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Electrical insulating materials - Determination of the effects of ionizing radiation - Part 1: Radiation interaction and dosimetry

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Matériaux isolants électriques - Détermination des effets des rayonnements ionisants - Partie 1: Interaction des rayonnements et dosimétrie

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(IEC 60544-1:2013)

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Elektroisolierstoffe - Bestimmung der Wirkung ionisierender Strahlung - Teil 1: Einfluss der Strahlenwirkung und Dosimetrie (IEC 60544-1:2013)

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Foreword

The text of document 112/254/FDIS, future edition 3 of IEC 60544-1, prepared by IEC TC 112 "Evaluation and qualification of electrical insulating materials and systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60544-1:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-05-01
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-08-01

This document supersedes EN 60544-1:1994.

EN 60544-1:2013 includes the following significant technical changes with respect to EN 60544-1:1994:

a) recent advances in simulation methods of radiation interaction with different matter enables the prediction of the energy-deposition profile in matter and design the irradiation procedure;

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ISO 11137 series NOTE Harmonised in EN ISO 11137 series.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60544-2	-	Electrical insulating materials - Determination of the effects of ionizing radiation on insulating materials - Part 2: Procedures for irradiation and test	EN 60544-2	-
IEC 60544-4	-	Electrical insulating materials - Determination of the effects of ionizing radiation - Part 4: Classification system for service in radiation environments	EN 60544-4	-

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Matériaux isolants électriques – Détermination des effets des rayonnements ionisants – Partie 1: Interaction des rayonnements et dosimétrie

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSULATING MATERIALS – DETERMINATION OF THE EFFECTS OF IONIZING RADIATION –

Part 1: Radiation interaction and dosimetry

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International Standard IEC 60544-1 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems.

This third edition cancels and replaces the second edition published in 1994 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) recent advances in simulation methods of radiation interaction with different matter enables the prediction of the energy-deposition profile in matter and design the irradiation procedure;

b) many new dosimetry systems have become available.

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The text of this standard is based on the following documents:

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112/254/FDIS	112/262/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60544 series, published under the general title *Electrical insulating materials – Determination of the effects of ionizing radiation*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

The establishment of suitable criteria for the evaluation of the radiation resistance of insulating materials is very complex, since such criteria depend upon the conditions under which the materials are used. For instance, if an insulated cable is flexed during a refuelling operation in a reactor, the service life will be that time during which the cable receives a radiation dose sufficient to reduce to a specified value one or more of the relevant mechanical properties. Temperature of operation, composition of the surrounding atmosphere and the time interval during which the total dose is received (dose rate or flux) are important factors which also determine the rate and mechanisms of chemical changes. In some applications, temporary changes may be the limiting factor.

Given this, it becomes necessary to define the radiation fields in which materials are exposed and the radiation dose subsequently absorbed by the material. It is also necessary to establish procedures for testing the mechanical and electrical properties of materials which will define the radiation degradation and link those properties with application requirements in order to provide an appropriate classification system.

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