

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

Proficiency testing scheme RNE.TD.DL.23.03

LMR/MOD.21.003 - agg. 3 del 2022-05-07

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 0022, 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 standard.

2. Terms

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 measurand

The proficiency test aims at evaluating the performances of the nuclear track detectors for measurement of “integrated radon-222 activity concentration in air” (exposure, kBq h m^{-3}). 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 100 to 2000 kBq h m^{-3}
- Number of exposures: 4
- An LP can participate with only one group of devices; each group is composed by 4 sets;
- Number of devices for each set: 12 devices (10 for exposure + 2 transit);
- The sets 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 group of devices divided in four sets, as defined in the paragraph 6 of this document.

LP will receive instructions about shipment of the group to the LMR. Each group 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 (LAT n. 104 – 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. Number and type of expected participants criteria to be met for participation

The PT can accept up to 25 participants and can take place with a minimum of 10 participants. Each participant can send only one group 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 the 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): 4 sets of 12 devices each (10 to be exposed + 2 transit);

Each set must be sealed in a 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 four exposures, using a value of $\hat{\sigma}$ 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 **1400 euros** (+ VAT) for each participant. 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 paragraph 4 has been verified, the laboratories will be accepted 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).