



Canadian National Radon Proficiency Program

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Alpha Track Intercomparison: Summary of Method and Detailed Results

Radon is a radioactive gas which is naturally occurring in soil and can accumulate to concentrated levels in homes and buildings due to the contact of these homes and buildings with the soil and to construction characteristics. Exposure to elevated levels of radon leads to an increased risk of developing lung cancer. Radon enters through a difference in air pressure between the soil beneath the ground and the air pressure inside the building. Radon levels can change as factors affect the balance including use of home, temperatures and weather conditions outside.

In order to provide Canadian consumers with an unbiased performance-based comparison of alpha track radon detectors commonly used in Canada, the Canadian National Radon Proficiency Program (C-NRPP) developed a test procedure and conducted a series of performance tests. This report presents the results of those tests.

Testing of the alpha track radon detectors was performed at the Radiation Safety Institute of Canada (RSIC) National Radon Chamber; a C-NRPP reference radon chamber used for testing radon monitors in Canada. The 12 m³ walk-in radon chamber located in Saskatoon, Saskatchewan, Canada is an approved chamber facility for C-NRPP and is a certified secondary reference radon chamber under the American Association of Radon Scientists and Technologists (AARST) National Radon Proficiency Program (NRPP), certificate number SC 1005.

For this project, C-NRPP reached out to currently listed Alpha Track laboratories and requested that they participate in the project by providing thirty-three of the same model for each of the types of alpha track detectors that they have listed on C-NRPP's list of devices. All the radon detectors were shipped unopened to the Radiation Safety Institute of Canada (RSIC) National Radon Chamber in Saskatoon, Saskatchewan, Canada.

Prior to exposing the passive radon detectors under the testing protocol, RSIC staff inspected the detectors to ensure the packages were properly sealed, and no holes or leaks were observed.

Radon detectors that appear to have packages which were not sealed during the initial inspection would not have been exposed in the radon chamber and the manufacturer would have been contacted to resubmit additional devices in time for the start of the intercomparison. All detectors supplied passed inspection.

The radon detectors were tested using three different sets of equivalent exposures, as summarized below. Batch 1 was exposed to a concentration equivalent to 600 Bq/m³ for 90 days; Batch 2 was exposed to an equivalent concentration of 200 Bq/m³; and Batch 3 was exposed to an equivalent concentration of 100 Bq/m³. The temperature and relative humidity for these three sets of test conditions were meant to approximate typical indoor temperature and humidity levels in Canadian homes during winter. The manufacturers were not told the concentration level prior to analysis, though they were provided the duration of exposure.



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1. Round 1 – Radon Chamber

- a. Radon concentration Equivalent: 100 Bq/m³
- b. Temperature: 24° C
- c. Humidity: 51% RH
- d. Duration: 96 hours

2. Round 2 – Radon Chamber

- a. Radon concentration Equivalent 200 Bq/m³
- b. Temperature: 24° C
- c. Humidity: 49% RH
- d. Duration: 193.5 hour

3. Round 3 – Radon Chamber

- a. Radon concentration: 600 Bq/m³
- b. Temperature: 24° C
- c. Humidity: 44% RH
- d. Duration: 522.6 hours

Once the results were received from each lab the Measurement Error was calculated for each type of detector for each round of testing. Performance Grades were then assigned to each type of detector as per Figure 1, below.

Measurement Error (%)	Performance Grade
≤ 10	A
> 15 and ≤ 20 (>10 and <15)	B (B+)
> 20 and ≤ 30	C
> 30 and ≤ 40	D
> 40	E

Figure 1: Performance Grades

The Performance Grades for all three rounds of testing were then averaged for each type of detector, and the overall Performance Grades were plotted in Figure 2.

All 7 types of Alpha Track detectors that were included in this intercomparison study received passing grades, as illustrated in Figure 2.

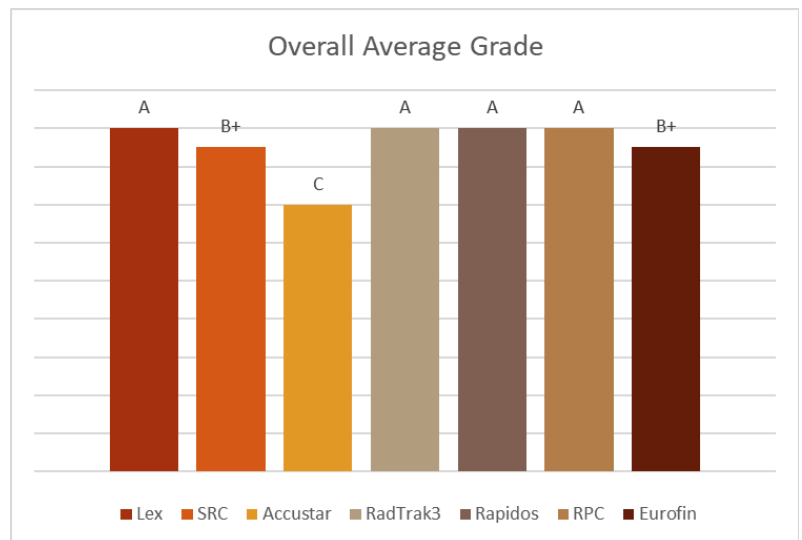


Figure 2: Overall Performance Grades