Electrical insulating materials - Thermal endurance properties - Part 3: Instructions for calculating thermal endurance characteristics

Electrical insulating materials - Thermal endurance properties Part 3: Instructions for calculating thermal endurance characteristics

EESTI STANDARDIKESKUS

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60216-3:2006 sisaldab Euroopa standardi EN 60216-3:2006 ingliskeelset teksti. Käesolev dokument on jõustatud 22.09.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 60216-3:2006 consists of the English text of the European standard EN 60216-3:2006. This document is endorsed on 22.09.2006 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This part of IEC 60216 specifies the calculation procedures to be used for deriving thermal endurance characteristics from experimental data obtained in accordance with the instructions of IEC 60216-1 and IEC 60216-2, using fixed ageing temperatures and variable ageing times.	**Scope:** This part of IEC 60216 specifies the calculation procedures to be used for deriving thermal endurance characteristics from experimental data obtained in accordance with the instructions of IEC 60216-1 and IEC 60216-2, using fixed ageing temperatures and variable ageing times.

ICS 17.220.99, 19.020, 29.035.01

Võtmesõnad: ele, electrical insulating m, guide books, insulating materials, long-time behaviour, mathematical calculations, properties, ratings, statistical analysis, statistical methods of analysis, thermal properties of materials, thermal stability, thermodynamic pr

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60216-3

July 2006

ICS 17.220.99; 19.020; 29.035.01

Supersedes EN 60216-3:2002

English version

Electrical insulating materials - Thermal endurance properties Part 3: Instructions for calculating thermal endurance characteristics

(IEC 60216-3:2006)

Matériaux isolants électriques - Propriétés d'endurance thermique Partie 3: Instructions pour le calcul des caractéristiques d'endurance thermique (CEI 60216-3:2006)

Elektroisolierstoffe – Eigenschaften hinsichtlich des thermischen Langzeitverhaltens Teil 3: Anweisungen zur Berechnung thermischer Langzeitkennwerte (IEC 60216-3:2006)

This European Standard was approved by CENELEC on 2006-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 60216-3:2006 E

Foreword

The text of document 112/26/FDIS, future edition 2 of IEC 60216-3, prepared by IEC TC 112, Evaluation and qualification of electrical insulating materials and systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60216-3 on 2006-06-01.

This European Standard supersedes EN 60216-3:2002.

The major technical changes with regard to EN 60216-3:2002 concern an updating of Table C.2. In addition, the scope has been extended to cover a greater range of data characteristics, particularly with regard to incomplete data, as often obtained from proof test criteria. The greater flexibility of use should lead to more efficient employment of the time available for ageing purposes. Finally, the procedures specified in this part of EN 60216 have been extensively tested and have been used to calculate results from a large body of experimental data obtained in accordance with other parts of the standard. Annex E 'Computer program' has been completely reworked.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2007-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-06-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60216-3:2006 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60216-5 NOTE Harmonized as EN 60216-5:2003 (not modified).

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. 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 60216-1	2001	Electrical insulating materials - Properties of thermal endurance Part 1: Ageing procedures and evaluation of test results	EN 60216-1	2001
IEC 60216-2	2005	Electrical insulating materials - Thermal endurance properties Part 2: Determination of thermal endurance properties of electrical insulating materials - Choice of test criteria	EN 60216-2	2005
IEC 60493-1	1974	Guide for the statistical analysis of ageing test data Part 1: Methods based on mean values of normally distributed test results	-	-

INTERNATIONAL STANDARD

IEC 60216-3

Second edition
2006-04

**Electrical insulating materials –
Thermal endurance properties –**

**Part 3:
Instructions for calculating thermal endurance characteristics**

Reference number
IEC 60216-3:2006(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site (www.iec.ch)**

- **Catalogue of IEC publications**

  The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

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INTERNATIONAL STANDARD

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Electrical insulating materials – Thermal endurance properties –

Part 3: Instructions for calculating thermal endurance characteristics

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE X

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

Part 3: Instructions for calculating thermal endurance characteristics

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60216-3 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems[1].

This second edition of IEC 60216-3 cancels and replaces the first edition, published in 2002, and constitutes a technical revision.

The major technical changes with regard to the first edition concern an updating of Table C.2. In addition, the scope has been extended to cover a greater range of data characteristics, particularly with regard to incomplete data, as often obtained from proof test criteria. The greater flexibility of use should lead to more efficient employment of the time available for ageing purposes. Finally, the procedures specified in this part of IEC 60216 have been extensively tested and have been used to calculate results from a large body of experimental data obtained in accordance with other parts of the standard. Annex E "Computer program" has been completely reworked.

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[1] Provisional title: IEC technical committee 112 has been formed out of a merger between subcommittee 15E and technical committee 98.

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

FDIS	Report on voting
112/26/FDIS	112/29/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.

IEC 60216 consists of the following parts, under the general title *Electrical insulating materials – Thermal endurance properties* [2]*:*

Part 1: Ageing procedures and evaluation of test results

Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria

Part 3: Instructions for calculating thermal endurance characteristics

Part 4: Ageing ovens

Part 5: Determination of relative thermal endurance index (RTE) of an insulating material

Part 6: Determination of thermal endurance indices (TI and RTE) of an insulating material using the fixed time frame method

NOTE This series may be extended. For revisions and new parts, see the current catalogue of IEC publications for an up-to-date list.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A CD-ROM containing the computer program and data files referred to in Annex E is affixed to the back cover of this publication.

A bilingual version of this publication may be issued at a later date.

2 Titles of existing parts in this series will be updated at the time of their next revision.

ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

Part 3: Instructions for calculating thermal endurance characteristics

1 Scope

This part of IEC 60216 specifies the calculation procedures to be used for deriving thermal endurance characteristics from experimental data obtained in accordance with the instructions of IEC 60216-1 and IEC 60216-2, using fixed ageing temperatures and variable ageing times.

The experimental data may be obtained using non-destructive, destructive or proof tests. Data obtained from non-destructive or proof tests may be incomplete, in that measurement of times taken to reach the endpoint may have been terminated at some point after the median time but before all specimens have reached end-point.

The procedures are illustrated by worked examples, and suitable computer programs are recommended to facilitate the calculations.

2 Normative references

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

IEC 60216-1:2001, *Electrical insulating materials – Properties of thermal endurance – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-2:2005, *Electrical insulating materials – Properties of thermal endurance – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

IEC 60493-1:1974, *Guide for the statistical analysis of ageing test data – Part 1: Methods based on mean values of normally distributed test results*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following definitions apply.

3.1.1
ordered data
group of data arranged in sequence so that in the appropriate direction through the sequence each member is greater than, or equal to, its predecessor

NOTE 1 In this standard, ascending order implies that the data is ordered in this way, the first being the smallest.

NOTE 2 It has been established that the term “group” is used in the theoretical statistics literature to represent a subset of the whole data set. The group comprises those data having the same value of one of the parameters of the set (e.g. ageing temperature). A group may itself comprise a number of sub-groups characterised by another parameter (e.g. time in the case of destructive tests).