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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 12128-2026

Replacing GB/T 12128-1989, GB/T 12128.2-1999

**Reference sources for calibration of surface contamination
monitors - Alpha-, beta- and photon emitters
(English Translation)**

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document supersedes GB/T 12128-1989 "Reference Sources beta-Emitters and alpha-Emitters for Calibrating Surface Contamination Monitors" and GB/T 12128.2-1999 Reference sources for calibrating surface contamination monitors - Part 2: Electrons and electrons with energies below 0.15 MeV "Photons with Quantities Below 1.5 MeV", compared with GB/T 12128-1989 and GB/T 12128.2-1999, except for structural adjustments and editorial changes.

Aside from the modifications, the main technical changes are as follows.

a) Activity, instrument efficiency, source efficiency, and traceability (see GB/T 12128-1989 sections 3.1, 3.4, 3.5, and 3.7, GB/T 12128.2-) have been removed.

(3.2, 3.3, 3.5 of 1999)

b) The alpha reference source nuclides ^{230}Th and ^{238}Pu were added, and the beta reference source nuclides ^{99}Tc and ^{60}Co were added (see 5.2.4);

c) The relative uncertainty of the surface emissivity of the alpha reference source in the second-order reference source was changed, and the uncertainty of the energy greater than 1 in the second-order reference source was changed.

The relative uncertainty of the surface emissivity of a 150 keV beta reference source (see 5.3.2, GB/T 12128-1989).

d) The requirement that the distance between the edge of the reference source and the edge of the active region be at least 10 mm has been removed from the dimensional requirements of the reference source (see...).

GB/T 12128.2-1999, 5.2.1.1);

- e) Recommended effective active area values for the reference source have been increased to 100mm x 150mm and 150mm x.200mm (see 5.2.1);
 - f) The gamma-ray energies of the ^{60}Co and ^{137}Cs nuclides were altered (see 5.1, 5.2.4 of GB/T 12128.2-1999);
 - g) The maximum energy of beta reference sources such as $^{90}\text{Sr}/^{90}\text{Y}$ and $^{106}\text{Ru}/^{106}\text{Rh}$ was changed (see 5.2.4, GB/T 12128-1989).
 - h) The unit of half-life of the radioactive source has been changed (see 5.1 and 5.2.4, GB/T 12128.2-1999).
- (5.2.4 of 1989).

This document is modified to adopt ISO 8769:2020 "Radioactivity - Calibration of instruments for monitoring surface contamination of radionuclides emitting alpha, beta and gamma".

"Refer to the standard measurement".

This document has undergone the following structural adjustments compared to ISO 8769:2020.

---Sections 1-5 of Chapter 4 of ISO 8769:2020 correspond to 4.1-4.5 respectively;

---ISO 8769:2020's 6.1, 6.2, and 6.3 correspond to 6.1.1, 6.1.2, 6.2.1, 6.2.2, 6.3.1, and 6.3.2, respectively.

The technical differences between this document and ISO 8769:2020, and the reasons therefor, are as follows.

---Normative references to ISO 12749-2 and IEC 60050-395 (see Chapter 3) have been removed to accommodate my country's technical requirements;

---The terms "source surface" (see 3.2) and "instrument efficiency" (see 3.4) have been removed as they are generic terms and do not require further definition.

---The tracing mechanisms for reference sources at all levels have been modified to adapt to my country's technological conditions (see 4.1, 4.2);

---Added "c) Activity of the source and its uncertainty (this item is not mandatory)" (see 5.2.1) to conform to the current status of domestic measurement.

The following editorial changes have been made to this document.

---The standard title has been changed to "Reference Sources alpha, beta and Photon Emitters for Calibrating Surface Contamination Monitors";

---GB/T 12612 (all parts) has replaced the informative reference ISO 4037 (all parts);

---The references have been adjusted.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed and is under the jurisdiction of the National Nuclear Energy Standardization Technical Committee (SAC/TC58).

1 Scope

This document specifies the nuclides, structural forms, and other characteristics of the planar reference sources (hereinafter referred to as "reference sources") used for calibrating radioactive surface contamination monitors.

Formula, characteristics and technical requirements.

This document applies to the calibration of alpha sources, beta sources, and photon sources with energies not exceeding 1.5 MeV for radioactive surface contamination monitors.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

The number of particles of a given type with a certain energy emitted from the source front surface per unit time.

The thickness of the medium that is equal to the maximum range of the specified particle radiation in a medium composed of homogeneous material.

self-absorption

The source material itself absorbs the radiation it emits.

uncertainty

Based on the information used, a non-negative parameter is used to characterize the dispersion of the measured quantity.

Note: Measurement uncertainty generally consists of several components. Some of these components are classified according to Type A of measurement uncertainty based on the statistical distribution of a series of measurements.

The evaluation is performed using a fixed method (statistical method), and characterized by the experimental standard deviation. Other components can be estimated based on probability assumptions from experience or other information.

The distribution is evaluated using the Type B method (non-statistical method) for assessing measurement uncertainty, and is also characterized by the standard deviation.

uniformity

The consistency of a certain characteristic (expressed as a measured quantity per unit area) across the entire source surface.

4 Reference source quantification traceability

4.1

Reference sources can be divided into primary reference sources, secondary reference sources, and working reference sources, all of which should be periodically adjusted according to the national measurement value transfer system.

calibration.

4.2

Primary reference sources should be directly calibrated by a national standards laboratory, which will provide their surface emissivity. Measurements are typically performed using absolute methods, such as...