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Nuclear energy — Reference beta-particle radiation —

Part 3: Calibration of area and personal dosimeters and the determination of their response as a function of beta radiation energy and angle of incidence

Énergie nucléaire — Rayonnement bêta de référence —

Partie 3: Étalonnage des dosimètres individuels et des dosimètres de zone et détermination de leur réponse en fonction de l'énergie des particules bêta et de l'angle d'incidence du rayonnement bêta



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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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 6980-3 cancels and replaces ISO 6980-3:2006, which has been technically revised. The main changes are the following:

- inclusion of the quantities $H_p(3)$ and $H'(3;\Omega)$;
- inclusion of $^{106}\text{Ru}/^{106}\text{Rh}$ series 1 sources;
- inclusion of energy-reduced beta-particle fields produced by $^{90}\text{Sr}/^{90}\text{Y}$ sources;
- removal of ^{14}C sources;
- reference to ISO 29661 and its terms and definitions in [Clause 3](#).
- inclusion of correction factors for the differentiation between different quantities at the same depth, such as $H_p(0,07)$ and $H'(0,07;\Omega)$ and $H_p(3)$ vs. $H'(3;\Omega)$;
- inclusion of correction factors for the differentiation between different phantoms for the same quantity, such as the slab and rod or slab and cylinder phantom for the quantities $H_p(0,07)$ and $H_p(3)$, respectively;
- addition of many conversion coefficients to Annex C.

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.

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Introduction

ISO 6980 series covers the production, calibration, and use of beta-particle reference radiation fields for the calibration of dosimeters and dose-rate meters for protection purposes. This document describes procedures for the calibration of dosimeters and dose-rate meters and the determination of their response as a function of beta-particle energy and angle of beta-particle incidence. ISO 6980-1 describes the methods of production and characterization of the reference radiation. ISO 6980-2 describes procedures for the determination of absorbed dose rate to a reference depth of tissue from beta particle reference radiation fields.

For beta particles, the calibration and the determination of the response of dosimeters 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 ISO 6980-2. 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 dosimeter. Depending on the type of dosimeter under test, the irradiation is either carried out on a phantom or free-in-air for personal and area dosimeters, 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 dosimeters 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 $H_p(3)$.