and Information Package
- Fan Monitoring
- Post Installation Radon Testing

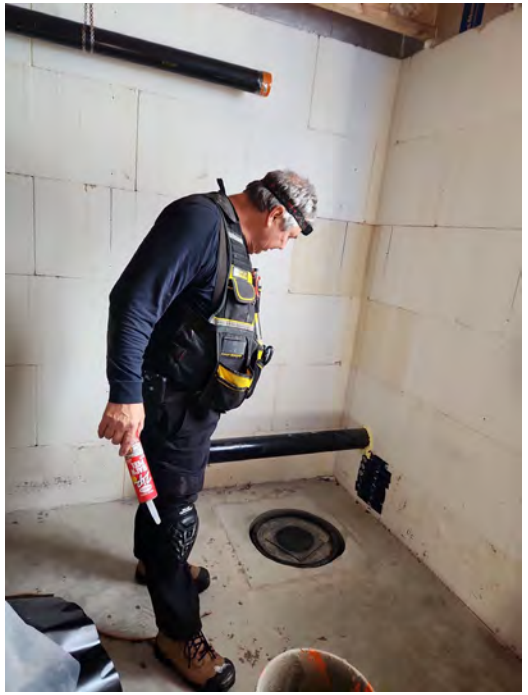
Find Information on Certification:
https://c-nrpp.ca/how-to-become-certified/

CGSB Standard for Existing Residential Construction – 149.12.2025

Canadian General Standards Board – Radon Mitigation options for EXISTING HOMES

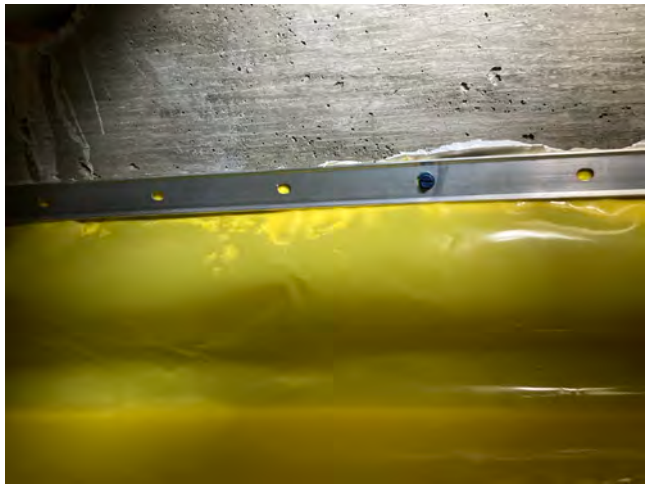
(CGSB 149.12)

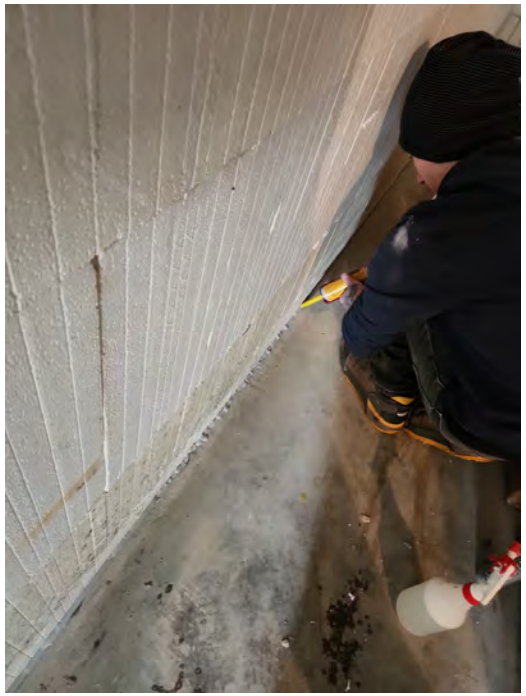
- includes existing buildings, not just low-rise residential buildings
- Includes information for both:
  - Active soil depressurization – the preferred method for reducing radon levels in existing buildings.
  - Ventilation – an alternative method for reducing radon levels that may be more feasible 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 an effective system





PREPARING THE SLAB:

- pressure measurements to ensure well sealed foundation
- proper sealing to seal the foundation (especially the floor to wall joint)
- assess barriers impeding airflow and underslab ‘communication’

Radon Mitigation Systems:

Understand what goes into the install

CHOOSING THE SUCTION LOCATION:

- ensuring the system is installed in a location where it will be effective
- ensuring the installation in a safe/appropriate location
- ensuring installation happens in a safe way for both the installer and the home occupant

SIZING THE FAN:

- As part of the diagnostics, PRESSURE FIELD EXTENSION will provide data for calculating the fan size

IT'S ABOUT BEING ABLE TO EASILY TURN A NEGATIVE TO A POSITIVE

Positive pressure under the slab demonstrated with a smoke pencil

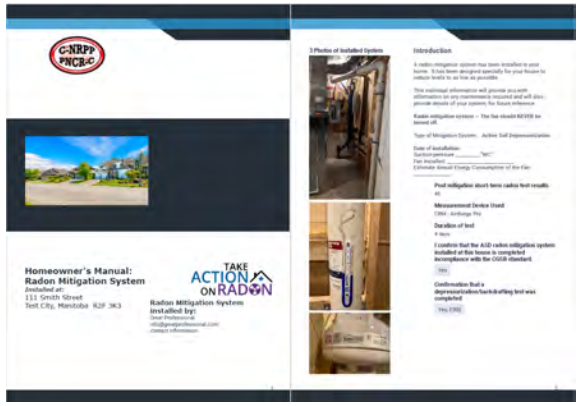
Negative pressure under the slab.

Radon Mitigation Systems:

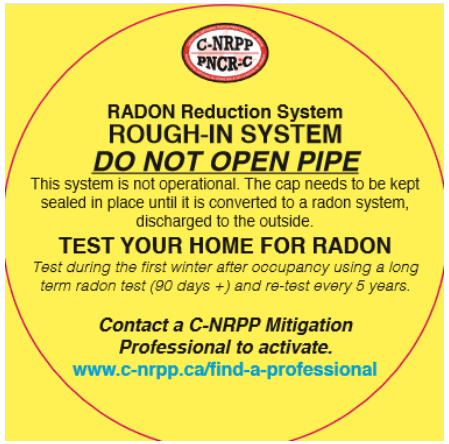
Understand what goes into the install

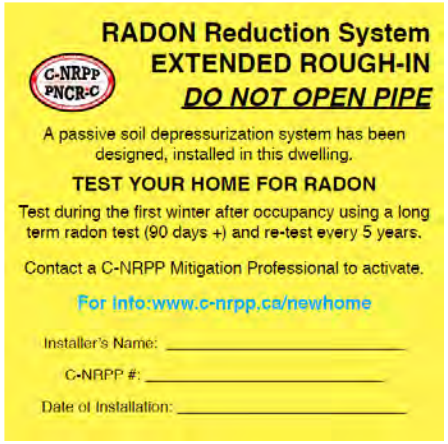
FINISHING THE INSTALLATION:

- properly sizing the fan to ensure its effective
- noise proofing the system
- proper materials used for the system (type of pipe; pipe adhesions; elbows(fittings);
- proper discharge clearances and considerations



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.

SUB-MEMBRANE DEPRESSURIZATION

C-NRPP CERTIFICATION

CANADIAN - NATIONAL RADON PROFICIENCY PROGRAM

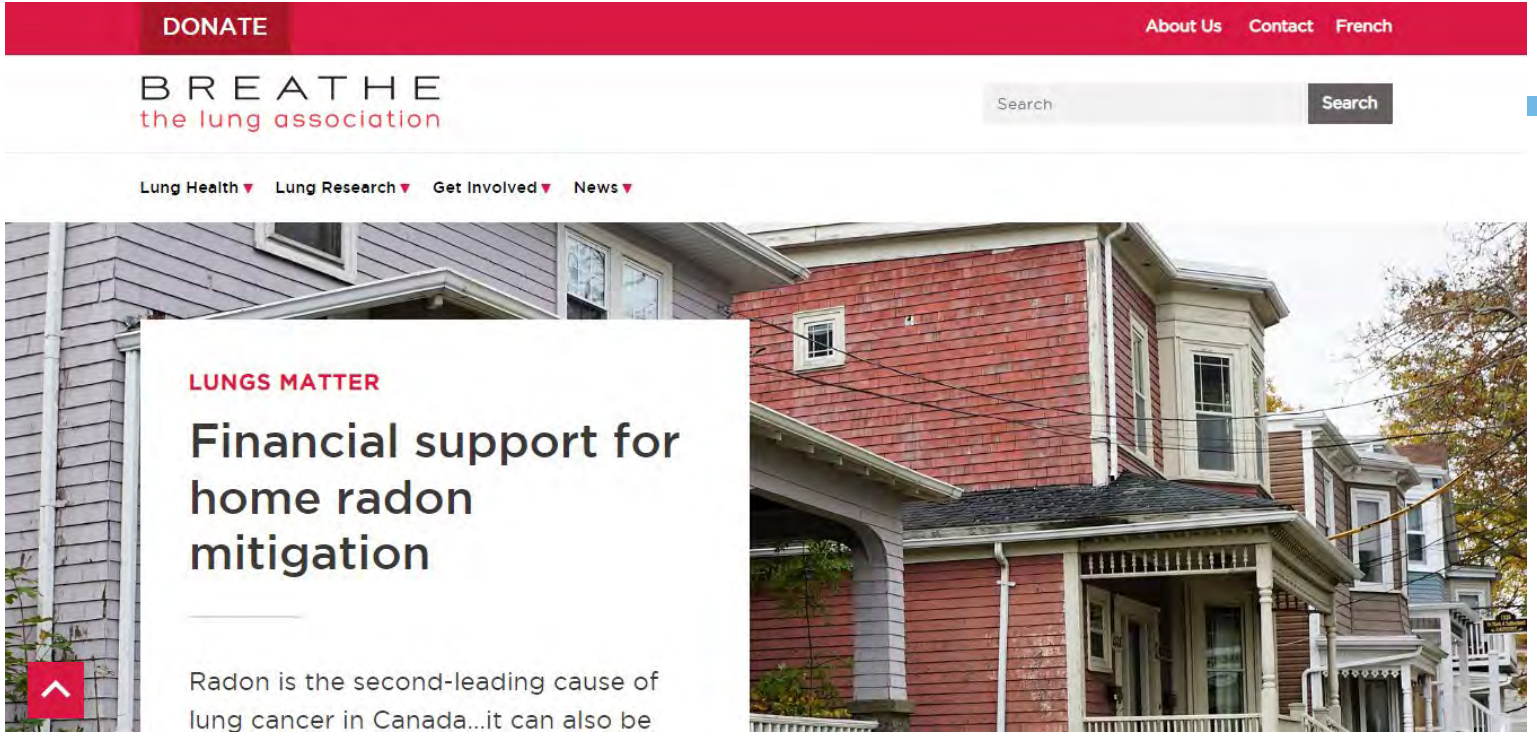
- C-NRPP Measurement Certification – 16hrs course work (available in French and English; online)

