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IEC 60216-5

Edition 4.0 2022-11  
COMMENTED VERSION

# INTERNATIONAL STANDARD



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**Electrical insulating materials – Thermal endurance properties –  
Part 5: Determination of relative temperature index (RTI) of an insulating material**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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ICS 19.020; 29.020; 29.035.01

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

#### Part 5: Determination of ~~relative thermal endurance index (RTE)~~ relative temperature index (RTI) **1** of an insulating material

#### 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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**This commented version (CMV) of the official standard IEC 60216-5:2022 edition 4.0 allows the user to identify the changes made to the previous IEC 60216-5:2008 edition 3.0. Furthermore, comments from IEC TC 112 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.**

**A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.**

**This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.**

IEC 60216-5 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2008. This edition constitutes a technical revision.

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

- a) Annex C “Computer program” has been completely reworked;
- b) in 3.1, the terms “ATE” and “RTE” were replaced by “ATI” and “RTI” to emphasize their reference to an electrical insulating material (EIM).

This standard is to be read in conjunction with IEC 60216-1:2013, IEC 60216-2:2005 and IEC 60216-3:2021.

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

Draft	Report on voting
112/582/FDIS	112/588/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

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- amended.

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## ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –

### Part 5: Determination of ~~relative thermal endurance index (RTE)~~ relative temperature index (RTI) of an insulating material

#### 1 Scope

This part of IEC 60216 specifies the experimental and calculation procedures to be used for deriving the relative ~~thermal endurance~~ temperature index of a material from experimental data obtained in accordance with the instructions of IEC 60216-1 and IEC 60216-2. The calculation procedures are supplementary to those of IEC 60216-3.

Guidance is also given for assessment of thermal ageing after a single fixed time and temperature, without extrapolation.

The experimental data ~~may~~ can **2** in principle be obtained using destructive, non-destructive or proof tests, although destructive tests have been much more extensively employed. Data obtained from non-destructive or proof tests ~~may~~ can **3** be “censored”, in that measurement of times taken to reach the endpoint ~~may~~ **4** have been terminated at some point after the median time but before all specimens have reached end-point (see IEC 60216-1).

Guidance is given for preliminary assignment of a thermal class for an electrical insulating material (EIM) **5**, based upon the thermal ageing performance.

While the thermal classification of an EIM is not directly related to the thermal classification of an electrical insulation system (EIS), the thermal classification of an EIS follows the same concepts as presented in this part of the 60216 series. **6** The calculation procedures of this standard apply to the determination of the thermal class of an EIS when the thermal stress is the prevailing ageing factor.

#### 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 60216-1:~~2004~~2013 **7**, *Electrical insulating materials – Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-2:2005 **8**, *Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

IEC 60216-3:~~2006~~2021 **9**, *Electrical insulating materials – Thermal endurance properties – Part 3: Instructions for calculating thermal endurance characteristics*

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Electrical insulating materials – Thermal endurance properties –  
Part 5: Determination of relative temperature index (RTI) of an insulating material**

**Matériaux isolants électriques – Propriétés d'endurance thermique –  
Partie 5: Détermination de l'indice de température relatif (ITR) d'un matériau  
isolant**

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### **ELECTRICAL INSULATING MATERIALS – THERMAL ENDURANCE PROPERTIES –**

#### **Part 5: Determination of relative temperature index (RTI) of an insulating material**

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

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## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

### MATÉRIAUX ISOLANTS ÉLECTRIQUES – PROPRIÉTÉS D'ENDURANCE THERMIQUE –

#### Partie 5: Détermination de l'indice de température relatif (ITR) d'un matériau isolant

##### AVANT-PROPOS

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L'IEC 60216-5 a été établie par le comité d'études 112 de l'IEC: Évaluation et qualification des systèmes et matériaux d'isolement électrique. Il s'agit d'une Norme internationale.

Cette quatrième édition annule et remplace la troisième édition parue en 2008. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) l'Annexe C "Programme informatique" a été complètement remaniée;
- b) en 3.1, les termes "ATE" et "RTE" ont été remplacés par "ATI" et "ITR" pour souligner leur référence à un matériau isolant électrique (MIE).

Cette norme doit être lue conjointement avec l'IEC 60216-1:2013, l'IEC 60216-2:2005 et l'IEC 60216-3:2021.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
112/582/FDIS	112/588/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Le présent document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). Les principaux types de documents développés par l'IEC sont décrits plus en détail sous [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

Une liste de toutes les parties de la série IEC 60216, publiées sous le titre général *Matériaux isolants électriques – Propriétés d'endurance thermique*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous [webstore.iec.ch](http://webstore.iec.ch) dans les données relatives au document recherché. À cette date, le document sera

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## MATÉRIAUX ISOLANTS ÉLECTRIQUES – PROPRIÉTÉS D'ENDURANCE THERMIQUE –

### Partie 5: Détermination de l'indice de température relatif (ITR) d'un matériau isolant

#### 1 Domaine d'application

La présente partie de l'IEC 60216 spécifie les procédures expérimentales et de calcul à utiliser pour déduire l'indice de température relatif d'un matériau à partir des données expérimentales obtenues conformément aux instructions de l'IEC 60216-1 et de l'IEC 60216-2. Les procédures de calcul s'ajoutent à celles indiquées dans l'IEC 60216-3.

Des recommandations sont également données pour évaluer le vieillissement thermique après une seule durée déterminée et une seule température, sans extrapolation.

Les données expérimentales peuvent en principe être obtenues en utilisant des essais destructifs, des essais non destructifs ou des essais d'épreuve, même si les essais destructifs ont été utilisés de manière beaucoup plus étendue. Les données obtenues à partir d'essais non destructifs ou d'essais d'épreuve peuvent être "censurées", en ce sens que le mesurage du temps nécessaire pour atteindre le point limite a été interrompu à un moment situé après le temps médian, mais avant que toutes les éprouvettes n'aient atteint le point limite (voir l'IEC 60216-1).

Des recommandations sont données pour l'affectation préliminaire d'une classe thermique pour un matériau isolant électrique (MIE), fondée sur les performances de vieillissement thermique.

Bien que la classification thermique d'un MIE ne soit pas directement reliée à la classification thermique d'un système d'isolation électrique (EIS - electrical insulation system), celle d'un EIS suit le même concept que dans la série IEC 60216. Les procédures de calcul du présent document sont applicables à la détermination de la classe thermique d'un système d'isolation électrique (EIS) lorsque la contrainte thermique est le facteur de vieillissement prédominant.

#### 2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60216-1:2013, *Matériaux isolants électriques – Propriétés d'endurance thermique – Partie 1: Méthodes de vieillissement et évaluation des résultats d'essai*

IEC 60216-2:2005, *Matériaux isolants électriques – Propriétés d'endurance thermique – Partie 2: Détermination des propriétés d'endurance thermique de matériaux isolants électriques – Choix de critères d'essai*

IEC 60216-3:2021, *Matériaux isolants électriques – Propriétés d'endurance thermique – Partie 3: Instructions pour le calcul des caractéristiques d'endurance thermique*