Canadian Radon Initiatives and New Initiative for Listing Professional and Consumer Grade Devices

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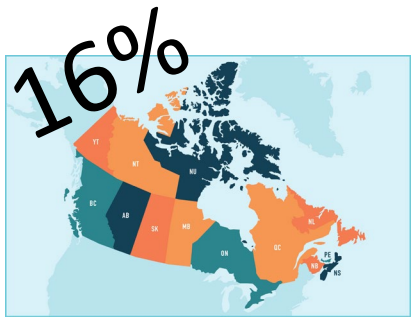
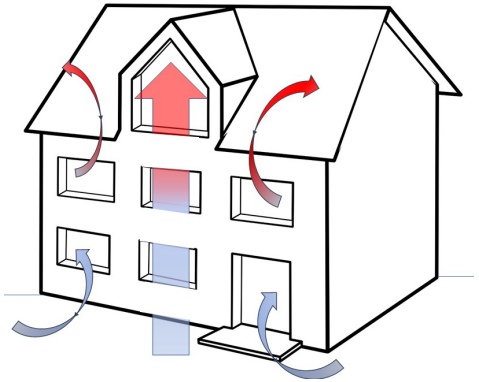


Radon is responsible for 16% of all lung cancers in Canada.

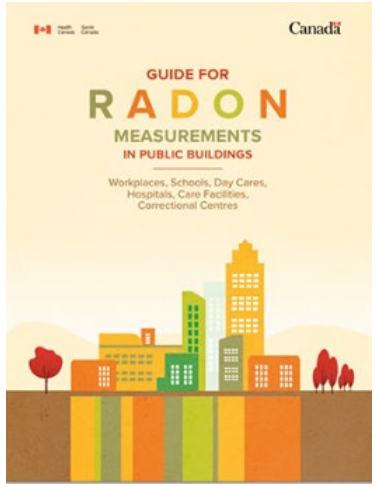
C-NRPP is Canada's National Radon Proficiency Program

Celebrating 10 years of providing certification program to Canadian professionals.



Canadian homes are generally well-sealed and built to resist cold weather. Our radon is usually highest in the winter when radon is drawn in from the soil at a great rate when pressure differences are the highest.

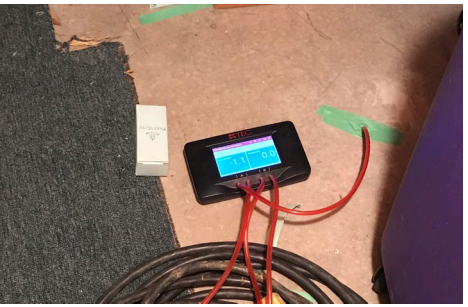
How are we different from the US? - MEASUREMENT

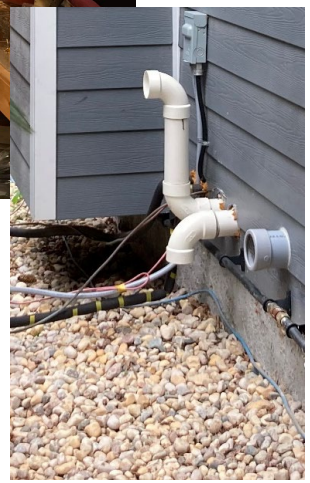


In Canada we recommend that people measure radon for 91 days or more during the heating season.

We use Bq/m^3 to measure radon levels.

How are we different from the US? - MITIGATION



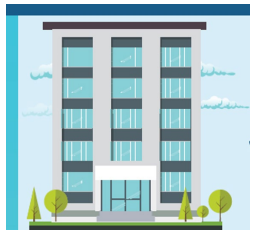


Require proper radon diagnostics and design as part of the installation of our mitigation systems to mitigate the entire footprint of the building.

Our mitigation systems can be vented out the side wall, low to the ground.

Our mitigations are VERY effective in reducing radon levels to low levels – **Average post-mitigation level is 1 pCi/L (39 Bq/m^3)**

UP COMING CHANGES IN CANADA



- The Canadian Labour Code was recently updated mandating federal workplaces to reduce radon levels when found high, to below 200 Bq/m^3. This will be published in the fall of 2024.

- Our National Building Code will be increasing radon control measures to include full passive system.