- 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)

BUILDING CODES

WHY SHOULD BUILDERS CARE?

- Radon control is in Building Code and has been for a long time.
  - Code conformance/compliance issue
  - Generally, it is not possible to construct a building without radon controls and meet code (very few exceptions)
- Radon poses a liability and financial risk to a builder/developer:
  - In Ontario, Tarion home warranty covers radon for 7 years post construction under major structural defect.
- Far less expensive to implement proper radon controls during construction than to fix it after .
  - These costs are passed along to the buyer
  - Market a healthy building
- Building retrofit radon control:
  - Is much more expensive
  - Comes out of your profits
  - Is time consuming
  - Is disruptive occupants
  - Causes dissatisfaction of owner
  - Can damage your reputation

Save Money, Time, and Reputation!

IT'S NOT JUST ABOUT GEOGRAPHY!

- Source Strength
- Construction Methods
- Construction Materials
- Construction Quality
- Basement Depth
- HVAC
- Heat Recovery Ventilators
- Heating Methods
- Occupant Activity
- Wind Forces
- Renovations

National Building code includes radon control measures:

- Gravel under the slab
- Well-sealed liner
- Sealed sump pit
- Radon rough-in for future installation, Capped, sealed

BC Building code includes radon control measures:

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

THIS DATA IS CURRENT TO NOVEMBER 2024.

Ontario Building Code:

Municipal Radon Option 1:

- rough-in soil gas pipe, removable cap; labeled
- mandatory radon gas testing

Municipal Radon Option 2:

- soil gas barrier on the foundation walls
- soil gas barrier under the basement floor slab

Municipal Radon Option 3

- soil gas barrier sealed up on the foundation walls
- active sub-slab depressurization system

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

NEW RESEARCH ON LUNG CANCER: CANADA

J Environ Manage. 2019 Oct 1;247:449-461. doi: 10.1016/j.jenvman.2019.06.032. Epub 2019 Jun 27.

A cost effectiveness analysis of interventions to reduce residential radon exposure in Canada

Janet Gaskin [1], Doug Coyle [2], Jeff Whyte [3], Nicholas Birkett [2], Daniel Krewksi [2]

Affiliations + expand

PMID: 31254760 DOI: 10.1016/j.jenvman.2019.06.032

- Radon is an important modifiable cause of lung cancer in Canada for both smokers and non-smokers
  - radon-attributable lung cancer deaths: ¼ in men and ⅓ in women occur in non-smokers
- Preventive measures installed in new housing are cost effective across Canada and could prevent ~ 450 lung cancer deaths annually
- Mitigation of existing housing built with radon control is more cost effective in higher radon regions
  - Expected to be more cost effective at increased rates of testing and mitigation
- Cost-utility analysis of interventions to reduce residential radon suggest it is a practical option for reducing the associated lung cancer burden in Canada

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

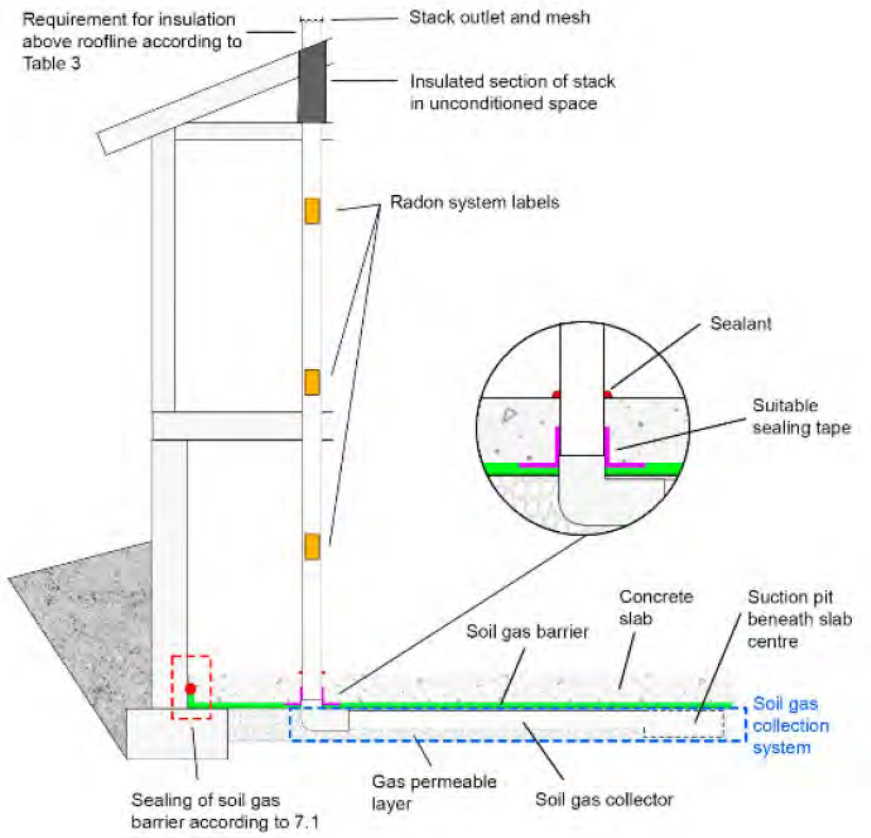
Radon Demonstration:
Application of Building Code Changes in Winnipeg New Home Construction

April 2014

Figure: 9 Sewer pipe (left) versus Schedule 40 pipe (right). Photo credit: Chantal Wils

PROPOSED BUILDING CODE CHANGES 2025

Figure 10 – Level 2 system – Illustrative example of a passive vertical radon stack (not to scale)



Passive Vertical Radon Stack

This proposed change adds requirements for radon mitigation by use of a passive vertical radon stack in dwelling units and home-type care occupancies that have a wall, roof or floor assembly in contact with the ground.

BC Building Code - 2024

BRITISH COLUMBIA

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MORE TOPICS

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

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;

