BS EN IEC 60034-18-32:2022

BSI Standards Publication

Rotating electrical machines

Part 18-32: Functional evaluation of insulation systems (Type II) — Electrical endurance qualification procedures for form-wound windings

bsi.

Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

National foreword

This British Standard is the UK implementation of EN IEC 60034-18-32:2022. It is identical to IEC 60034-18-32:2022. It supersedes BS EN 60034-18-32:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/2, Rotating electrical machinery.

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.

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 539 00002 3

AVA Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

ICS 29.080.30; 29.160.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2022.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60034-18-32

March 2022

ICS 29.160.01

Supersedes EN 60034-18-32:2010

English Version

Rotating electrical machines - Part 18-32: Functional evaluation of insulation systems (Type II) - Electrical endurance qualification procedures for form-wound windings (IEC 60034-18-32:2022)

Machines électriques tournantes - Partie 18-32: Evaluation fonctionnelle des systèmes d'isolation (Type II) - Procédures de qualification de l'endurance électrique pour enroulements préformés (IEC 60034-18-32:2022)

Drehende elektrische Maschinen - Teil 18-32: Funktionelle Bewertung von Isoliersystemen - Elektrische Lebensdauer Qualifizierungsverfahren für Wicklungen mit vorgeformten Elementen (IEC 60034-18-32:2022)

This European Standard was approved by CENELEC on 2022-03-01. 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, Turkey 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

© 2022 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Documents Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

European foreword

The text of document 2/2068/FDIS, future edition 2 of IEC 60034-18-32, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60034-18-32:2022.

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)	2022-12-01
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2025-03-01

This document supersedes EN 60034-18-32:2010 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 60034-18-32:2022 was approved by CENELEC as a European Standard without any modification.

Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

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 60034-1	-	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1[1]	-
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 60034-18-33	2010	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	CLC/TS 60034-18-33	2011
IEC 60034-18-41	-	Rotating electrical machines - Part 18-41: Partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters - Qualification and quality control tests	EN 60034-18-41	-
IEC 60034-18-42	2017	Rotating electrical machines - Part 18-42: Partial discharge resistant electrical insulation systems (Type II) used in rotating electrical machines fed from voltage converters - Qualification tests	EN 60034-18-42	2017
+ A1	2020		+ A1	2020
IEC 60034-27-1	-	Rotating electrical machines - Part 27-1: Off-line partial discharge measurements on the winding insulation	EN IEC 60034-27-1	-

[1] Under preparation. Stage at the time of publication: FprEN 60034-1 and FprEN 60034-1/prAA.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60034-18-32:2022

IEC 60034-27-3	-	Rotating electrical machines - Part 27-3: Dielectric dissipation factor measurement on stator winding insulation of rotating electrical machines	EN 60034-27-3	-
IEC 60216-4-1	-	Electrical insulating materials - Thermal endurance properties - Part 4-1: Ageing ovens - Single-chamber ovens	EN 60216-4-1	-
IEC 62539	-	Guide for the statistical analysis of electrical insulation breakdown data	-	-

Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

IEC 60034-18-32

Edition 2.0 2022-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Rotating electrical machines –
Part 18-32: Functional evaluation of insulation systems (Type II) –
Electrical endurance qualification procedures for form-wound windings

Machines électriques tournantes –
Partie 18-32: Evaluation fonctionnelle des systèmes d'isolation (Type II) –
Procédures de qualification de l'endurance électrique pour enroulements préformés

IEC 60034-18-32:2022-01(en-fr)

Documents
Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 8
4 General considerations 9
4.1 Relationship to IEC 60034-18-1 9
4.2 Selection and designation of test procedures 9
4.3 Reference insulation system 9
4.4 Test procedures 9
4.4.1 General 9
4.4.2 Electrical ageing of the mainwall insulation 9
4.4.3 Electrical ageing of the stress control system 10
4.4.4 Electrical ageing of the turn insulation 10
4.5 Extent of tests 10
4.5.1 Full evaluation of the mainwall insulation 10
4.5.2 Reduced evaluation of the mainwall insulation 10
4.5.3 Evaluation of the stress control system 10
5 Test objects 10
5.1 Construction of test objects 10
5.2 Number of test specimens 11
5.3 Initial quality control tests 11
6 Electrical ageing 11
6.1 General 11
6.2 Voltage levels and intended test lives of the mainwall insulation 11
6.3 Test temperatures during electrical endurance testing of the mainwall insulation 11
6.3.1 Electrical ageing at room temperature 11
6.3.2 Electrical ageing at elevated temperature 12
6.3.3 Ageing procedure for the mainwall insulation 12
6.4 Maintenance of stress control coatings 12
7 Diagnostic sub-cycle 12
7.1 General 12
7.2 Voltage test of the mainwall insulation 12
7.3 Other diagnostic tests 13
8 Failures of the mainwall insulation 13
8.1 Failure location and verification 13
8.2 Failed specimen observations 13
9 Functional evaluation of the mainwall data 13
9.1 General 13
9.2 Full evaluation (same voltage level and same expected service life) 13
9.3 Reduced evaluation (same voltage level and same expected service life) 15
9.4 Recommended data to be recorded 16
9.5 Determining qualification for performances different to the reference system 17
9.5.1 Overview 17

AVA Documents Document Sharing Hub

Full document details: BS EN IEC 60034-18-32:2022

9.5.2 Case B: Qualification for the same phase to phase voltage and a different expected service life 17
9.5.3 Case C: Qualification for different voltage level and same expected service life 18
9.5.4 Case D: Qualification for different voltage level and different expected service life 19
9.5.5 Non-linearity of regression lines 20
Annex A (normative) Reference life line for mainwall insulation in the absence of a manufacturer's reference life line 21
Annex B (informative) 22
B.1 Electrical ageing of the conductive slot coating 22
B.2 Electrical ageing of the stress control coating 22
B.3 Test objects 22
B.4 Evaluation of the stress control system 22
B.5 Ageing procedure for the conductive slot and stress control coating 23
B.5.1 General 23
B.5.2 Arrangement of temperature control by heater plates 23
B.5.3 Heating by means of an oven 23
B.5.4 Test parameter 23
B.6 Qualification of the stress control system 24
B.6.1 General 24
B.6.2 Test procedure 24
B.6.3 Test pass criteria 24
B.7 Examples of deterioration marks at the stress control system 25

Figure 1 – Comparison of ageing data from candidate (C) and reference (R) insulation systems showing qualification 14
Figure 2 – Comparison of ageing data from candidate and reference insulation systems showing failure to qualify 15
Figure 3 – Comparison of reduced evaluation test data from four separate candidate systems with that from the reference system 16
Figure 4 – Candidate system qualified for the same voltage level and different expected service life 18
Figure 5 – Candidate system qualified for a higher voltage level and the same expected service life 19
Figure 6 – Candidate system qualified for a different service life and different voltage level from the reference 20
Figure A.1 – Reference lifeline for mainwall insulation 21
Figure B.1 – Application of heater elements to a stator bar 23
Figure B.2 – Typical deterioration mark at the conductive slot coating 25

Table 1 – Conditions for qualification of candidate system 17
Table B.1 – Phase to ground test voltages and test temperatures 24

Documents
Document Sharing Hub
Full document details: BS EN IEC 60034-18-32:2022