- Our two CGSB standards on radon mitigation were updated in 2024.
  - CGSB 140.11 Standard for Radon mitigation in new construction – updated August 2024.
  - CGSB 149.12 Standard for Radon mitigation in existing construction – updated September 2024.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PAPER • OPEN ACCESS

A comparison of consumer-grade electronic radon monitors

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

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Published: A Comparison of Consumer-Grade Electronic Radon Monitors

Two consumer-grade electronic radon monitors were recalled through our Government of Canada's product consumer protection.

Consumer Radon Monitor Report

Published Consumer Radon Monitor Report

October 2020

Summer 2021

Conducted intercomparison of Passive detectors and reviewed results with five major alpha track companies.

September 2022

Summer 2023

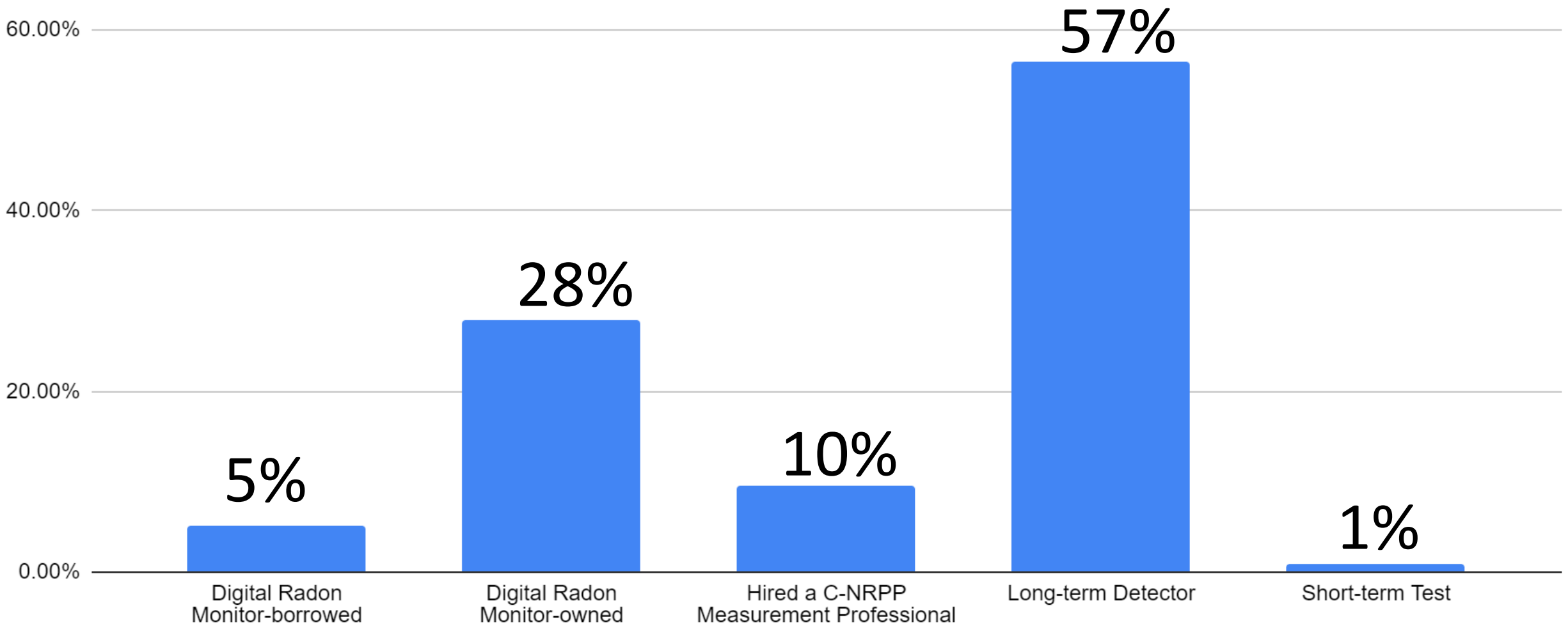
Intercomparison of Consumer-grade, and professional-grade electronic monitors and alphatrack detectors.