CHALLENGES WITH PIPE LOCATION

INCORRECT PIPE

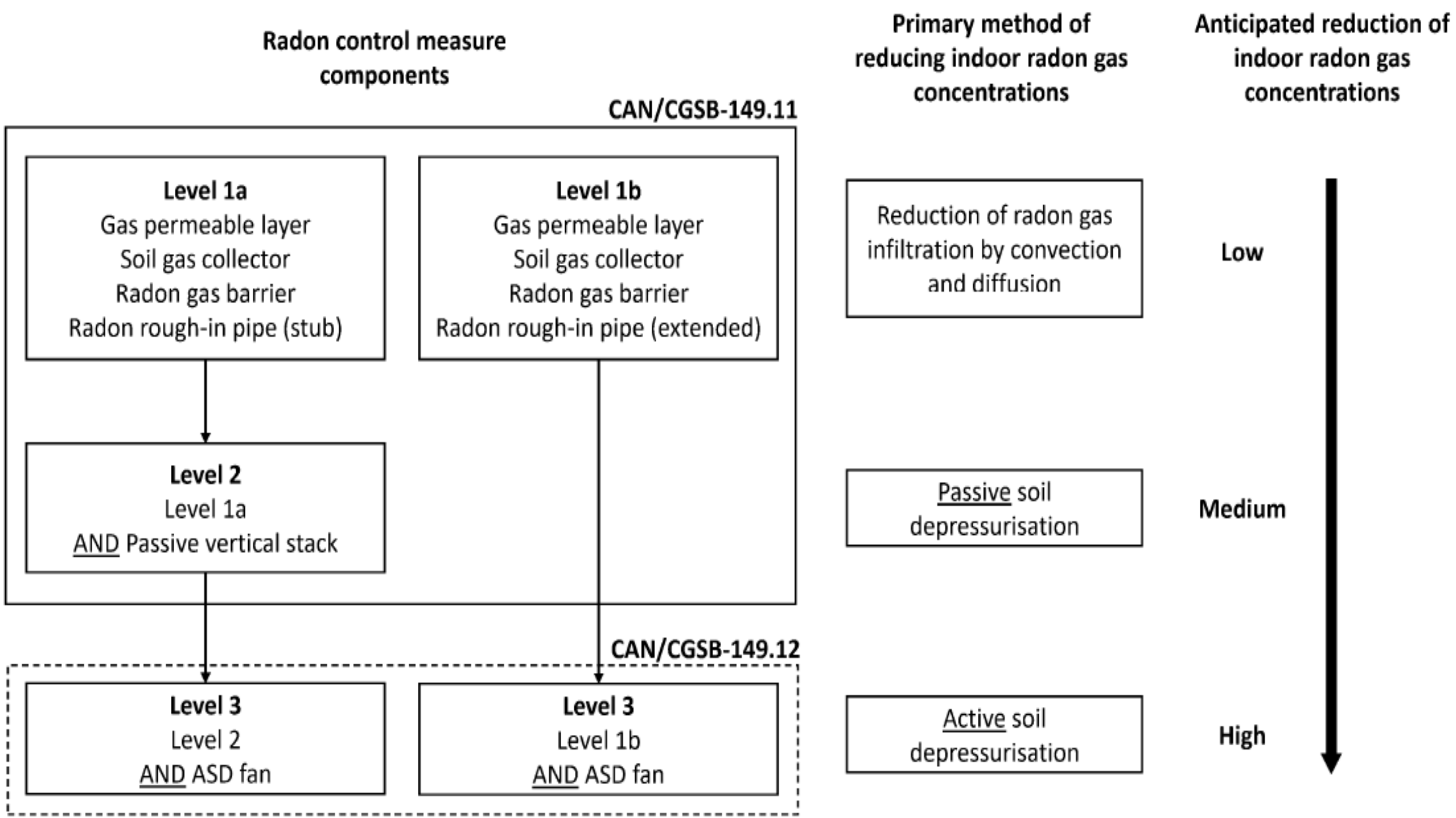
BEST PRACTICE – CGSB STANDARDS

CANADIAN GENERAL STANDARD BOARD CAN/CGSB-149.11-2024

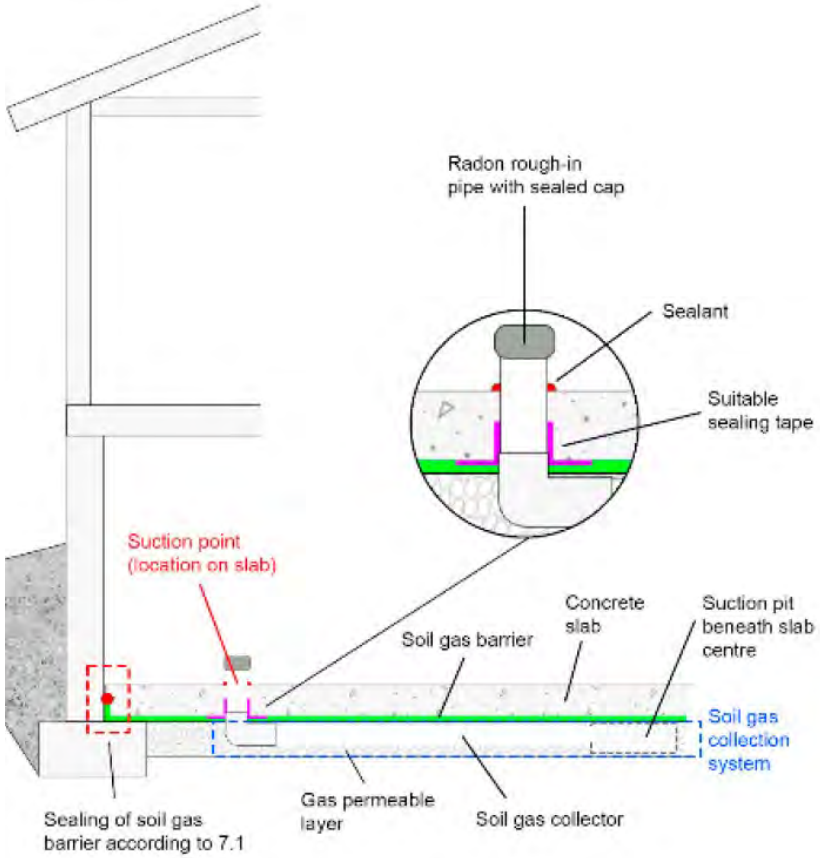
RADON CONTROL OPTIONS FOR NEW BUILDINGS

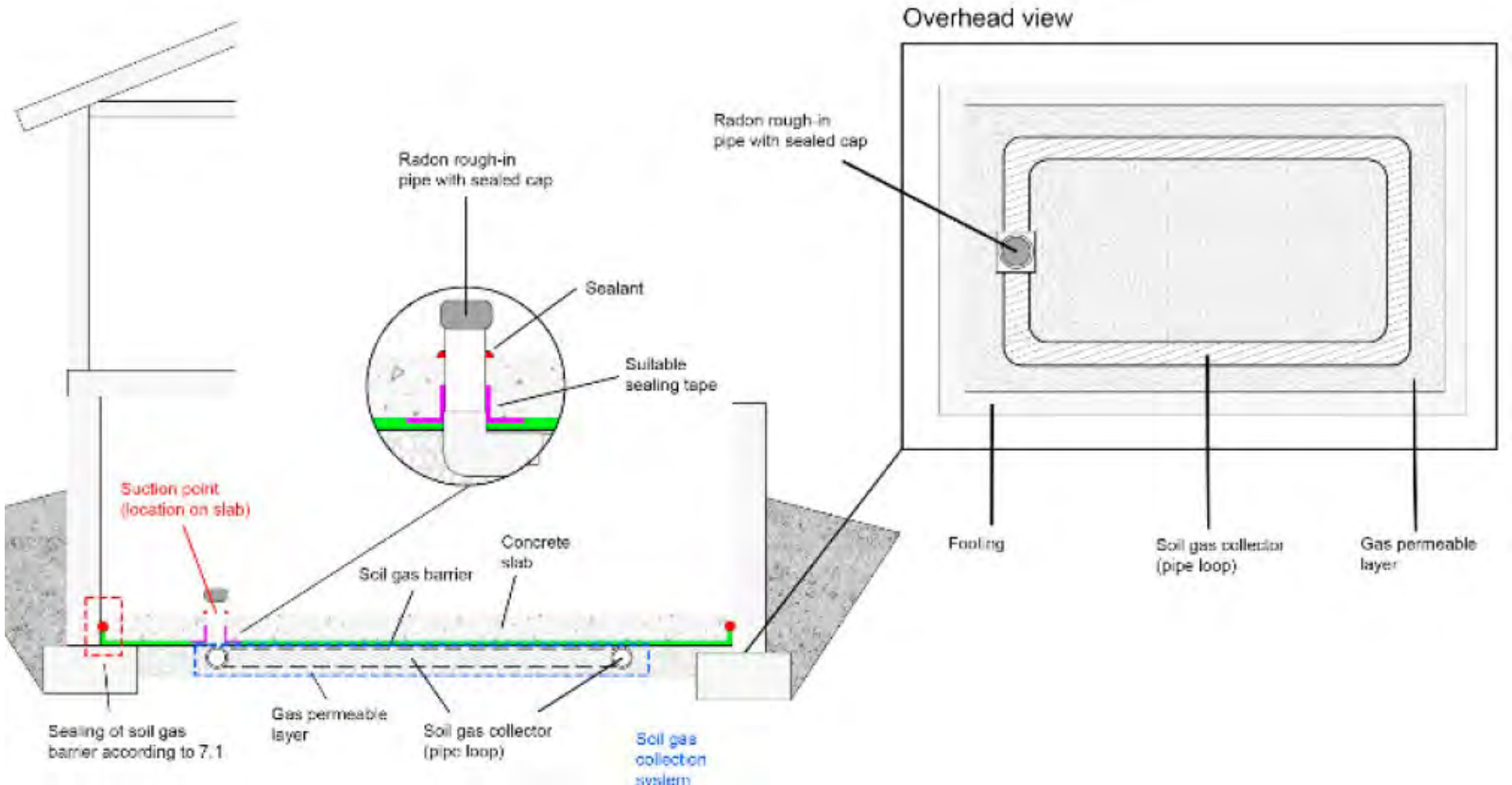
CAN CGSB-149.11 Requirements

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


Radon control measure components
Primary method of reducing indoor radon gas concentrations
Anticipated reduction of indoor radon gas concentrations
CAN/CGSB-149.11
Level 1a
Gas permeable layer
Soil gas collector
Radon gas barrier
Radon rough-in pipe (stub)
Level 1b
Gas permeable layer
Soil gas collector
Radon gas barrier
Radon rough-in pipe (extended)
Level 2
Level 1a
AND Passive vertical stack
CAN/CGSB-149.12
Level 3
Level 2
AND ASD fan
Level 3
Level 1b
AND ASD fan
Reduction of radon gas infiltration by convection and diffusion
Low
Passive soil depressurisation
Medium
Active soil depressurisation
High

