Second edition
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Nuclear energy — Reference beta-particle radiation —

Part 2: Calibration fundamentals related to basic quantities characterizing the radiation field

Énergie nucléaire — Rayonnement bêta de référence —

Partie 2: Concepts d'étalonnage en relation avec les grandeurs fondamentales caractérisant le champ du rayonnement

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Foreword

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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, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

This second edition of ISO 6980-2 cancels and replaces ISO 6980-2:2004, which has been technically revised. The main changes are the following:

— inclusion of the quantities $H_p(3)$ and $H'(3;\Omega)$;

— inclusion of $^{106}Ru/^{106}Rh$ series 1 sources;

— inclusion of energy-reduced beta-particle fields based on $^{90}Sr/^{90}Y$ sources;

— removal of ^{14}C sources;

— reference to ISO 29661 and its terms and definitions in Clause 3;

— inclusion of correction factors for primary dosimetry based on radiation transport simulations – replacing some of the factors used in the 2004 edition;

— inclusion of a correction factor for primary dosimetry to use the Spencer-Attix theory instead of the Bragg-Gray theory, k_{SA};

— inclusion of a correction factor for the stopping power ratio at different phantom depths, k_{Sta};

— inclusion of a correction factor for the source to chamber distance at different phantom depths, k_{ph};

— use of Chebyshev polynomials with twelve parameters instead of ordinary polynomials with three parameters for the description of transmission functions.

A list of all the parts in the ISO 6980 series can be found on the ISO website.

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.

Introduction

ISO 6980 series covers the production, calibration, and use of beta-particle reference radiation fields for the calibration of dosemeters and dose-rate meters for protection purposes. This document describes the procedures for the determination of absorbed dose rate to a reference depth of tissue from beta particle reference radiation fields. ISO 6980-1 describes methods of production and characterization of the reference radiation. ISO 6980-3 describes procedures for the calibration of dosemeters and dose-rate meters and the determination of their response as a function of beta-particle energy and angle of beta-particle incidence.

For beta particles, the calibration and the determination of the response of dosemeters and dose-rate meters is essentially a three-step process. First, the basic field quantity, absorbed dose to tissue at a depth of 0,07 mm (and optionally also at a depth of 3 mm) in a tissue-equivalent slab geometry is measured at the point of test, using methods described in this document. Then, the appropriate operational quantity is derived by the application of a conversion coefficient that relates the quantity measured (reference absorbed dose) to the selected operational quantity for the selected irradiation geometry. Finally, the reference point of the device under test is placed at the point of test for the calibration and determination of the response of the dosemeter. Depending on the type of dosemeter under test, the irradiation is either carried out on a phantom or free-in-air for personal and area dosemeters, respectively. For individual and area monitoring, this document describes the methods and the conversion coefficients to be used for the determination of the response of dosemeters and dose-rate meters in terms of the ICRU operational quantities, i.e., directional dose equivalent, $H'(0{,}07;\Omega)$ and $H'(3;\Omega)$, as well as personal dose equivalent, $H_p(0{,}07)$ and $H_p(3)$.