November 2023

Summer 2024

C-NRPP'S Device Listing Policy

2023 Radon Reduction Sweepstakes report



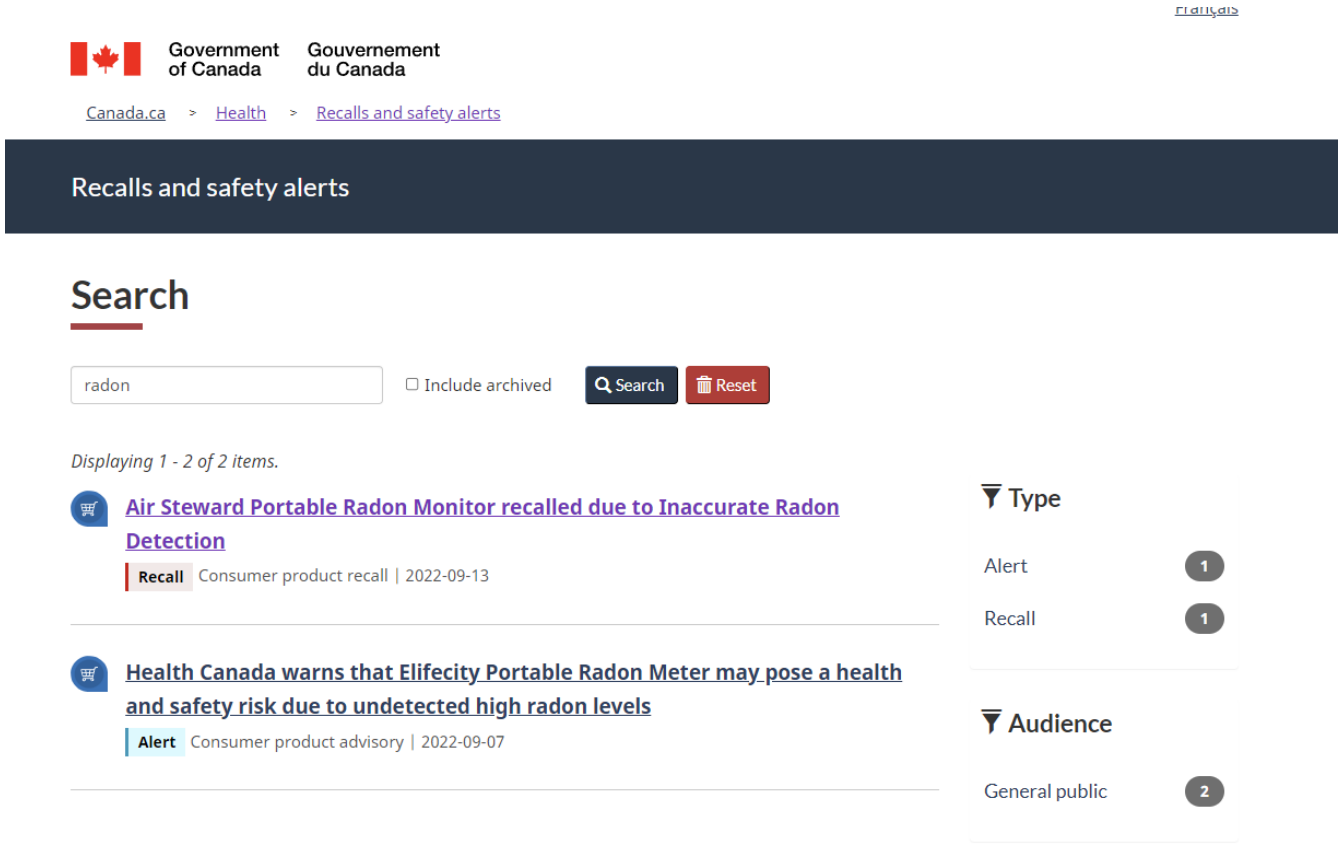
Radon Monitor Lending Programs across Canada

