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**Roterande elektriska maskiner –  
Del 18-31: Funktionsutvärdering av isolersystem  
för roterande elektriska maskiner –  
Provning av formlindade lindningar –  
Utvärdering av termomekanisk livslängd**

*Rotating electrical machines –*

*Part 18-34: Functional evaluation of insulation systems –*

*Test procedures for form-wound windings –*

*Evaluation of thermomechanical endurance of insulation systems*

Som svensk standard gäller europastandarden EN 60034-18-34:2012. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60034-18-34:2012.

**Nationellt förord**

Europastandarden EN 60034-18-34:2012

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60034-18-34, First edition, 2012 - Rotating electrical machines - Part 18-34: Functional evaluation of insulation systems - Test procedures for form-wound windings - Evaluation of thermomechanical endurance of insulation systems**

utarbetad inom International Electrotechnical Commission, IEC.

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**Rotating electrical machines -  
Part 18-34: Functional evaluation of insulation systems -  
Test procedures for form-wound windings -  
Evaluation of thermomechanical endurance of insulation systems  
(IEC 60034-18-34:2012)**

Machines électriques tournantes -  
Partie 18-34: Evaluation fonctionnelle des  
systèmes d'isolation -  
Procédures d'essai pour enroulement  
préformés -  
Evaluation de l'endurance  
thermomécanique des systèmes  
d'isolation  
(CEI 60034-18-34:2012)

Drehende elektrische Maschinen -  
Teil 18-34: Funktionelle Bewertung von  
Isoliersystemen -  
Prüfverfahren für Wicklungen mit  
vorgeformten Elementen -  
Thermomechanische Bewertung von  
Isoliersystemen  
(IEC 60034-18-34:2012)

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

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

## Foreword

The text of document 2/1660/FDIS, future edition 1 of IEC 60034-18-34, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60034-18-34:2012.

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) 2013-04-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-07-19

This document supersedes CLC/TS 60034-18-34:2004.

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## Endorsement notice

The text of the International Standard IEC 60034-18-34:2012 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, 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 60028                    | 1925         | International standard of resistance for copper -                                                                                                                              |                               | -            |
| IEC 60034-1 (mod)            | 2010         | Rotating electrical machines -<br>Part 1: Rating and performance                                                                                                               | EN 60034-1<br>+ corr. October | 2010<br>2010 |
| IEC 60034-15                 | -            | Rotating electrical machines -<br>Part 15: Impulse voltage withstand levels of<br>form-wound stator coils for rotating a.c.<br>machines                                        | EN 60034-15                   | -            |
| IEC 60034-18-1               | -            | Rotating electrical machines -<br>Part 18-1: Functional evaluation of insulation<br>systems - General guidelines                                                               | EN 60034-18-1                 | -            |
| IEC 60034-18-32              | 2010         | Rotating electrical machines -<br>Part 18-32: Functional evaluation of insulation<br>systems - Test procedures for form-wound<br>windings - Evaluation of electrical endurance | EN 60034-18-32                | 2010         |
| IEC/TS 60034-27              | 2006         | Rotating electrical machines -<br>Part 27: Off-line partial discharge<br>measurements on the stator winding<br>insulation of rotating electrical machines                      | CLC/TS 60034-27               | 2011         |
| IEC 60093                    | 1980         | Methods of test for volume resistivity and<br>surface resistivity of solid electrical insulating<br>materials                                                                  | HD 429 S1 <sup>1)</sup>       | 1983         |
| IEC/TR 60894<br>+ corr. July | 1987<br>1987 | Guide for a test procedure for the<br>measurement of loss tangent of coils and bars<br>for machine windings                                                                    | -                             | -            |

<sup>1)</sup> HD 429 S1 is superseded by EN 62631-1:2011, which is based on IEC 62631-1:2011.

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## INTRODUCTION

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

This part deals with the evaluation of insulation systems for form-wound windings under thermal cycling operation. This kind of endurance is of special importance for long rotating machines (especially indirectly cooled) and machines that are exposed to a very large number of considerable load changes during normal operation.

The main ageing factor expected in this test procedure is a mechanical stress due to the thermal expansion difference between the conductor and the insulation, which is defined as a thermomechanical stress. In this test, a transient temperature gradient from the conductor to the outer surface of the bar or coil is generated with similar time constant as those found in real generators. This thermal cycle is repeated to induce fatigue in the insulation system.

In this test, the thermal ageing is negligible. For thermal functional test, see IEC 60034-18-31.

## ROTATING ELECTRICAL MACHINES –

### **Part 18-34: Functional evaluation of insulation systems – Test procedures for form-wound windings – Evaluation of thermomechanical endurance of insulation systems**

#### **1 Scope**

This part of IEC 60034 gives test procedures for the evaluation of thermomechanical endurance of insulation systems of form-wound windings.

In this evaluation, the performance of a candidate system is compared to that of a reference insulation system with proven service experience.

#### **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 60028:1925, *International standard of resistance for copper*

IEC 60034-1:2010, *Rotating electrical machines – Part 1: Rating and performance*

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

IEC 60034-18-32:2010, *Rotating electrical machines – Part 18-32: Functional evaluation of insulation systems – Test procedures for form-wound windings – Evaluation by electrical endurance*

IEC/TS 60034-27:2006, *Rotating electrical machines – Part 27: Off-line partial discharge measurements on the stator winding insulation of rotating electrical machines*

IEC 60093:1980, *Method of test for volume resistivity and surface resistivity of solid electrical insulating materials*

IEC/TR 60894:1987, *Guide for a test procedure for the measurement of loss tangent of coils and bars for machine windings*