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Standards

Irish Standard
I.S. EN 60034-18-31:2012

Rotating electrical machines -- Part 18-31: Functional evaluation of insulation systems - Test procedures for form-wound windings - Thermal evaluation and classification of insulation systems used in rotating machines (IEC 60034-18-31:2012 (EQV))

I.S. EN 60034-18-31:2012

Incorporating amendments/corrigenda issued since publication:

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English version

**Rotating electrical machines -
Part 18-31: Functional evaluation of insulation systems -
Test procedures for form-wound windings -
Thermal evaluation and classification of insulation systems used in
rotating machines
(IEC 60034-18-31:2012)**

Machines électriques tournantes -
Partie 18-31: Evaluation fonctionnelle des
systèmes d'isolation -
Procédures d'essai pour enroulements
préformés -
Evaluation thermique et classification des
systèmes d'isolation utilisés dans les
machines tournantes
(CEI 60034-18-31:2012)

Drehende elektrische Maschinen -
Teil 18-31: Funktionelle Bewertung von
Isoliersystemen -
Prüfverfahren für Wicklungen mit
vorgeformten Elementen -
Thermische Bewertung und
Klassifizierung von Isoliersystemen für
drehende Maschinen
(IEC 60034-18-31:2012)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 2/1662/FDIS, future edition 2 of IEC 60034-18-31, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60034-18-31:2012.

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) 2013-04-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-07-30

This document supersedes EN 60034-18-31:1994 + A1:1996.

EN 60034-18-31:2012 includes the following significant technical changes with respect to EN 60034-18-31:1994 + A1:1996:

- Definition of the test method and sub-cycles required to establish a consistent standardized platform for thermal ageing of insulation systems for form-wound windings.
- Recommendations for establishing a thermal life curve based on confidence intervals.
- Comparison of candidate and reference system performance for specific requirements of thermal class, within feasible limits.

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

Endorsement notice

The text of the International Standard IEC 60034-18-31:2012 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 60034-1 NOTE Harmonized as EN 60034-1.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-15	2009	Rotating electrical machines - Part 15: Impulse voltage withstand levels of form-wound stator coils for rotating a.c. machines	EN 60034-15	2009
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 60060-1	-	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	-
IEC 60085	-	Electrical insulation - Thermal evaluation and designation	EN 60085	-
IEC 60216-1	-	Electrical insulating materials - Thermal endurance properties - Part 1: Ageing procedures and evaluation of test results	EN 60216-1	-
IEC 60216-4-1	-	Electrical insulating materials - Thermal endurance properties - Part 4-1: Ageing ovens - Single-chamber ovens	EN 60216-4-1	-
IEC 60216-5	-	Electrical insulating materials - Thermal endurance properties - Part 5: Determination of relative thermal endurance index (RTE) of an insulating material	EN 60216-5	-
IEC 60505	-	Evaluation and qualification of electrical insulation systems	EN 60505	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

**Part 18-31: Functional evaluation of insulation systems –
Test procedures for form-wound windings –
Thermal evaluation and classification of insulation
systems used in rotating machines**

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 60034-18-31 has been prepared by IEC technical committee 2: Rotating machinery.

This second edition cancels and replaces the first edition published in 1992, and its amendment 1 (1996), of which it constitutes a technical revision.

The main technical changes with regard to the previous edition include:

- Definition of the test method and sub-cycles required to establish a consistent standardized platform for thermal ageing of insulation systems for form-wound windings.
- Recommendations for establishing a thermal life curve based on confidence intervals.
- Comparison of candidate and reference system performance for specific requirements of thermal class, within feasible limits.

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

FDIS	Report on voting
2/1662/FDIS	2/1671/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.

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

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

INTRODUCTION

IEC 60034-18 comprises several parts, dealing with different types of functional evaluation and special kinds of test procedures for insulation systems of rotating electrical machines. IEC 60034-18-1 provides general guidelines for such procedures and qualification principles. The subsequent parts IEC 60034-18-21, IEC 60034-18-31, IEC 60034-18-32, IEC 60034-18-33, IEC 60034-18-34, IEC 60034-18-41 and IEC 60034-18-42 give detailed procedures for the various types of windings.

IEC 60034-18-31 describes thermal evaluation and classification of insulation systems for form-wound windings. It provides standard thermal ageing techniques and diagnostic test procedures.

Parts relevant to this document are:

- IEC 60034-18-1: General guidelines
- IEC 60034-18-21: Test procedures for wire-wound windings
- IEC 60034-18-41: Qualification and type tests for Type I electrical insulation systems used in rotating electrical machines fed from voltage converters
- IEC 60034-18-42: Qualification and acceptance tests for partial discharge resistant electrical insulation systems (Type II) electrical insulation systems used in rotating electrical machines fed from voltage converters

ROTATING ELECTRICAL MACHINES –

Part 18-31: Functional evaluation of insulation systems – Test procedures for form-wound windings – Thermal evaluation and classification of insulation systems used in rotating machines

1 Scope

This part of IEC 60034 describes thermal endurance test procedures for classification of insulation systems used in a.c. or d.c. rotating electrical machines with indirect cooling and form-wound windings.

The test performance of a candidate insulation system is compared to the test performance of a reference insulation system with proven service experience.

The test procedures described in IEC 60034-18-31 are intended to compare the thermal endurance performance of the mainwall insulation between conductor(s) and ground and, where required by the design of the coil or bar, the insulation between the turns.

The test is not intended to simulate the in-service mechanical stresses experienced by the endwinding bracing or support materials. It does not include the evaluation of thermo-mechanical deterioration by expansion and contraction of insulation during temperature cycling.

IEC 60034-18-1 describes general testing principles applicable to thermal endurance testing of insulation systems used in rotating electrical machines. The principles of IEC 60034-18-1 are followed unless otherwise stated in IEC 60034-18-31.

The thermal class for the insulation system refers to its maximum allowed (“hot spot”) temperature. The average temperature measured in service should not exceed the allowed temperature rise according to IEC 60034-1.

NOTE 1 Large machines, especially synchronous generators using bars, may require special thermal evaluation test procedures which are not included in this part.

NOTE 2 Recommended parameters for the diagnostic test may be applied according to IEC 60034-18-42 to form-wound coils designed with Type II insulation systems for use in converter applications.

2 Normative references

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.

IEC 60034-15:2009, *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*

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