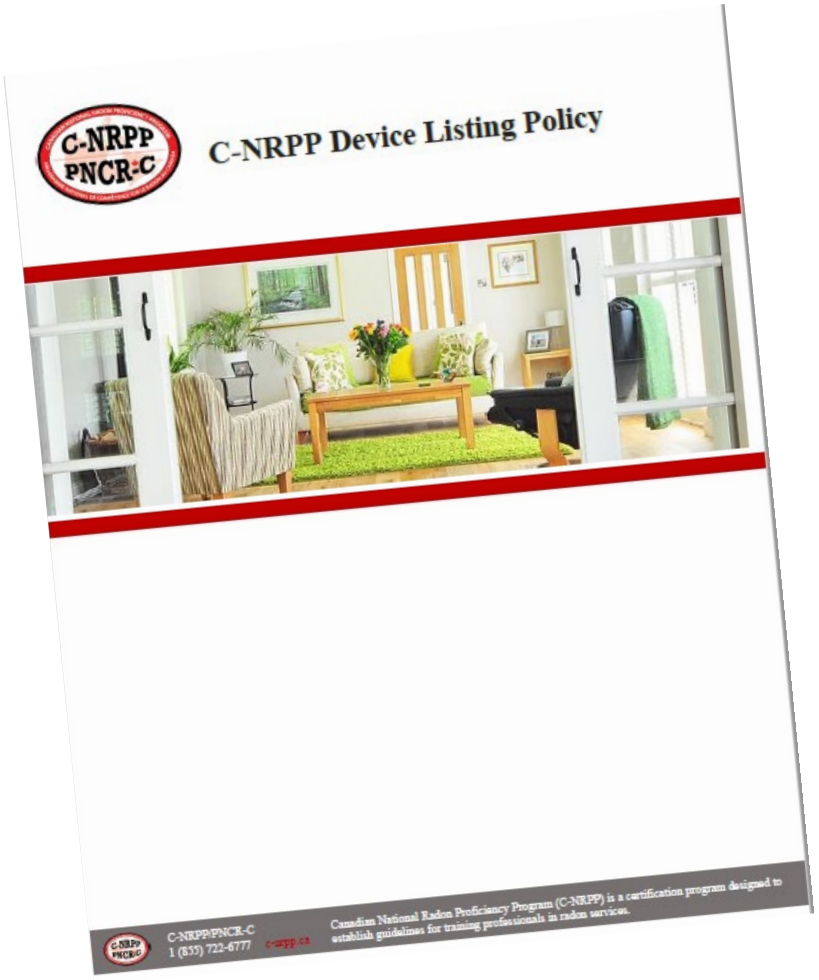
PRODUCT RECALL:

We recommend that you not sell these devices and advise homeowners that they do not accurately measure radon levels.

Currently still only 2 on recall, however we are anticipating another 15 more devices to come.

You can track them on the government of Canada recall website.



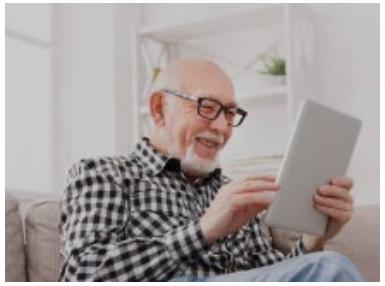


Purpose

The purpose of this policy is to define the process whereby radon measurement devices (both passive and electronic) are evaluated and approved (or listed, in the case of homeowner-grade electronic devices) by the C-NRPP.

The C-NRPP evaluates devices in order to maintain high standards for radon measurement devices in Canada and protect Canadians from faulty devices and poor-quality radon measurements.

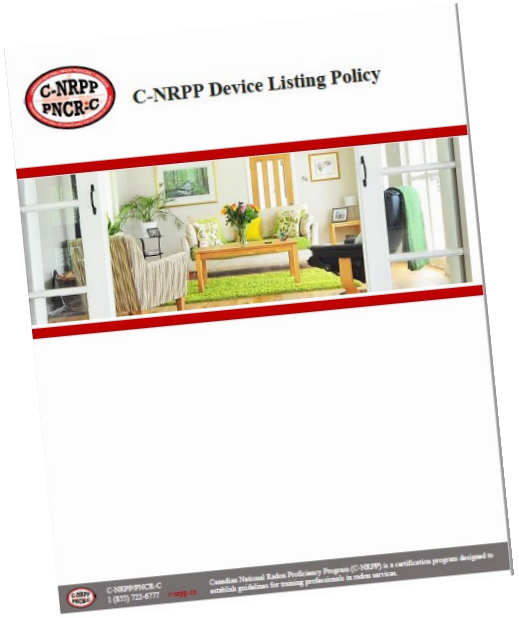
NEW: Definitions



- **Consumer-grade electronic radon monitors (ERM):** Consumer-grade electronic radon monitors
  - Record a series of radon measurements at regular time intervals and record and report the results.
  - Store and displaying radon measurements.
  - Cannot be calibrated by the manufacturer and should have an expiry date.
  - **NOT to be used by C-NRPP certified radon measurement and mitigation professionals to perform radon measurements for clients. C-NRPP professionals may, however, sell these devices for use by homeowners.**

