

PROFICIENCY TESTING FOR THE MEASUREMENT OF INTEGRATED RADON-222 ACTIVITY CONCENTRATION IN AIR

Proficiency testing scheme RNE.AL.LE.25.04

LMR/MOD.21.003 - agg. 5 del 2025-09-23

1. Scope

This document describes the proficiency test for the measurement of integrated radon activity concentration in air. It specifies the type of tested devices, the reference quantity, the exposure conditions, the devices returning timetable, the test scheme and the operating instructions.

The RNE proficiency testing scheme is accredited. The Laboratory is accredited with number PTP n. 00140, issued by ACCREDIA. Accreditation involves the recognition of the technical competence of the Laboratory, in relation to the accredited proficiency testing schemes, and the compliance of its management system with the standard UNI CEI EN ISO/IEC 17043:2010 standard.

2. Definitions

PT	Proficiency testing
LP	Participant laboratory to the PT
CAB	Conformity assessment body, laboratory that carries out the exposures
LMR	Radiation Metrology Laboratory, PT organizer

3. Devices and reference quantity

The proficiency test aims at evaluating the performances of the devices for measurement of “integrated radon-222 activity concentration in air” (exposure, kBq h m^{-3}) at very low levels of exposure. The PT is open to all passive devices, but it is optimised to the SST e LST electrets. The proficiency testing is a RNE scheme and it is accredited, quantitative and simultaneous.

4. Radionuclide, range and exposure

The PT will be carried out in a controlled radon-222 atmosphere:

- Exposure range: from 30 to 300 kBq h m^{-3}
- Number of exposures: 3
- An LP can participate with one or two sets of devices; each group is composed by 3 bags;
- Number of devices for each bag:
 - Track detectors: 12 devices (10 for exposure + 2 transit)
 - Electrets: 7 devices (6 for exposure + 1 transit).
- The devices of each bag will be exposed at different times. At the end of the single exposure, the devices will be closed in a radon proof bag with the corresponding transits. For each exposure, there will be a dedicated bag.

5. Proficiency testing set-up

Every LP will send a set of devices divided in three bags, as defined in paragraph 6 of this document.

LP will receive instructions about shipment of the group to the LMR. Each set will be identified by a univocal code, communicated to the participant together with another code to identify the participant itself.

The exposures will be carried out in the radon chamber of accredited laboratory CAB (n. 00140 – Politecnico di Milano). Sets, stored by the LMR, will be sealed in radon proof bags and kept in a laboratory with constantly monitored environmental conditions (temperature, pressure, and humidity), until returned to the LP.

Within the scheduled dates, the LP must transmit the results, following the instruction for results return.

The confirmation of the results will be asked before their processing.

The LMR will carry out the data analysis, as reported in the document EN_LMR/DOC.21.006, and will prepare a final report.

In addition, the LMR will communicate to the LP their own results through an individual participation report.

6. Operational instructions and terms for participation

The PT can accept up to 30 sets and can take place with a minimum of 6 sets. Each participant can send one or two sets of devices. The application is made through the website <https://www.metrorad.polimi.it/en/> at the page dedicated to the proficiency testing. The PT is confirmed as the minimum number of participants is reached. Confirmation, PT instructions for the shipment and the coding of the devices and information for the payment of the fee, are sent to the accepted participants.

Each group of devices admitted to the test is composed as follows:

- Track detectors (CR-39, LR115, Makrofol): 3 bags of 12 devices each (10 to be exposed + 2 transit);
- Electrets: 3 bags of 7 devices each (6 to be exposed + 1 transit).

The bags are radon-proof bag and properly labelled according to the instruction.

Devices must be already assembled and in the same configuration as the one for the users. If possible, avoid laboratory name labels.

Once the LP receives back the exposed devices, it has to return the results to LMR within the deadlines indicated in the time schedule. Please note that after the confirmation of the transmission, wrong results cannot be modified, even if this may result in failure of the test.

7. Statistical design and evaluation of performance

As reported in the document EN_LMR/DOC.21.006, the score T_j will be calculated for each of the three exposures, using a value of $\hat{\sigma}$ equal to 15% of the reference value, if the exposure level is less than 200 kBq h m⁻³, otherwise it is equal to 10% of the reference value.

Based on the score T_j , the results of the various participants are divided into six categories (from A to F): results from A to C are considered "acceptable", results from D to E are considered "acceptable with reserve" and the results in the range F are considered "Not acceptable".

8. Fee

The participation fee is **1200 euros** (+ VAT) for each set. This fee also includes the shipment of the devices from the LMR to the LP.

9. Criteria for admitting participants

Laboratories willing to participate, can apply through the website <https://www.metrorad.polimi.it/en/>. Once compliance with the requirements in the paragraphs 3 and 4 has been verified, the laboratories will be accepted up to the limit of 30 participants, based on the chronological order of registration.

10. Confidentiality

For confidentiality assurance, a specific identification code (CI) is assigned to the participants. An additional code (CS) is given to each group/set; this code is used also for documents transmission, both to the participant and to the laboratory performing the exposures. A third code (CP) is used for anonymous presentation of the results in the final report. To further guarantee the confidentiality with respect to the personnel involved in the proficiency test, whether belonging to the Politecnico di Milano - Department of Energy, or to external structures, the pairing between CP and CS is known only by the coordinator,

Participants must not disclose these codes to third parties. Politecnico di Milano - LMR is bound to keep confidentiality as well.

The participant must not share information about test results among other participants.

In case of evident collusion (agreement) between/among participants or falsification of the results, the Politecnico di Milano - LMR has the right to exclude from the test the responsible(s) for such behavior.

11. Coordinator

The test coordinator is Prof. Marco Caresana of the Energy Department – Radiation Metrology Laboratory (email: ptp-deng@polimi.it, phone: 02 2399 6336).