Norma Española

UNE-EN ISO 28057:2018

Idioma: Inglés

Dosimetría con detectores de termoluminiscencia sólidos para fotón y radiaciones de electrones en radioterapia (ISO 28057:2014) (Ratificada por la Asociación Española de Normalización en noviembre de 2018.)

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Dosimetry with solid thermoluminescence detectors for photon and electron radiations in radiotherapy (ISO 28057:2014) (Endorsed by Asociación Española de Normalización in November of 2018.)

Dosimétrie avec détecteurs de thermolumiscence solides pour le photon et rayonnements d'électron en radiothérapie (ISO 28057:2014) (Entérinée par l'Asociación Española de Normalización en novembre 2018.)

En cumplimiento del punto 11.2.5.4 de las Reglas Internas de CEN/CENELEC Parte 2, se ha otorgado el rango de documento normativo español UNE al documento normativo europeo EN ISO 28057:2018 (Fecha de disponibilidad 2018-09-26)

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La correspondiente versión oficial de este documento se encuentra disponible en la Asociación Española de Normalización (Génova 6 28004 MADRID, www.une.org).

Las observaciones a este documento han de dirigirse a:

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EUROPEAN STANDARD
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EN ISO 28057

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English Version

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Dosimétrie avec détecteurs de thermolumiscence solides pour le photon et rayonnements d'électron en radiothérapie (ISO 28057:2014)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

The text of ISO 28057:2014 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 28057:2018 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of an identical text or by endorsement, at the latest by March 2019, and conflicting national standards shall be withdrawn at the latest by March 2019.

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Endorsement notice

The text of ISO 28057:2014 has been approved by CEN as EN ISO 28057:2018 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. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: http://www.iso.org/iso/home/standards_development/resources-for-technical-work/foreword.htm

Introduction

The thermoluminescence dosimetry (TLD) with lithium fluoride (LiF) detectors has several advantages, in particular:

— small volumes of the detectors;

— applicability to continuous and pulsed radiation;

— fair water equivalency of the detector material;

— few correction factors needed for absorbed dose determinations.

The main disadvantage of thermoluminescence (TL) detectors is, however, that they have to be regenerated by a pre-irradiation annealing procedure. Unfortunately, it is not possible to restore the former response of the detectors perfectly by this annealing. Provided, however, that all detectors of a production batch always undergo the same thermal treatment, one can at least determine the mean alteration of the response of these detectors, with sufficiently small fluctuations of the individual values. From this mean alteration, a correction factor can be derived.

The essential aim of this International Standard is to specify the procedures and to carry out corrections which allow one to achieve (1) a repeatability of the indicated value within a fraction of a percent[17] and thus, (2) a total uncertainty of measurement (including the calibration steps tracing to the primary standards) of a few percent, as in ionization chamber dosimetry.[18][31][25][61][62]

The specifications in this International Standard comprise special terms used in TLD, rules for the measurement technique, and requirements for the measurement system. The defined requirements and the testing techniques can, in whole or in part, serve as a basis for stability checks and acceptance tests. The TLD procedures described in this International Standard can be used for photon radiation within the energy range from 20 keV to 50 MeV, including photon brachytherapy, and for electron radiation within the energy range from 4 MeV to 25 MeV, excluding beta radiation brachytherapy. In order to achieve the repeatability and total uncertainty stated above, this International Standard is applicable in the dose range above 1 mGy. The upper limit of the minimum measuring range is in the order of magnitude of 10 Gy to 100 Gy. In clinical dosimetry, TL detectors are applied taking into account the requirements of high spatial resolution, i.e. in the study of the dose distributions with high gradients occurring in small stereotactic radiation fields and around brachytherapy sources. The other common application is the measurement of dose distributions in large absorbers, e.g. geometrical or tissue equivalent phantoms, either within the radiation field or in its periphery. A further usage is the quality assurance of clinical dosimetry by postal dose intercomparison.[1][2][10][12][20][22][26][27][55]

The role of this International Standard is not to anticipate national or international codes of practice in clinical dosimetry, neither for external beam therapy, brachytherapy, whole-body irradiation, mammography, nor dose measurements outside the treatment field or radiation protection of the staff. The authors of this International Standard are well aware of the wide spectrum of the methods of clinical dosimetry, in which TL dosimetry is merely occupying a small sector. But within this framework, this International Standard provides reliable concepts and rules for good practice for the application of TLD methods. The items covered include the terms and definitions, the rules for TLD measurement procedures, and the requirements for the TLD system; this International Standard also addresses medical physicists and instrument producers. Notably, the numerical examples given are valid for the TL detector materials and products stated in the publications referred to, and tests may be necessary to check whether they apply to TLD materials of other producers. The practical examples given, e.g. for the TL probe calibration conditions and for the numerical values of correction factor, k_Q, accounting for the dependence of the detector response on radiation quality, Q, are not conceived to be preemptive in relation to more general standards of the methods of clinical dosimetry or of dose intercomparisons. Rather, this International Standard provides access to the reliable application of TLD methods based upon the published results of worldwide development. The long-standing experience in the clinical usage of TLD, expressed in a set of valuable textbooks, protocols, and recommendations,[6][13][25][28][29][42][43][61][62][54] has been accounted for.