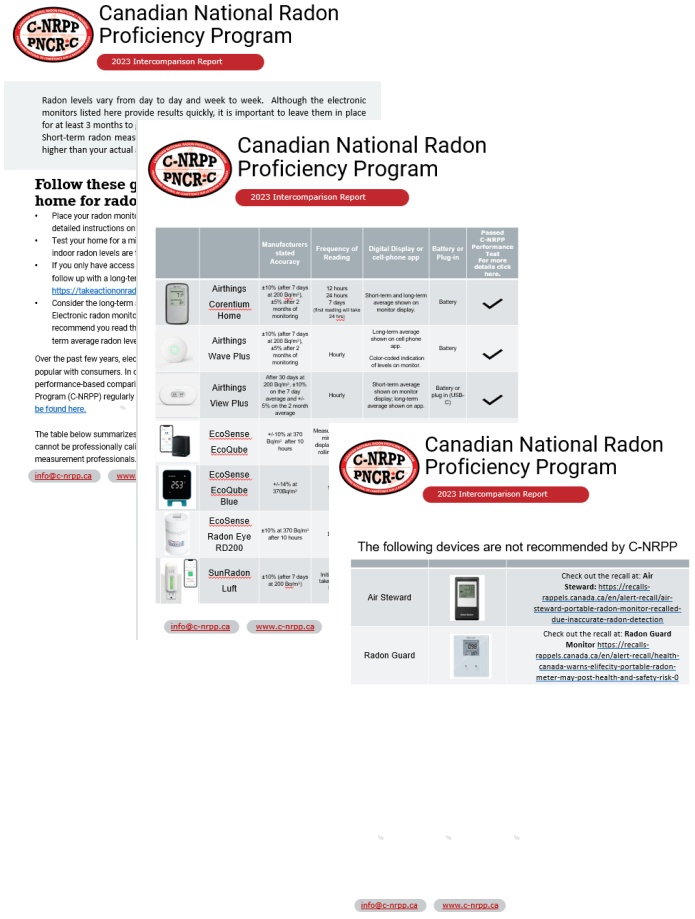
- **Professional-grade electronic radon monitor (Continuous radon monitors or CRM):**
  - Record a series of radon measurements at regular time intervals (hourly or shorter) and record and report the results.
  - Must be capable of storing, displaying, and retrieving the radon measurement data and shall also have the ability to measure and track additional environmental parameters such as temperature, barometric pressure, relative humidity, and motion.
  - Must be calibrated annually by the manufacturer or a manufacturer approved facility.
  - **These devices can be used for short-term or long-term measurements by C-NRPP certified radon measurement and mitigation professionals.**

Listing Requirements: C-NRPP List of Professional Devices



- Details of manufacturer
- Must have at least one C-NRPP Measurement professional
- Details of device to be listed
- Performance testing on device
- Must meet performance requirements of C-NRPP
- Must continue to participate in an annual intercomparison exercise
- Alphatrak and E-Perm labs must maintain C-NRPP certification for Analytical Lab

Listing Requirements: Annual Consumer-grade electronic radon monitor report


Canadian National Radon Proficiency Program

2023 Intercomparison Report

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				
	EcoSense EcoQube Blue	+/-14% at 370Bq/m³				
	EcoSense Radon Eye RD200	±10% at 370 Bq/m³ after 10 hours				
	SunRadon Luft	±10% (after 7 days at 200 Bq/m³)				

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Canadian National Radon Proficiency Program

2023 Intercomparison Report

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-elfecity-portable-radon-meter-may-post-health-and-safety-risk-0

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- Manufacturers can complete the C-NRPP's Intercomparison Project – Intent to participate form and submit devices within required timeframe. The intent to participate form changes each year, contact the C-NRPP office.
- C-NRPP reserves the right to purchase devices and include them in the Intercomparison.
- A device receives a "recommended" status when it achieves a Grade of A or B as part of the intercomparison project.

