NSAI Standards

Standard Recommendation
S.R. CLC/TS 60034-18-33:2011

# Rotating electrical machines -- Part 18 -33: Functional evaluation of insulation systems - Test procedures for form-wound windings - Multifactor evaluation by endurance under simultaneous thermal and electrical stresses (IEC/TS 60034-18-33:2010 (EQV))

S.R. CLC/TS 60034-18-33:2011

*Incorporating amendments/corrigenda issued since publication:*

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SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

| *This document replaces:* | *This document is based on:* | *Published:* |
|---|---|---|
| CLC/TR 60034-18-33:2004 | CLC/TS 60034-18-33:2011<br>CLC/TR 60034-18-33:2004 | 25 March, 2011<br>10 September, 2004 |

This document was published
under the authority of the NSAI and comes into effect on:

5 April, 2011

ICS number:
29.160

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TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

# CLC/TS 60034-18-33

March 2011

ICS 29.160

Supersedes CLC/TR 60034-18-33:2004

English version

# Rotating electrical machines - Part 18-33: Functional evaluation of insulation systems - Test procedures for form-wound windings - Multifactor evaluation by endurance under simultaneous thermal and electrical stresses

(IEC/TS 60034-18-33:2010)

Machines électriques tournantes - Partie 18-33: Évaluation fonctionnelle des systèmes d'isolation - Procédures d'essai pour enroulements préformés - Évaluation fonctionnelle à plusieurs facteurs par endurance sous contraintes thermiques et électriques simultanées des systèmes d'isolation utilisés dans les machines électriques tournantes (CEI/TS 60034-18-33:2010)

Drehende elektrische Maschinen - Teil 18-33: Funktionale Bewertung von Isoliersystemen - Prüfverfahren für die multifunktionelle Bewertung von Wicklungen mit vorgeformten Elementen bei gleichzeitiger thermischer und elektrischer Beanspruchung der Isoliersysteme von drehenden Maschinen (IEC/TS 60034-18-33:2010)

This Technical Specification was approved by CENELEC on 2011-02-21.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

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, 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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**



Ref. No. CLC/TS 60034-18-33:2011 E

## Foreword

The text of the Technical Specification IEC/TS 60034-18-33:2010, prepared by IEC TC 2, Rotating machinery, was submitted to the formal vote and was approved by CENELEC as CLC/TS 60034-18-33 on 2011-02-21.

This European Standard supersedes CLC/TR 60034-18-33:2004.

The main changes with respect to CLC/TR 60034-18-33:2004 are as follows:

a) the requirement to investigate the nature of interactions between thermal and electrical stresses has been abandoned;

b) the use of single stress acceleration factors has been removed;

c) the selection of stress levels has been adjusted and the temperatures are now related to the thermal class temperature of the insulation system;

d) the introduction of end-point criteria;

e) a simplified method to display results.

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

The following date was fixed:

– latest date by which the existence of the CLC/TS has to be announced at national level (doa) 2011-08-21

Annex ZA has been added by CENELEC.

## Endorsement notice

The text of the Technical Specification IEC/TS 60034-18-33:2010 was approved by CENELEC as a Technical Specification without any modification.

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

IEC 60034-18-32 NOTE Harmonized as EN 60034-18-33.

# 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 60034-15 | - | Rotating electrical machines - Part 15: Impulse voltage withstand levels of form-wound stator coils for rotating a.c. machines | EN 60034-15 | - |
| IEC 60034-18-1 | 2010 | Rotating electrical machines - Part 18-1: Functional evaluation of insulation systems - General guidelines | EN 60034-18-1 | 2010 |
| IEC/TS 60034-18-42 | - | Rotating electrical machines - Part 18-42: Qualification and acceptance tests for partial discharge resistant electrical insulation systems (Type II) used in rotating electrical machines fed from voltage converters | CLC/TS 60034-18-42 | - |
| IEC 60085 | - | Electrical insulation - Thermal evaluation and designation | EN 60085 | - |
| IEC 60505 | - | Evaluation and qualification of electrical insulation systems | EN 60505 | - |
| IEC 62539 | - | Guide for the statistical analysis of electrical insulation breakdown data | - | - |

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# ROTATING ELECTRICAL MACHINES –

# Part 18-33: Functional evaluation of insulation systems – Test procedures for form-wound windings – Multifactor evaluation by endurance under simultaneous thermal and electrical stresses

## 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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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.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC/TS 60034-18-33, which is a technical specification, has been prepared by IEC technical committee 2: Rotating machinery.