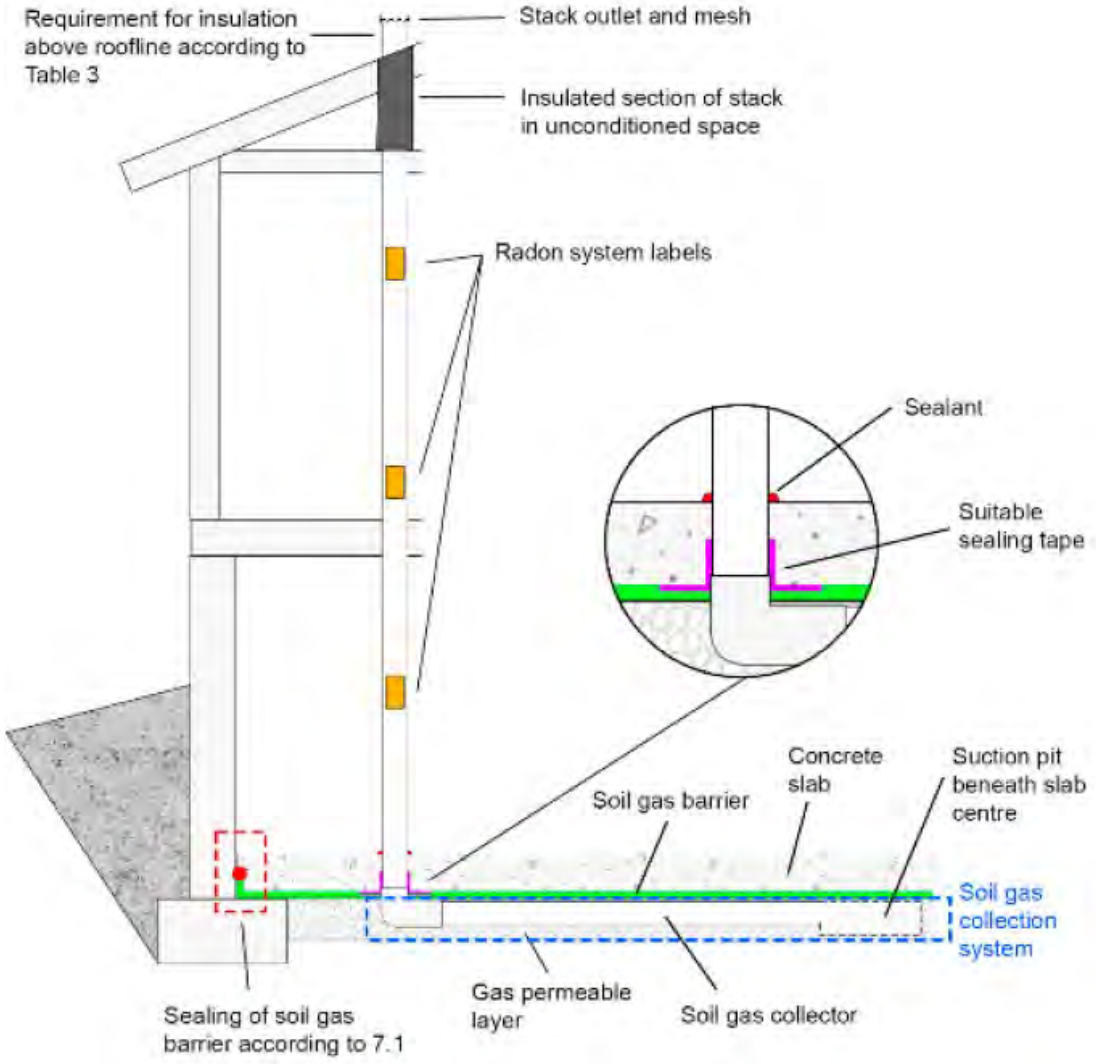
ILLUSTRATIVE DIAGRAM OF A LEVEL 1A RADON ROUGH-IN (FIGURE 2A AND 2B)





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)

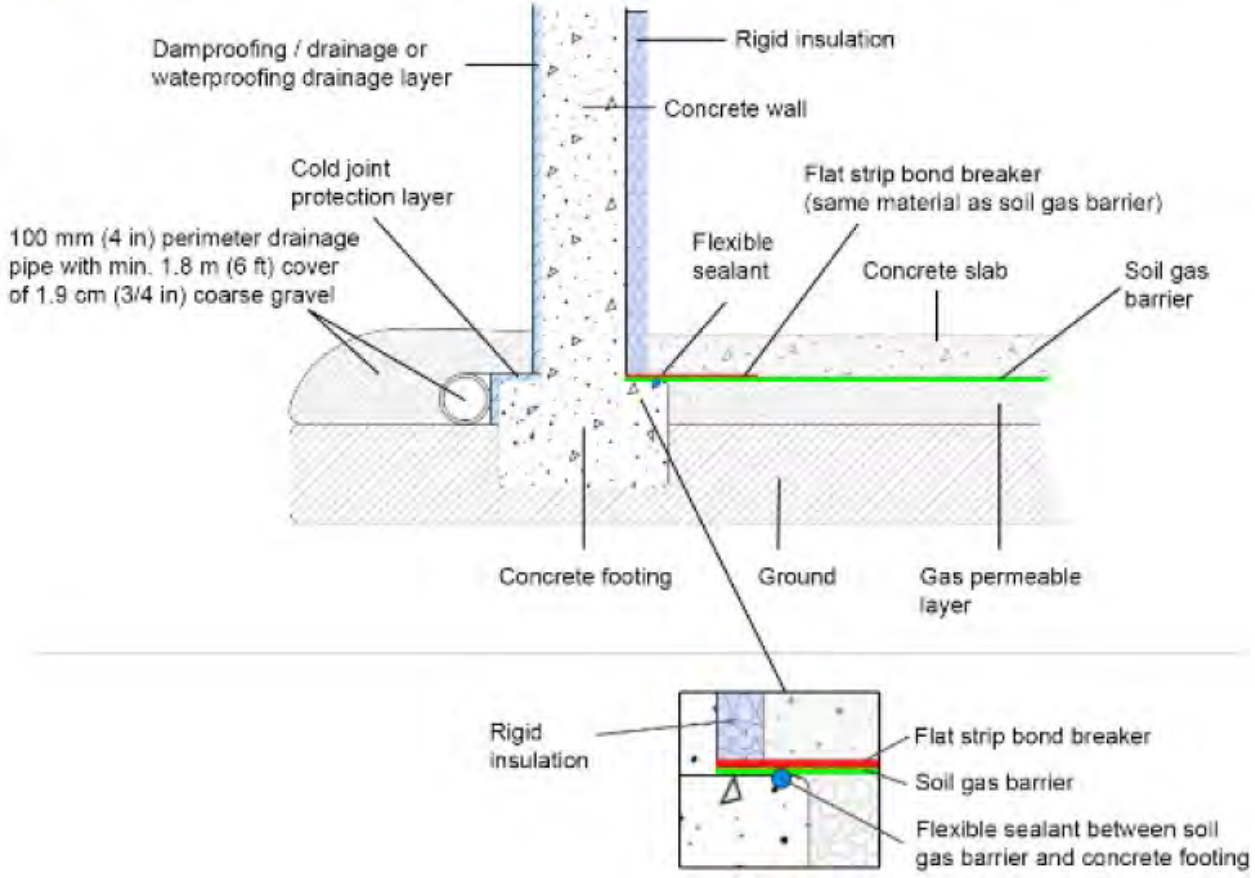
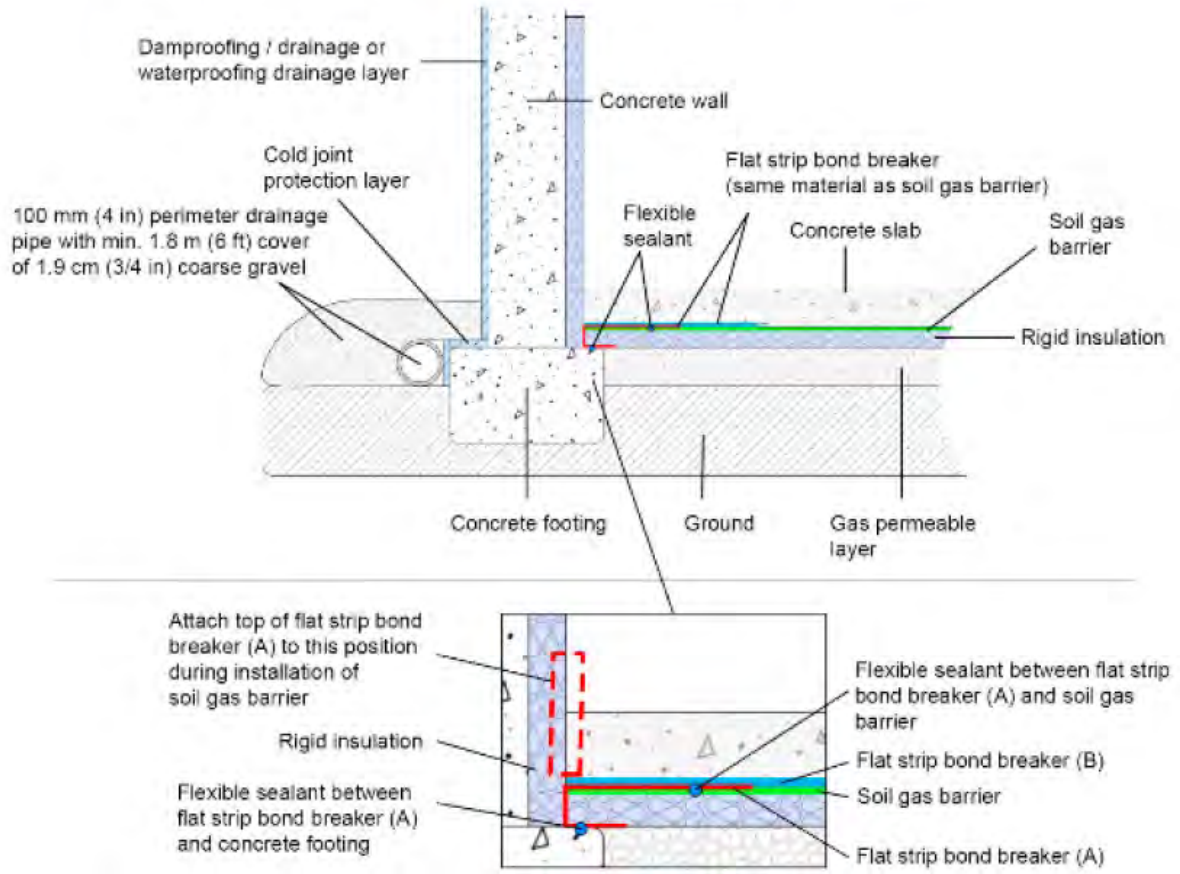


