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Reference radiation fields for radiation protection — Definitions and fundamental concepts

*Champs de rayonnement de référence pour la radioprotection —
Définitions et concepts fondamentaux*



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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 General	1
3.2 Quantities and conversion coefficients	9
4 Symbols	15
5 Application of the measurement quantities and units	17
5.1 Measurement quantities for area monitoring	17
5.2 Measurement quantities for individual monitoring	18
5.3 Establishing of the measurement quantities for area and individual monitoring	18
6 Calibration and determination of the response in reference radiation fields	18
6.1 General principles	18
6.2 Calibration in reference radiation fields	19
6.3 Determination of the response in reference radiation fields	21
6.4 Methods for the determination of the calibration coefficient	22
6.5 Special considerations for area dosimeters (area survey meters)	25
6.6 Special considerations for personal dosimeters	26
7 Uncertainty	29
8 Certificates	29
Annex A (normative) List of reference conditions and standard test conditions	30
Annex B (normative) Description of the calibration coefficient	31
Bibliography	33

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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.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 29661 was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

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Introduction

International Standards ISO 4037, ISO 6980, ISO 8529 and ISO 12789^{[1]...[12]}, with focus on photon, beta and neutron reference radiation fields, are each divided into several parts: one part gives the methods of production and characterization of reference radiation fields, and others describe the dosimetry of the reference radiation qualities and the procedures for calibrating and determining the response of dosimeters and doserate meters in terms of the operational quantities of the International Commission on Radiation Units and Measurements (ICRU)^{[25] [26] [27] [28] [31]}.

The subject of these four International Standards is the same; they differ only in the kind of radiation each addresses. Their terms and definitions, and most of the descriptions of methods and procedures given are basically the same — whatever the radiation. Nevertheless, they do differ, more or less, from one to the other in detail. This International Standard brings together terms and definitions and fundamental concepts common to all of them. Thus, it serves to harmonize International Standards on radiation protection.

Besides definitions relating to calibration primary quantities, the operational quantities for area and individual monitoring are specified. For area monitoring, the operational quantities are ambient dose equivalent, $H^*(10)$, directional dose equivalents, $H'(0,07,\vec{\Omega})$ and $H'(3,\vec{\Omega})$, and the appropriate dose rates. For individual monitoring using personal dosimeters, the dose equivalent quantities, $H_p(10)$, $H_p(0,07)$ and $H_p(3)$, and the respective dose rates are available.

The method used to represent these operational quantities is the following. First, a basic (primary) quantity, such as air kerma free-in-air, fluence or absorbed dose to soft tissue, is measured. Then the appropriate operational quantity is derived by the application of the conversion coefficient that relates the basic (primary) quantity to the selected operational quantity. The procedure for the calibration and the determination of the response of radiation protection dosimeters is described in general terms. Depending on the type of dosimeter under test, the position of the reference point is specified differently and the irradiation is either carried out on a phantom (for personal dosimeters) or free in air (for area dosimeters or area survey meters).

With the publication of this International Standard, it is intended that ISO 4037, ISO 6980, ISO 8529 and ISO 12789 be revised successively for further harmonization since, among other aspects, certain of their definitions differ from those published here and the symbols chosen for this International Standard are more consistent with ICRU reports and other International Standards used for radiation protection purposes.