

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

Proficiency testing scheme RNE.CR.AF.21.01

LMR/MOD.21.01 – rev. 0 del 2021-04-15

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.

2. Terms

LP	Participant laboratory to the LP
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 devices for measurement of “integrated radon-222 activity concentration in air”. The PT is limited to nuclear track devices based on CR-39 plastics and is intended to test the capability of LPs to manage the effects of aging and fading.

4. Radionuclide, range and exposure

The PT is carried out in a controlled Radon-222 atmosphere:

- Exposure range: from 200 to 3000 kBq h m⁻³
- Number of exposures: 6
- An LP can participate with only one group of devices; each group is composed by 6 sets;
- Number of devices for each set: 12 (10 for exposure + 2 transit)
- The sets will be exposed and returned to the participants in different moments within a period of maximum 6 months.

5. Proficiency testing set-up

Every LP will send a group of devices divided in six 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 exposure scheme is the following:

- Four sets are exposed immediately and two sets are stored by the LMR;
- Two out of the four sets exposed immediately are sent back to the LP (1st lot);

- The other two sets of the four exposed immediately are stored by the LMR (2nd lot);
- LP sends the results for the sets belonging to the 1st lot;
- LMR sends an intermediate report with the results of 1st lot;
- Approximately four months later, the CAB exposes the last two sets (3rd lot);
- The four remaining sets (2nd and 3rd lots) are sent back to the LP;
- LP send the results for the four sets belonging to 2nd and 3rd lots.

The exposures are carried out in the radon chamber of accredited laboratory 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).

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.

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 20 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.

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

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

- 6 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.

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 is calculated for each of the six exposures, using a value of $\hat{\sigma}$ equal to 10% of the reference value.

Basing on the score T, 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 1800 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/>. They must comply with all the requirements in paragraph 3 of this document. Once this constraint has been verified, only the registration date and the time criterion will be applied.

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.