Figure 5 – Installation of soil gas barrier on concrete foundation (with insulation)



MULTIPLE DETAILS PRESENTED

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

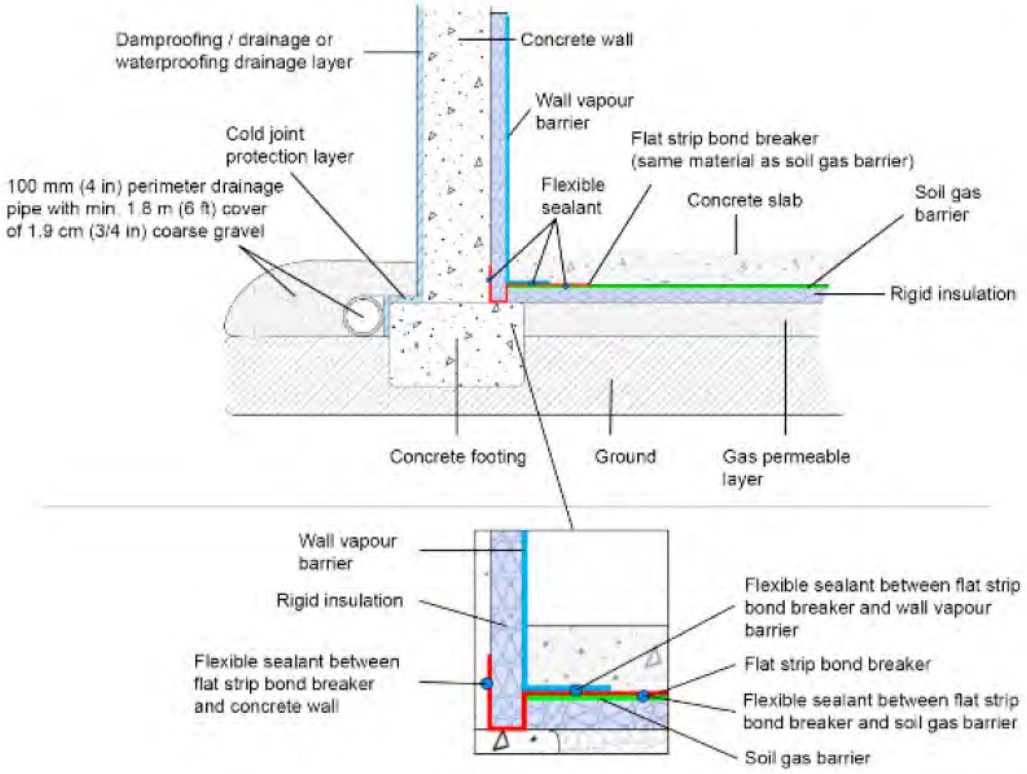
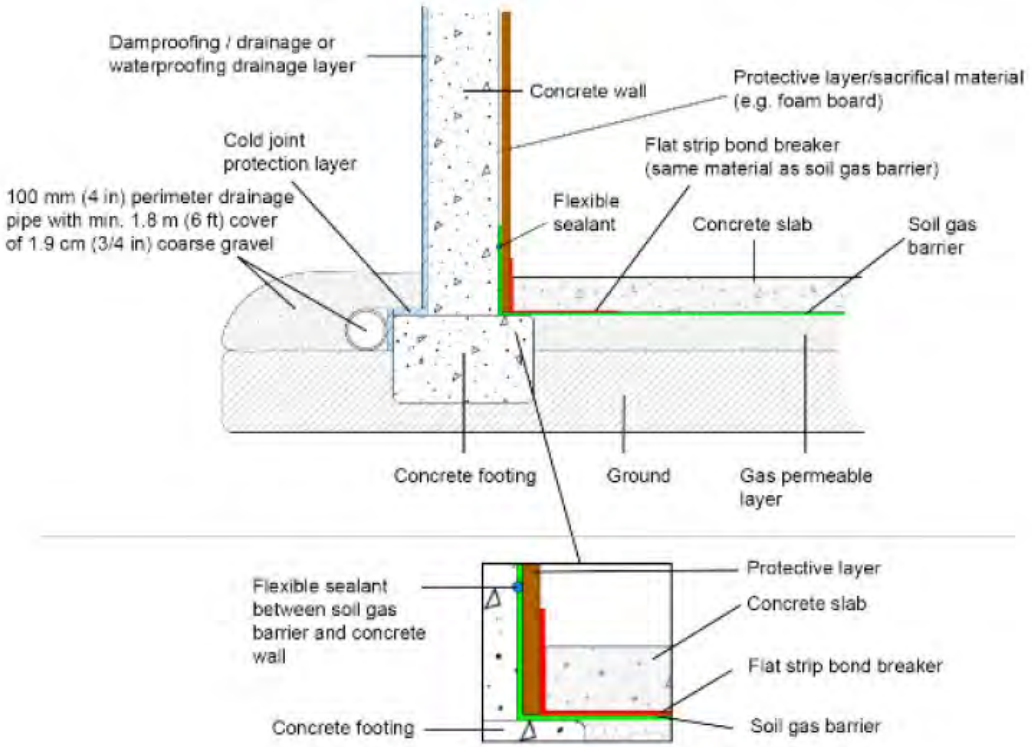


Figure 7 – Installation of soil gas barrier on concrete foundation (without insulation - alternative)