This new edition was originally issued as a technical report in 1995 but has been revised extensively prior to re-issue as a technical specification. The main changes with respect to the earlier version of this document are as follows.

a) the requirement to investigate the nature of interactions between thermal and electrical stresses has been abandoned;
b) the use of single stress acceleration factors has been removed;
c) the selection of stress levels has been adjusted and the temperatures are now related to the thermal class temperature of the insulation system;
d) the introduction of end-point criteria;
e) a simplified method to display results.

The text of this technical specification is based on the following documents:

| Enquiry draft | Report on voting |
|---|---|
| 2/1581/DTS | 2/1601/RVC |

Full information on the voting for the approval of this technical specification 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 of the IEC 60034 series, published under the general title *Rotating electrical machines,* can be found on the IEC website**.**

NOTE A table of cross-references of all IEC TC 2 publications can be found on the IEC TC 2 dashboard 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 be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

# INTRODUCTION

This document is being issued as a technical specification (according to the ISO/IEC Directives, Part 1, 3.1.1.1) for provisional application in the field of insulation systems for rotating electrical machines, because there is a need for guidance on how standards in this field should be used to meet an identified need.

This document is not to be regarded as an International Standard. It is proposed for provisional application so that information and experience of its use in practice may be gathered. Comments on the content of this document should be sent to the IEC Central Office.

Part 18-1 of IEC 60034 presents general guidelines for the evaluation and classification of insulation systems used in rotating machines.

Part 18-33 deals exclusively with insulation systems for form-wound windings and concentrates on multifactor functional evaluation under simultaneous thermal and electrical ageing.

# ROTATING ELECTRICAL MACHINES –

# Part 18-33: Functional evaluation of insulation systems – Test procedures for form-wound windings – Multifactor evaluation by endurance under simultaneous thermal and electrical stresses

## 1 Scope

This part of IEC 60034-18 describes procedures for evaluation of insulation systems by endurance testing where thermal and electrical stresses are applied simultaneously. The procedures are intended for insulation systems used, or proposed to be used, in a.c. electrical machines using form-wound windings. The test procedures provide a comparison of performance between reference and candidate systems at combinations of voltage and temperature which have been used separately to assess quality in the past and which are chosen to produce failures within a suitable timescale and at stresses within practical limits. The outcome of the test on the candidate insulation system will indicate whether it is better or worse than the reference system with proven service experience but will not enable a lifetime in service to be calculated. The evaluation described in this technical specification does not include stress grading.

The test procedures in this technical specification are not intended to establish the interaction between thermal and electrical stress in the ageing process nor endurance lines. If additional information is required on this interaction or in order to achieve endurance lines, it is necessary to undertake further tests in which electrical ageing is carried out at constant temperature and different voltages (IEC 60034-18-32) and thermal ageing is performed at different temperatures and constant voltage.

## 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 60034-15, *Rotating electrical machines – Part 15: Impulse voltage withstand levels of form-wound stator coils for rotating a.c. machines*

IEC 60034-18-1:2010, *Rotating electrical machines – Part 18-1: Functional evaluation of insulation systems – General guidelines*

IEC/TS 60034-18-42, *Rotating electrical machines – Part 18-42: Qualification and acceptance tests for partial discharge resistant electrical insulation systems (Type II) used in rotating electrical machines fed from voltage converters*

IEC 60085, *Electrical insulation –Thermal evaluation and designation*

IEC 60505, *Evaluation and qualification of electrical insulation systems*

IEC 62539, *Guide for the statistical analysis of electrical insulation breakdown data*