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**INDUSTRY STANDARD OF THE
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**Measurement methods for determination of radon in
environmental air**

环境空气中氡的测量方法

(English Translation)

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1 Scope of application

This standard specifies four common measurement methods for radon in ambient air, namely track etching method, activated carbon box method, pulse ionization chamber method, static Electric collection method.

This standard applies to the determination of radon concentration in ambient air, including outdoor and indoor environments.

2 Normative references

This standard refers to the following documents or clauses thereof. For dated references, only the dated version applies to this standard.

For undated references, the latest edition (including all amendments) applies to this standard.

GB/T 8170 Numerical Rounding Rules and Representation and Judgment of Limit Values
GB/T 13163.1 Radiation Protection Instruments Radon and Radon Progeny Measuring Instruments Part 1: General Principles HJ 61 Radiation Environment Monitoring Technical Specification JJG 825 Radon Tester

3 Terms and Definitions

The following terms and definitions apply to this standard.

radon

The isotope ^{222}Rn of the element with atomic number 86 is an intermediate product of the decay of the uranium series. Radon in nature has ^{219}Rn , ^{220}Rn , ^{222}Rn Three isotopes, radon in this standard ambient air only refers to ^{222}Rn .

radon concentration

The radioactive activity of radon per unit volume of air, the SI unit is Bq/m³.

spot measurement

A method of obtaining the concentration value at a certain moment in a relatively short time range.

continuous measurement an uninterrupted measurement that takes place at a certain time interval and can obtain results for each time interval.

integrating measurement an integral measurement made over a specific time period, the result of which is the average concentration over that time period.

standard radon chamber A special sealed radon-containing container can stably and uniformly regulate the radon concentration and related environmental conditions inside it, and control the radon concentration.

Accurately determined value. For the verification or calibration of radon concentration measuring instruments.

Scale calibration

Determine the scale factor (sensitivity) or correction factor of the measuring device given the known radon concentration.

sampling strategy

According to the sampling purpose and environment, select the sampling point location and density, measurement method, and technical principles of sampling or measurement time.

4.1 Purpose of measurement

The purpose of the measurement is to collect enough representative samples to obtain useful measurement results. In actual measurement, the radon concentration in the air will generally be Over time, there may even be an order of magnitude change in some regions. Therefore, it should be based on different measurement purposes and uncertainty requirements.

Seek to choose a sampling strategy and measurement method.

4.2 Sampling strategy

4.2.1

Analyze the historical survey situation of sampling points.

4.2.2

On-site survey (in some cases, preliminary measurements of the survey area can be carried out with the aid of portable radiometric instruments).

4.2.3

Determine the migration path and accumulation area of radon in the survey area.

4.2.4

Carefully investigate the area of the sampling site and select the sampling site and density.

4.2.5

Select measurement methods according to different measurement purposes, see Appendix A for details.

4.2.6

Determine the sampling or measurement time according to the measurement uncertainty requirements. Typical values of each measurement method at different sampling or measurement times See Appendix B for relative standard uncertainty.

4.3 Measurement method

4.3.1

According to the different sampling time, the measurement methods are divided into instantaneous measurement, continuous measurement and cumulative measurement. obtained by different measurement methods the characteristics of the measurement results are shown in Table 1.

4.3.2

According to the different sampling methods, the measurement methods are divided into active measurement and passive measurement.

5.1.1 Method overview

This method is cumulative sampling, and the measurement result is the average concentration of radon during the sampling period. Adopt passive measurement method, if the measurement period is 90 d, the detection limit of this method can reach at least 5 Bq/m³.

5.1.2 Measurement principle

The detector adopts solid nuclear track material (such as Kodak Alpha Film LR-115 or Carbonic Acrylic Acetate CR-39), placed in a certain shape the track-etching radon sampler (hereinafter referred to as "sampler") is composed of the sampling box, as shown in Figure 1.

The radon gas enters the sampling box through the diffusion window. When the alpha particles emitted by radon and its newly decayed daughter bombard the detector, it generates a submerged path.

trace. The detector is chemically or electrochemically etched under certain conditions to expand the damage track, so that a microscope or automatic counting device can be used Make observational statistics or counts. The number of tracks per unit area is proportional to the product of radon concentration and exposure time. Use the scale factor to convert the track density Converted to radon concentration. This method can be used for cumulative measurements.

5.1.3.1 Detectors

Select solid core track materials sensitive to alpha particles, such as LR-115, CR-39, etc.

5.1.3.2 Sampling box

Most of the cavity boxes are made of conductive plastic or metal, and their dimensions should meet the actual measurement requirements.

5.1.3.3 Etching device

Used to etch detectors bombarded by alpha particles to expand damage tracks for measurement by counting devices. Mostly by NaOH or KOH solution for chemical etching or electrochemical etching.

5.1.3.4 Counting device

A device used to read the number of tracks per unit area of the etched detector, generally through an optical magnifying device such as an optical microscope.

number of traces.

5.1.4.1 Sampler Preparation

5.1.4.1.1

Put the detector into the sampling box and fix it to form a sampler.