Number of devices required to participate

Type of Project	Number of Devices
Alpha Track detectors	33 per detector model
Consumer-grade electronic Radon monitors	3 devices per model
Professional-grade electronic radon monitor	3 devices per model

Intercomparison projects are performed in the ***Radiation Safety Institute of Canada National Radon Chamber.***

Exposures: Electronic Radon Monitors

Ambient Levels Check – Institute National Laboratories

a. Radon concentrations: 30-50 Bq/m^3
b. Temperature: 21-22° C
c. Humidity: 20-30% RH
d. Duration: 7 days

During the ambient levels check, measurements will be compared against co-located calibrated C-NRPP approved Professional-grade electronic radon monitor.

This test is only intended as a general check on the operation of the devices.

1. **Round 1 – Radon Chamber**
   a. Radon concentration: 200 Bq/m^3
   b. Temperature: 18-22° C
   c. Humidity: 20-50% RH
   d. Duration: 7 days
2. **Round 2 – Radon Chamber**
   a. Radon concentration: 200 Bq/m^3
   b. Temperature: 30° C
   c. Humidity: 70% RH
   d. Duration: 7 days
3. **Round 3 – Radon Chamber**
   a. Radon concentration: 400 Bq/m^3
   b. Temperature: 18-22° C
   c. Humidity: 20-50% RH
   d. Duration: 7 days
4. **Round 4 – Radon Chamber**
   a. Radon concentration: 1000 Bq/m^3
   b. Temperature: 18-22° C
   c. Humidity: 20-50% RH
   d. Duration: 7 days

Exposures: Passive Detectors

- The radon monitors will be subjected to **three rounds** of test scenarios at various concentrations and exposure durations.
- The target **concentration will be kept confidential**, and the exposure **duration will range from 96 hours to 600 hours**. A radon concentration at or near our guideline level will be included.
- At the end of the exposure, the devices will be removed from the chamber and set in the chambers office **for 24 hrs to allow for off gassing** before being returned to the labs by mail following instructions provided by the lab.
- Each lab will be provided with information on the start and end time and date of the exposure and will be required to provide C-NRPP with a complete report of the calculated radon concentration for each of the devices.

Accuracy – Relative Percent Error between the average radon monitor radon concentration and radon chamber reference radon gas concentration

$$Relative\ Percent\ Error\ (\%) = \frac{(Measured\ Mean - Reference\ Value)}{Reference\ Value} \times 100\%$$

Precision – Relative Standard Deviation for the results measured for each model of individual radon monitor tested

$$Relative\ Standard\ Deviation\ (\%) = \frac{Standard\ Deviation}{Measured\ Mean} \times 100\%$$

Measurement Error

$$Measurement\ Error\ (\%) = \sqrt{(Relative\ Percent\ Error)^2 + (Relative\ Standard\ Deviation)^2}$$

Measurement Error (%)	Performance Grade
≤ 10	A
> 10 and ≤ 20	B
> 20 and ≤ 30	C
> 30 and ≤ 40	D
> 40	E

Results of Intercomparison - Measures of Success

Performance Indicator	Acceptable Range
Accuracy – Relative Performance Error (%)	Less than or equal to 20%
Precision – Relative Standard Deviation (%)	Less than or equal to 20%
Measurement Error (%)	Grade of A or B

Current status:

- No new devices can be added to C-NRPP's listing unless they go through our process
- C-NRPP is conducting the annual intercomparison soon, Passive Devices going in within a couple weeks and electronic devices will be entered after that
- Devices for professional are on our – APPROVED LIST
- Consumer devices are on our – RECOMMENDED LIST

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Winnipeg, November 4-8, 2024

Mississauga, ON - November 25-29, 2024

Kelowna, BC February 3-7, 2025

Sign up now at: www.carst.ca

CANADIAN NATIONAL RADON PROFICIENCY PROGRAM
C-NRPP
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PROGRAMME NATIONAL DE COMPÉTENCE SUR LE RADON AU CANADA

Canadian National Radon Proficiency Program (C-NRPP)