MULTIPLE DETAILS PRESENTED

Figure 8 – Installation of soil gas barrier on ICF foundation

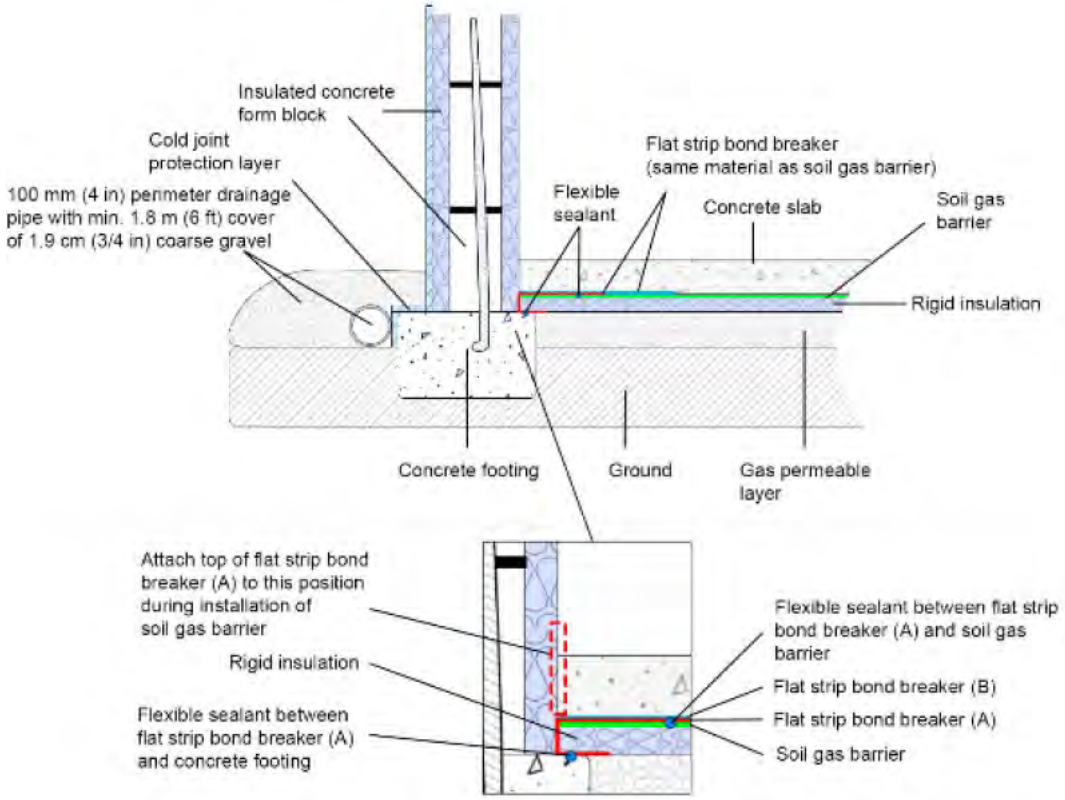
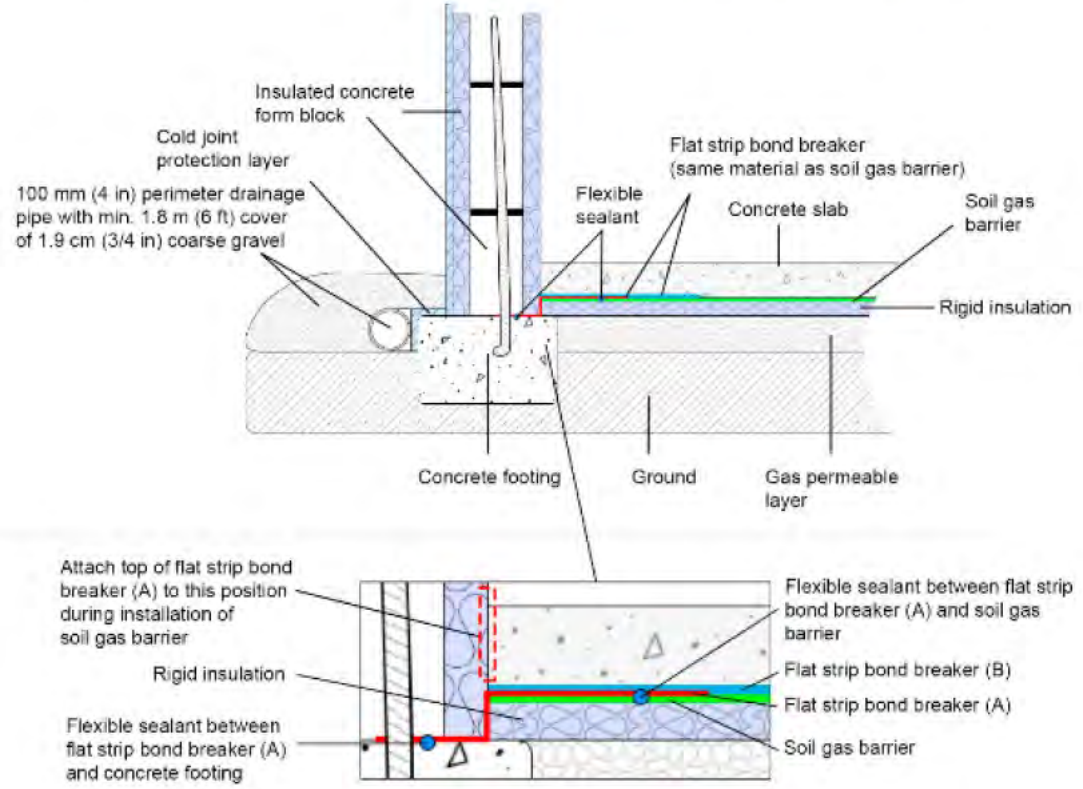
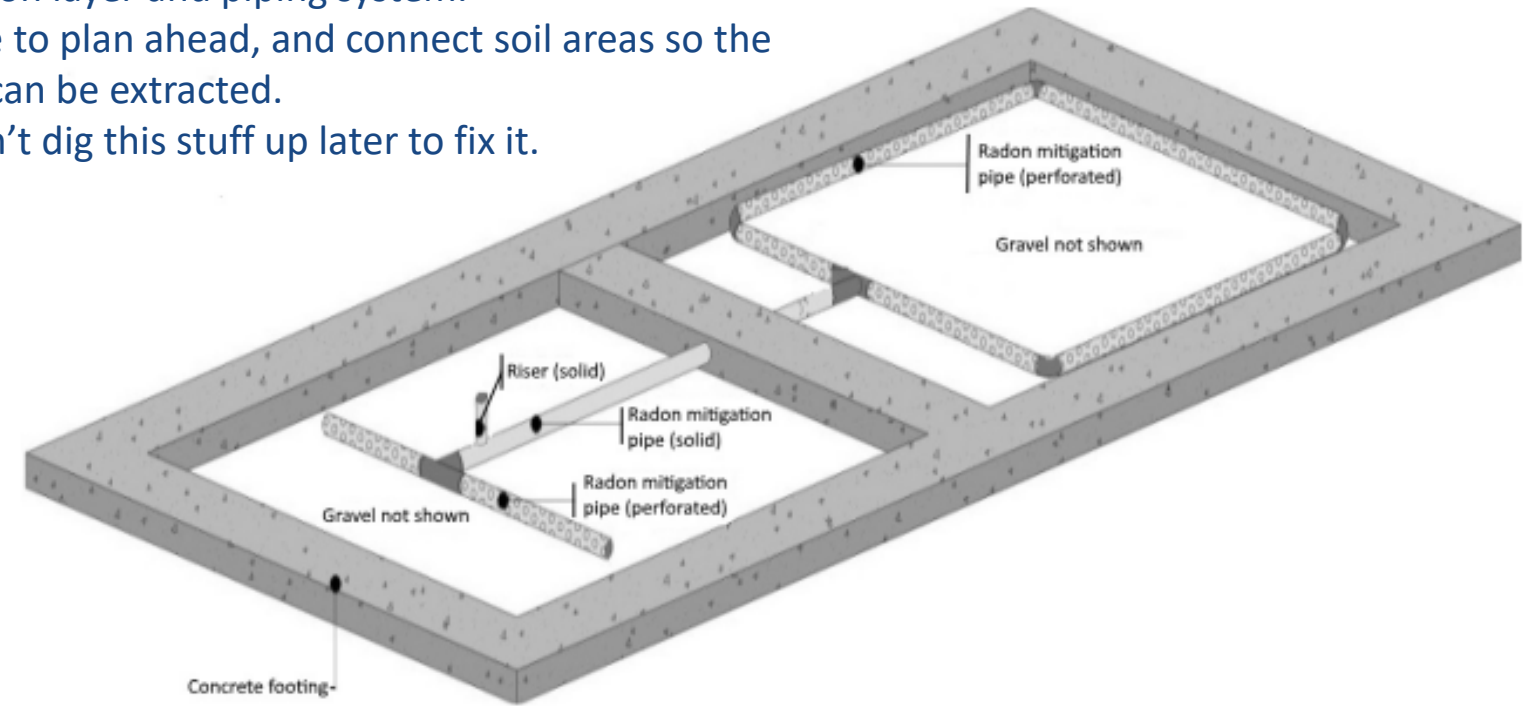


Figure 9 – Installation of soil gas barrier on ICF foundation prior to block pour (alternative)



MULTIPLE FOOTINGS NEED TO BE CONSIDERED

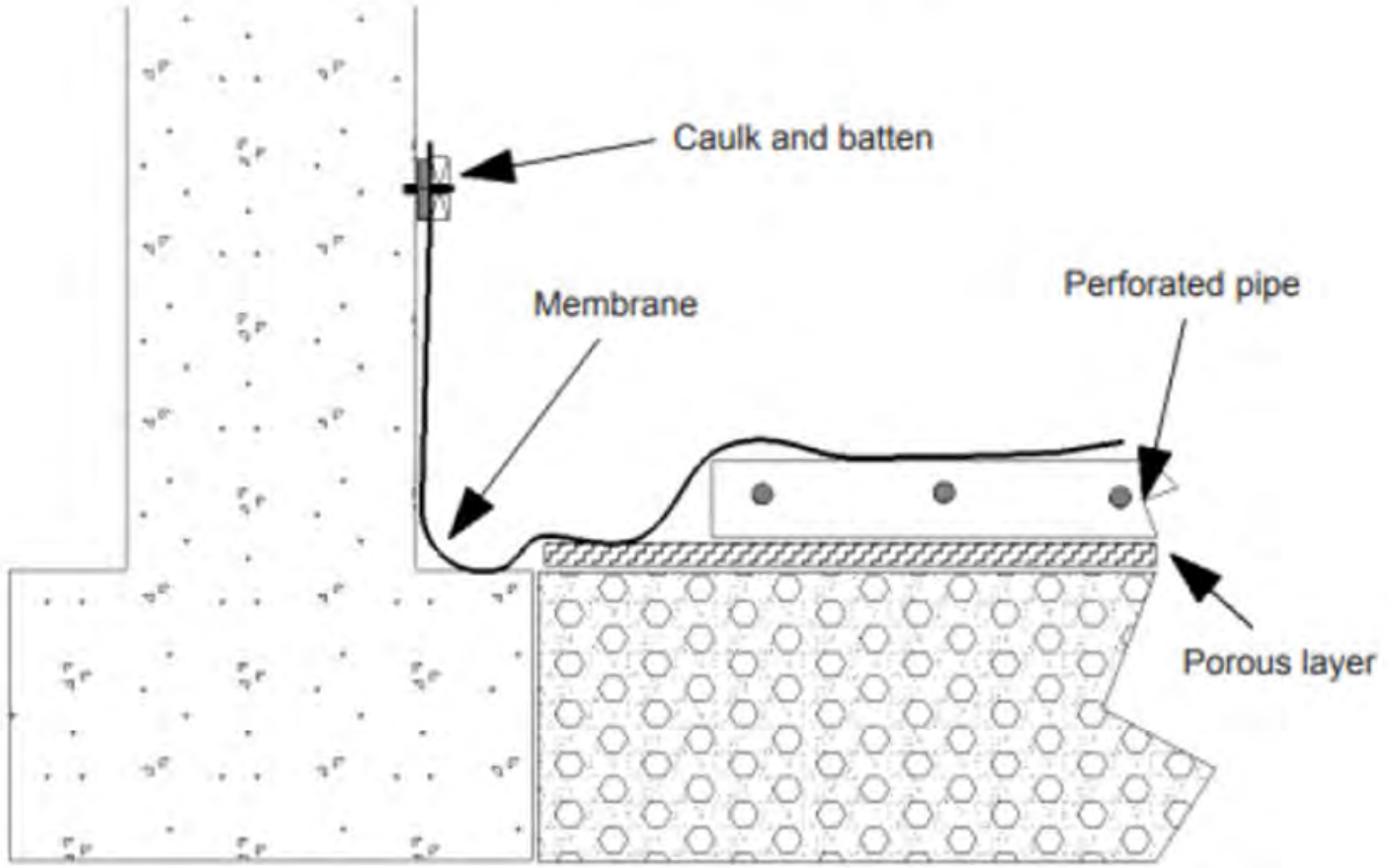
- Footing strips can effectively break up a soil collection layer and piping system.
- Be sure to plan ahead, and connect soil areas so the radon can be extracted.
- You can't dig this stuff up later to fix it.



