BS EN IEC 60216-6:2022

BSI Standards Publication

Electrical insulating materials — Thermal endurance properties

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

bsi.

National foreword

This British Standard is the UK implementation of EN 60216-6:2023. It is identical to IEC 60216-6:2022. It supersedes BS EN 60216-6:2006, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/112, Evaluation and qualification of electrical insulating materials and systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. Therefore Annex ZA/ZZ in the European text, and references to EU legislation, are still valid for this market.

UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

Published by BSI Standards Limited 2023

ISBN 978 0 580 51394 7

ICS 17.220.99; 29.035.01

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2023.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60216-6

January 2023

ICS 17.220.99; 29.035.01

Supersedes EN 60216-6:2006

English Version

Electrical insulating materials - Thermal endurance properties - Part 6: Determination of thermal endurance indices (TI and RTI) of an insulating material using the fixed time frame method (IEC 60216-6:2022)

Matériaux isolants électriques - Propriétés d'endurance thermique - Partie 6: Détermination des indices d'endurance thermique (IT et ITR) d'un matériau isolant en utilisant la méthode de trame de durées fixes (IEC 60216-6:2022)

Elektroisolierstoffe - Eigenschaften hinsichtlich des thermischen Langzeitverhaltens - Teil 6: Bestimmung der thermischen Langzeitkennwerte (TI und RTI) eines Isolierstoffes unter Anwendung des Festzeitrahmenverfahrens (IEC 60216-6:2022)

This European Standard was approved by CENELEC on 2023-01-02. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 112/583/FDIS, future edition 3 of IEC 60216-6, 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 IEC 60216-6:2023.

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) 2023-10-02
•	latest date by which the national standards conflicting with the document have to be withdrawn	(dow) 2026-01-02

This document supersedes EN 60216-6:2006 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60216-6:2022 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60212	-	Standard conditions for use prior to and during the testing of solid electrical insulating materials	EN 60212	-
IEC 60216-1	2013	Electrical insulating materials - Thermal endurance properties - Part 1: Ageing procedures and evaluation of test results	EN 60216-1	2013
IEC 60216-2	-	Electrical insulating materials - Thermal endurance properties - Part 2: Determination of thermal endurance properties of electrical insulating materials - Choice of test criteria	EN 60216-2	-
IEC 60216-3	2021	Electrical insulating materials - Thermal endurance properties - Part 3: Instructions for calculating thermal endurance characteristics	EN IEC 60216-3	2021
IEC 60216-4-1	-	Electrical insulating materials - Thermal endurance properties - Part 4-1: Ageing ovens - Single-chamber ovens	EN 60216-4-1	-
IEC 60216-4-2	-	Electrical insulating materials - Thermal endurance properties - Part 4-2: Ageing ovens - Precision ovens for use up to 300 °C	EN 60216-4-2	-
IEC 60216-4-3	-	Electrical insulating materials - Thermal endurance properties - Part 4-3: Ageing ovens - Multi-chamber ovens	EN 60216-4-3	-
IEC 60216-5	2022	Electrical insulating materials - Thermal endurance properties - Part 5: Determination of relative temperature index (RTI) of an insulating material	EN 60216-5	2022
IEC 60493-1	-	Guide for the statistical analysis of ageing test data - Part 1: Methods based on mean values of normally distributed test results	-	-

IEC 60216-6

Edition 3.0 2022-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Electrical insulating materials – Thermal endurance properties – Part 6: Determination of thermal endurance indices (TI and RTI) of an insulating material using the fixed time frame method

Matériaux isolants électriques – Propriétés d'endurance thermique – Partie 6: Détermination des indices d'endurance thermique (IT et ITR) d'un matériau isolant en utilisant la méthode de trame de durées fixes

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 17.220.99; 29.035.01

ISBN 978-2-8322-6022-7

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

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

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60216-6 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems. It is an International Standard.

This second edition cancels and replaces the first edition published in 2003. This edition constitutes a technical revision.

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

a) clarification of definition of index properties vs. endurance properties;
b) complete rework of Annex G and the corresponding program.

The text of this International Standard is based on the following documents:

Draft	Report on voting
112/583/FDIS	112/589/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 60216 series, published under the general title *Electrical insulating materials – Thermal endurance properties*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

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

1 Scope

This part of IEC 60216 specifies the experimental and calculation procedures for deriving the thermal endurance characteristics, temperature index (TI) and relative temperature index (RTI) of an electrical insulating material (EIM) using the “fixed time frame method (FTFM)”.

In this protocol, the ageing takes place for a small number of fixed times, using the appropriate number of ageing temperatures throughout each time, the properties of the specimens being measured at the end of the relevant time interval. This differs from the procedure of IEC 60216-1, where ageing is conducted at a small number of fixed temperatures, property measurement taking place after ageing times dependent on the progress of ageing.

The diagnostic tests employed in the fixed time frame method are restricted to destructive tests. The method has not yet been applied to non-destructive or proof test procedures.

Both the TI and the RTI determined according to the FTFM protocol are derived from experimental data obtained in accordance with the instructions of IEC 60216-1 and IEC 60216-2 as modified in this part of IEC 60216. The calculation procedures and statistical tests are modified from those of IEC 60216-3 and IEC 60216-5.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60212, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60216-1:2013, *Electrical insulating materials –Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

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

IEC 60216-3:2021, *Electrical insulating materials – Thermal endurance properties – Part 3: Instructions for calculating thermal endurance characteristics*

IEC 60216-4-1, *Electrical insulating materials – Thermal endurance properties – Part 4-1: Ageing ovens – Single-chamber ovens*

IEC 60216-4-2, *Electrical insulating materials – Thermal endurance properties – Part 4-2: Ageing ovens – Precision ovens for use up to 300 °C*