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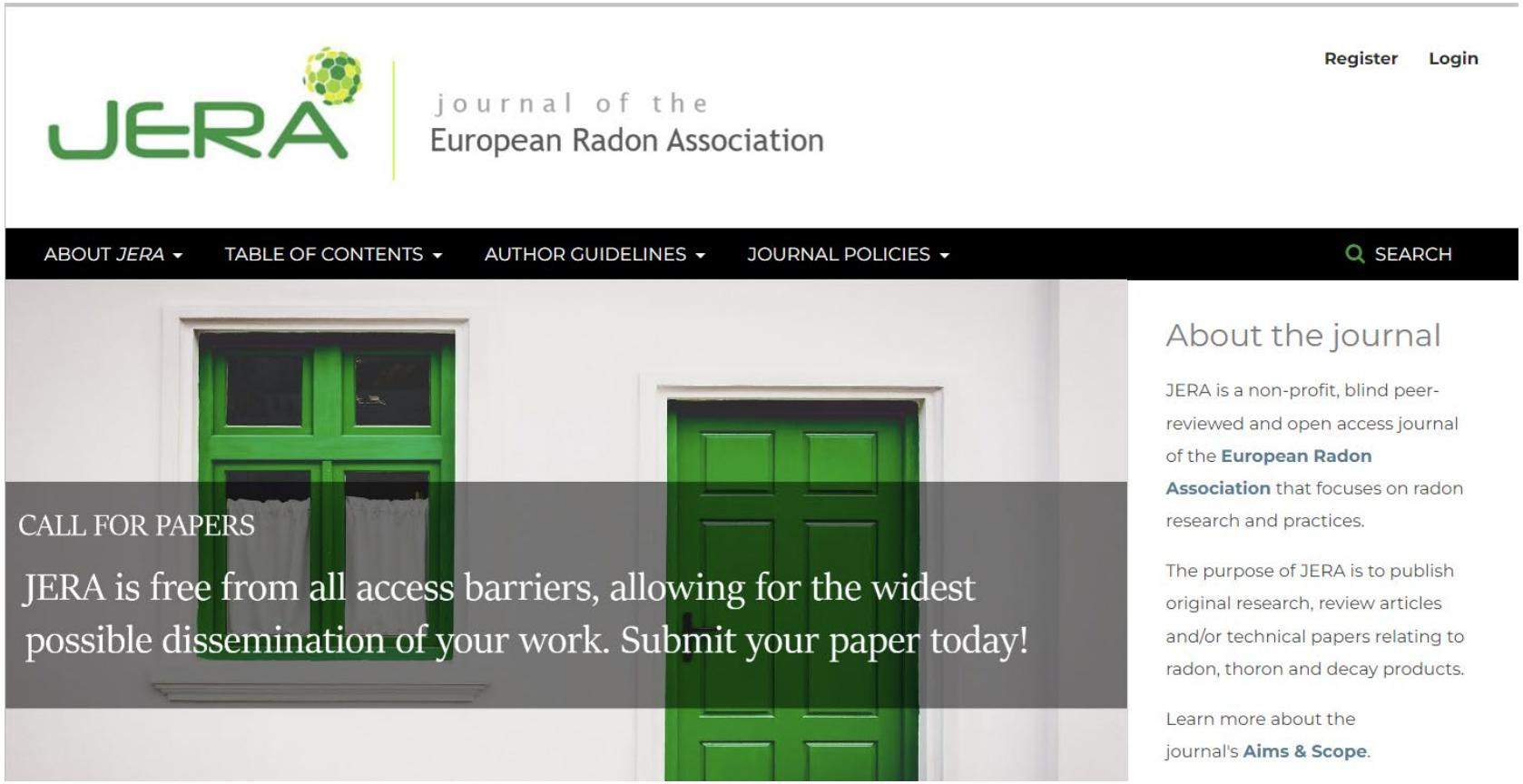
Registration will open in October.

SPONSORSHIP OPPORTUNITIES are now open.

We want you to be part of CARST 2025 in:

Québec city, Québec - April 23-27, 2025!



International InterComparison of Radon 222 Activity Concentration Calibration Facilities

- Melinda Ronca-Battista, Pam Warkentin, Jens Jensen, José - Luis Gutiérrez Villanueva

- COMING SOON TO JERA - https://radonjournal.net/index.php/radon

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