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



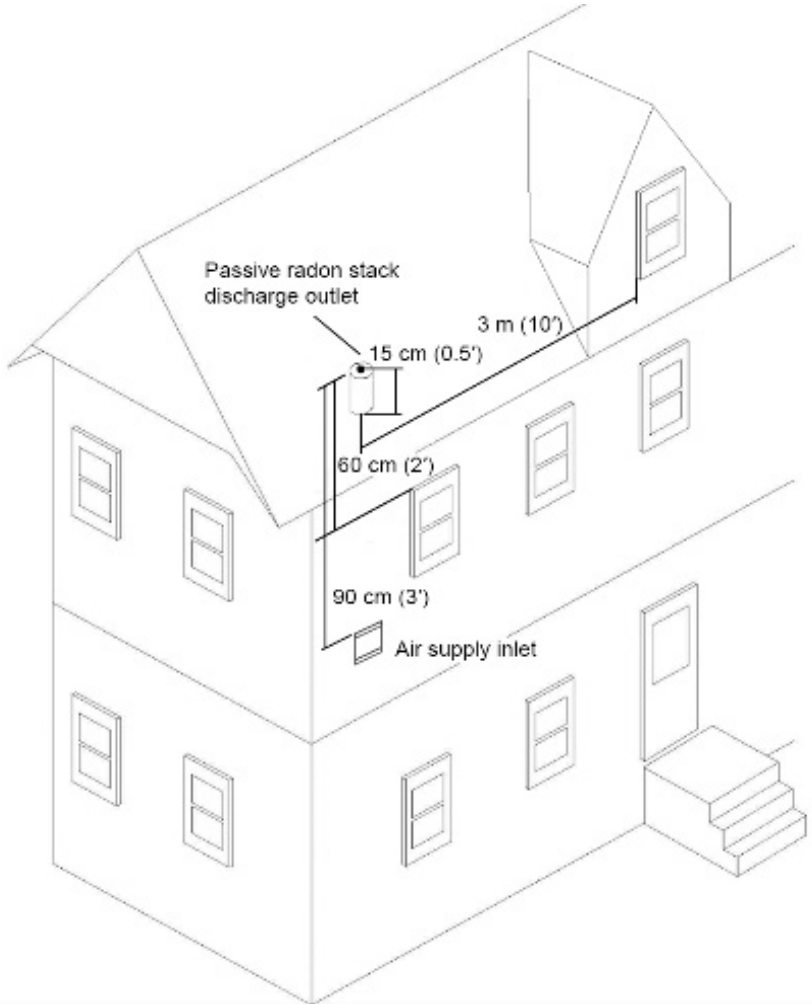
CGSB – PIPING REQUIREMENTS

- 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)

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

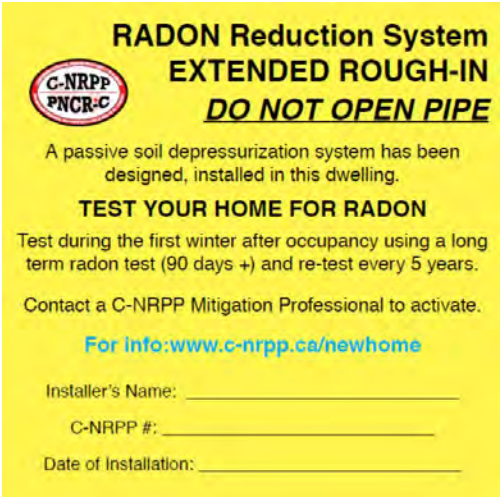
- **There are five label types:**

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

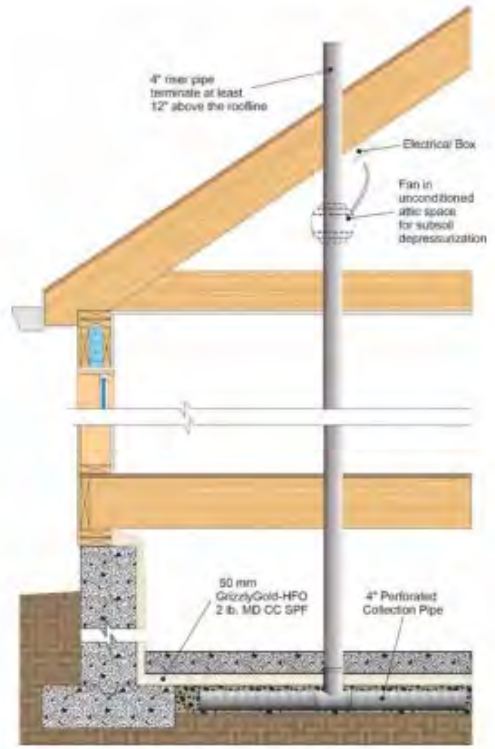
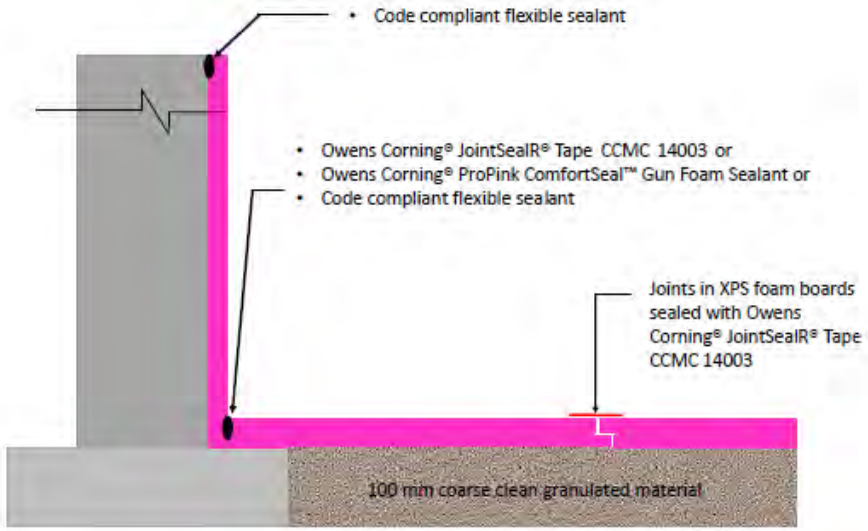
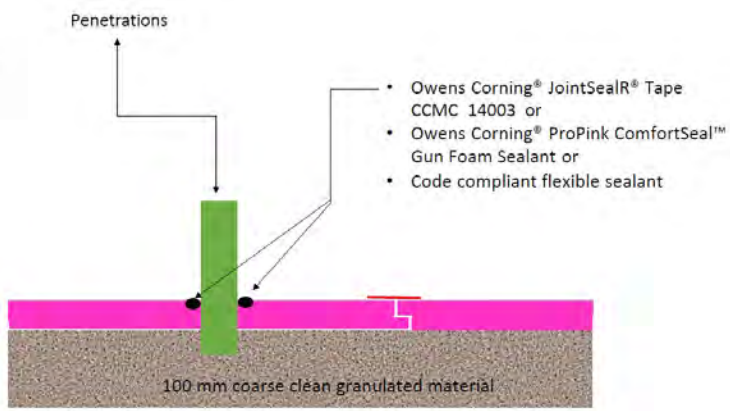


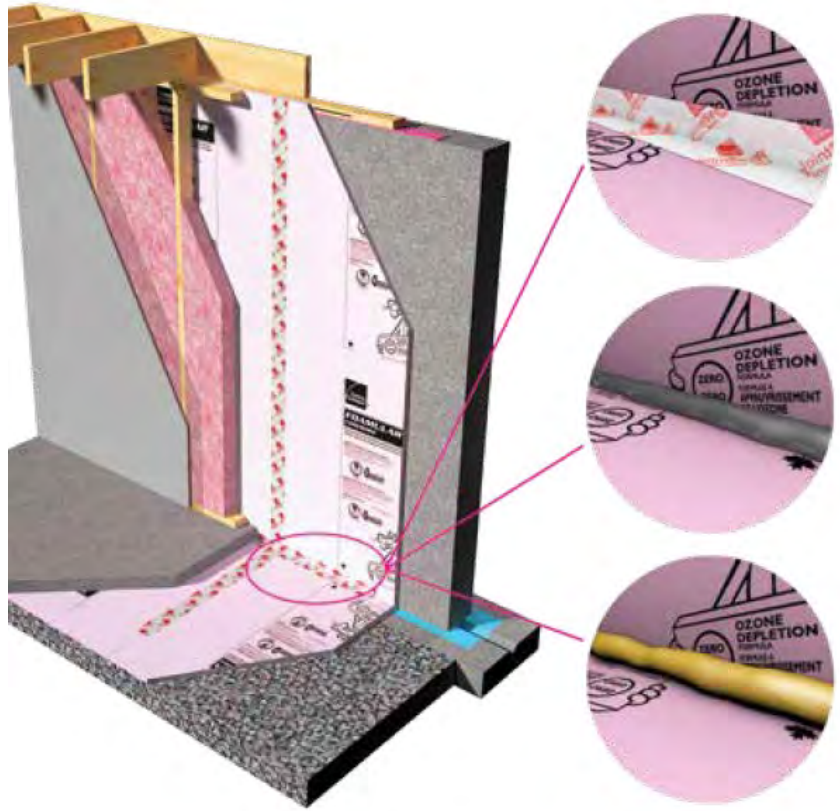
Figure 1:
Installation of CUFCA RCS® for radon control below grade with 100 mm grade bed and roughed-in sub slab radon depressurization system.

