BS EN ISO 8769:2022
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BSI Standards Publication

Measurement of radioactivity — Alpha-, beta- and photon emitting radionuclides — Reference measurement standard specifications for the calibration of surface contamination monitors

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National foreword

This British Standard is the UK implementation of EN ISO 8769:2022. It is identical to ISO 8769:2020. It supersedes BS ISO 8769:2016 and BS ISO 8769:2020, which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NCE/2, Radiation protection and measurement.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Measurement of radioactivity - Alpha-, beta- and photon emitting radionuclides - Reference measurement standard specifications for the calibration of surface contamination monitors (ISO 8769:2020)

Mesurage de la radioactivité - Radionucléides émetteurs alpha, bêta et photoniques - Spécifications des étalons de référence pour l'étalonnage des contrôleurs de contamination de surface (ISO 8769:2020)

Bestimmung der Radioaktivität - Alpha-, Beta- und Photonenstrahlung emittierende Radionuklide - Spezifikation von Bezugsnormalen für die Kalibrierung von Oberflächenkontaminationsmonitoren (ISO 8769:2020)

This European Standard was approved by CEN on 18 December 2022.

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European foreword

The text of ISO 8769:2020 has been prepared by Technical Committee ISO/TC 85 "Nuclear energy, nuclear technologies, and radiological protection" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 8769:2022 by Technical Committee CEN/TC 430 "Nuclear energy, nuclear technologies, and radiological protection" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

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Endorsement notice

The text of ISO 8769:2020 has been approved by CEN as EN ISO 8769:2022 without any modification.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy*, Subcommittee SC 2, *Radiological protection*.

This fourth edition cancels and replaces the third edition (ISO 8769:2016), which has been technically revised. The changes compared to the previous edition are as follows:

— In order to maintain consistency with terms described in the International Vocabulary of Metrology or ISO/IEC 17025[16], “reference measurement standard”, “working measurement standard” and “transfer measurement device” were adopted respectively instead of a “reference source”, “working source” and “reference transfer instrument”.

— 5.1 b): “a surface layer of thickness equal to the saturation layer thickness” was modified to “a surface layer of thickness equal to or less than the saturation layer thickness”.

— 5.2.3 and 5.3.3: The statement of “minus its relative standard uncertainty” was removed.

— 5.4.3: Requirement for the re-measurement of uniformity was added as follows; “In case that significant change not due to half-life is found on the re-calibration of surface emission rate, re-measurement of uniformity is required.”

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Radioactive contamination of surfaces can result from spilling, splashing, or leakage from unsealed sources, or breakage or loss of integrity of sealed sources. It can lead to the spread of contamination, loss of quality control and can give rise to the following health hazards:

a) external exposure to parts of the body in proximity to the contaminated surface;

b) internal exposure through incorporation of radioactive material emanating from the surface.

The need for effective monitoring of surface contamination has long been recognized, see Reference [1]. Surface contamination is quantified in terms of activity per unit area, the quantity which is normally used to specify "derived limits", i.e. maximum limits of surface contamination. These limits are based on radiological protection considerations and have been derived from the dose equivalent or intake limits recommended by the International Commission on Radiological Protection (ICRP), see References [2] and [3]. Derived limits are incorporated into numerous national and international regulatory documents which relate specifically to surface contamination monitoring.

The requirement for this document originated from the need for calibration measurement standards in International Standards dealing with the calibration of surface contamination monitors.

While regulatory documents refer to surface contamination in terms of activity per unit area, the response of monitoring instruments is related directly to the radiation emitted from the surface rather than to the activity contained upon or within the surface. Due to variations in the absorptive and scattering properties of real surfaces, it cannot be assumed, in general, that there is a simple, known relationship between surface emission rate and activity. Thus, there emerges a clear need for calibration measurement standards that are specified primarily in terms of surface emission rate, as well as activity. The manner in which these standards are used and the associated calibration protocols vary from country to country[4].

Calibration of an instrument in terms of activity for the types of surfaces that are usually encountered in monitoring situations depends on the following considerations:

— mixture and ratios of radionuclides being monitored;

— their types and abundances of emissions;

— nature of the surface;

— depths and distribution profiles within the surface;

— spectral attenuation dependence of the instrument entrance window;

— distance between the instrument entrance window and the surface.

The derivation of appropriate calibration factors in terms of activity is therefore a highly complex process which is outside the scope of this document. Appropriate guidance on this process is addressed in ISO 7503 (all parts)[5]. However, some estimate of the activity of the calibration measurement standard is required for general radiological safety purposes such as handling, leak testing, shielding, packaging, and transport. This is a generic issue for all radioactive sources regardless of their intended use and is not therefore addressed specifically in this document.

Traceability of calibration measurement standards to International Standards or national standards is established by a system of reference transfer instruments.

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