CUFCA RCS™
CCMC# 14073-R
radon 86 Rn [222]
RADON CONTROL SYSTEM
IN ONE SEAMLESS APPLICATION

OWENS CORNING – FOAMULAR®



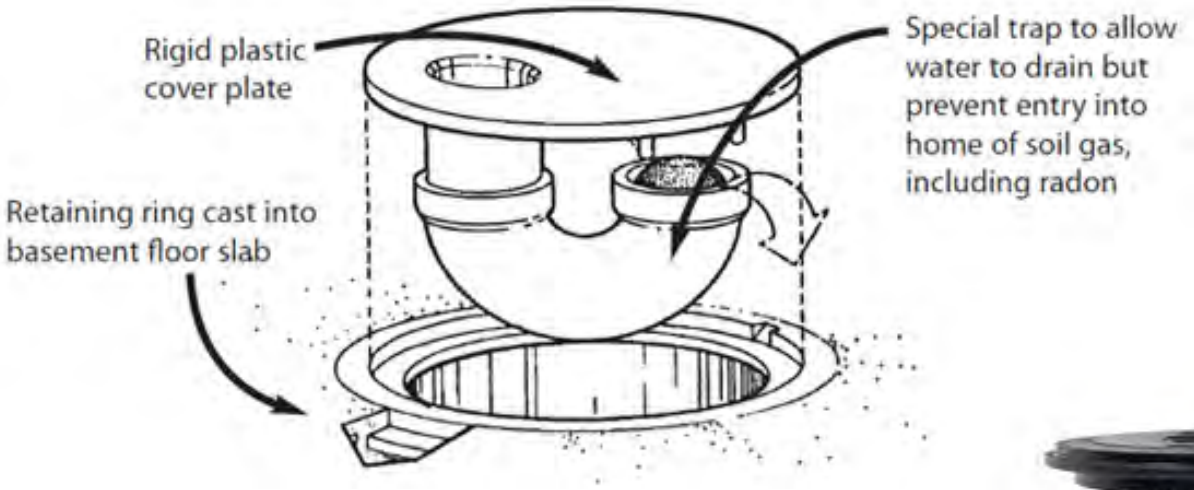


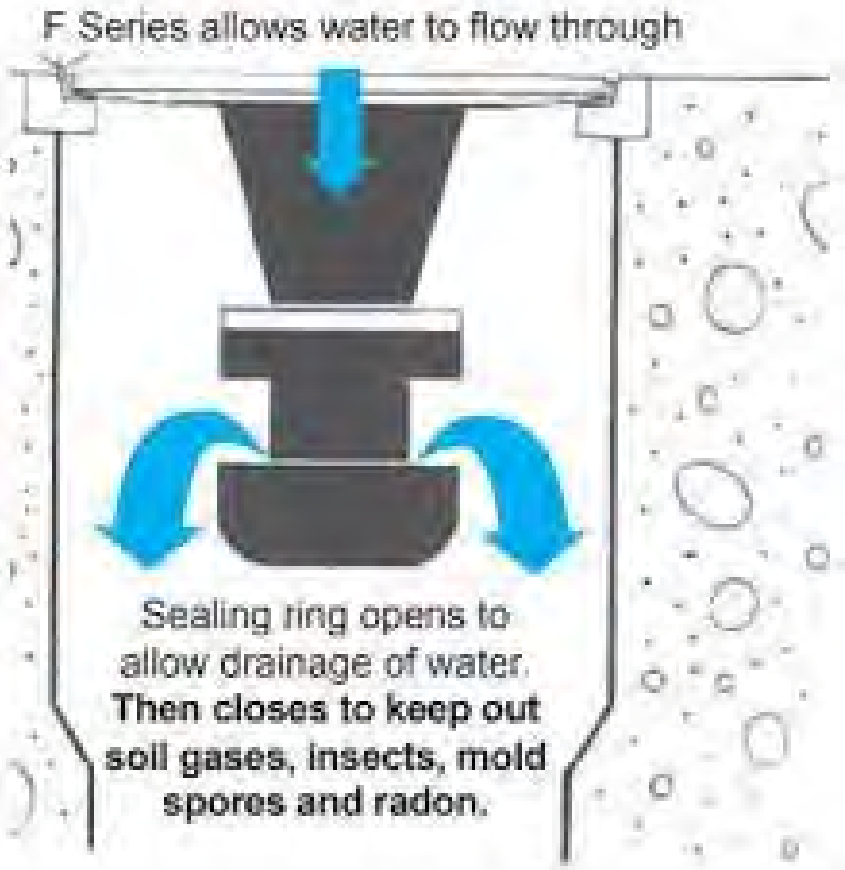


SUCTION PIT CAGES FOR EASY CONSTRUCTION

RadonWest

GAS TIGHT DRAINS





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 o 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 numbe cause of lung cancer in non-smokers.

Radon enters buildings through conti with the ground.

Health Canada recommends every ho 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.

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.

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

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

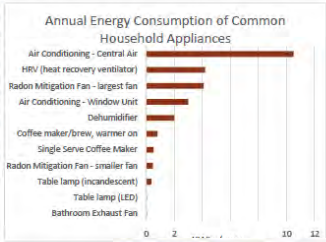
Understanding the **Energy Use of a RADON MITIGATION FAN**

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.



www.c-nrpp.ca
ph: 1-855-677-7222 info@c-nrpp.ca

Homeowner Bulletin:
March 2024

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

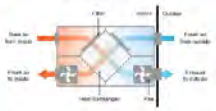
The short answer is yes: if you haven't already tested for radon, it's very important to do so regardless of whether your home has an HRV/ERV. Heat and energy recovery ventilators (HRV/ERV) are systems designed to improve indoor air quality by bringing fresh outdoor air into a home while exhausting stale 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.**

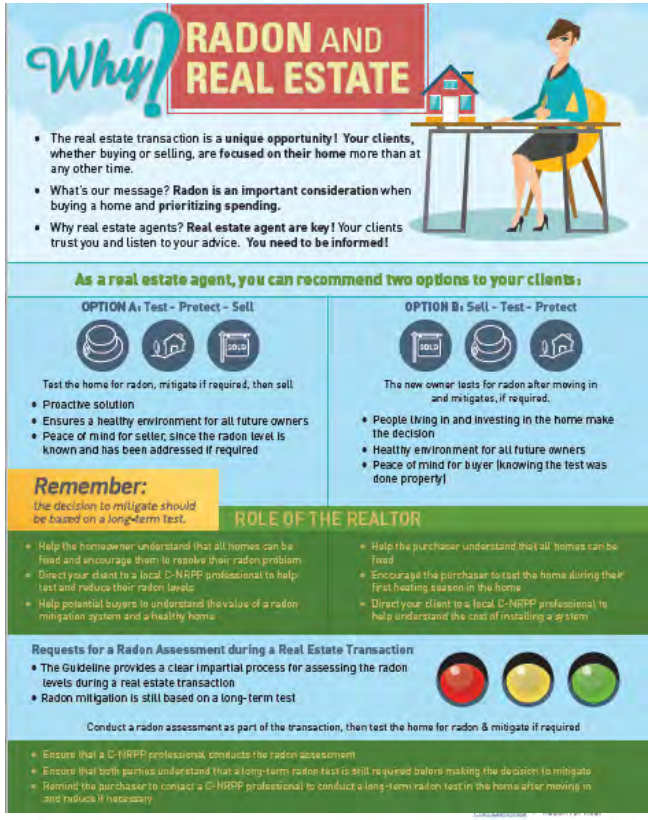
Continual Radon Monitoring and your HRV/ERV

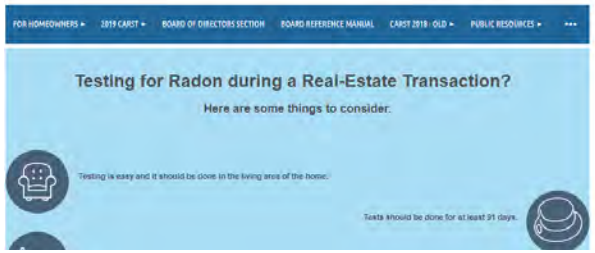
If you are using an HRV or ERV to manage your radon levels, we recommend that you use a digital radon monitor to continually measure your radon levels. If your HRV/ERV starts to become unbalanced, the digital monitor will alert you to increasing radon levels. The digital monitor will also alert you to 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

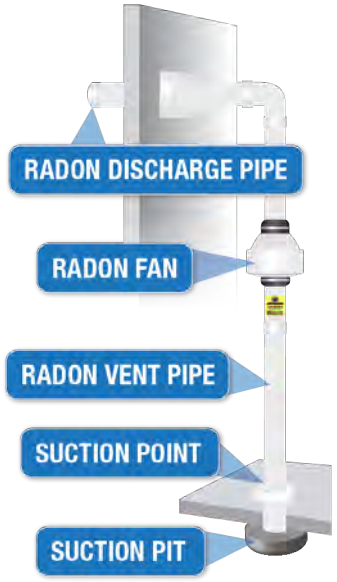
www.c-nrpp.ca
ph: 1-855-722-6777 info@c-nrpp.ca

https://c-nrpp.ca/wp-content/uploads/2021/04/Homeowner-QA-Side-wall-discharge.pdf

RESOURCES







Real Estate information

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

TEST & REDUCE

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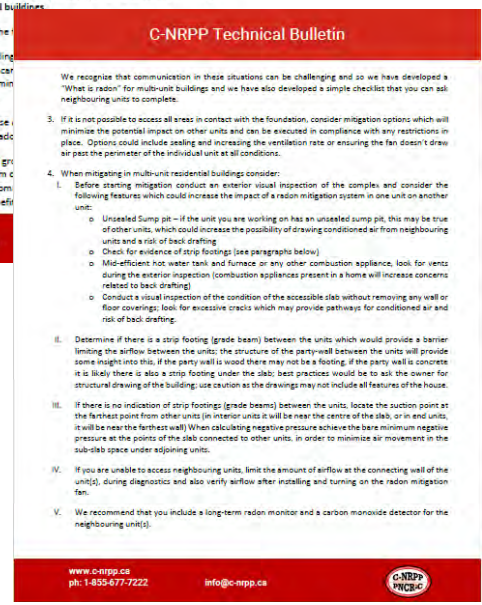
HELPING CANADIANS REDUCE RADON RISK



- Infographic for Landlords and Tenants

Thank you.

Questions, comments?

For more information contact:

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