IEC 60034-18-32

Edition 1.0 2010-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Machines électriques tournantes –
Partie 18-32: Evaluation fonctionnelle des systèmes d'isolation – Procédures d'essai pour enroulements préformés – Evaluation par endurance électrique

IEC 60034-18-32:2010

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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 60034-18-32 has been prepared by IEC technical committee 2: Rotating machinery.

This first edition cancels and replaces IEC/TS 60034-18-32, published in 1995 and constitutes a technical revision.

The main technical changes with regard to the previous technical specification are as follows.

a) simplification of clauses;
b) reduction in the number of test procedures;
c) inclusion of full bars and coils as test objects;
d) a new clause dealing with failures and failure criteria.

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

CDV	Report on voting
2/1580/CDV	2/1602/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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 in the IEC TC 2 dashboard on the IEC website.

The committee has decided that the contents of this amendment and the base 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

Part 1 of IEC 60034-18 presents general principles for the evaluation of insulation systems used in rotating electrical machines.

This standard deals exclusively with insulation systems for form-wound windings and concentrates on electrical functional evaluation.

ROTATING ELECTRICAL MACHINES –

Part 18-32: Functional evaluation of insulation systems – Test procedures for form-wound windings – Evaluation by electrical endurance

1 Scope

This part of IEC 60034-18 describes test procedures for the evaluation of electrical endurance of insulation systems for use in a.c. or d.c. rotating electrical machines using form-wound windings. The test procedures are comparative in nature, such that the performance of a candidate insulation system is compared to that of a reference insulation system with proven service experience. The test procedures are principally directed at the insulation systems in air-cooled machines but may also be used for evaluating parts of the insulation systems in hydrogen cooled machines. Note that the qualification procedures of inverter duty insulation systems for form-wound windings can be found in IEC 60034-18-42.

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

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*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
mainwall insulation
main electrical insulation that separates the conductors from the earthed stator/rotor core in motor and generator windings

3.2
turn insulation
electrical insulation that covers each conductor in coils/bars

3.3
interturn insulation
electrical insulation that separates the conductor turns from each other in coils/bars

3.4
corona protection material
material which is used to coat a stator coil/bar within the slot portion of the stator core to avoid slot discharges

3.5
stress grading material
material generally having a non-linear resistivity characteristic, applied to the endwindings of stators to reduce the maximum surface electrical stress

4 General considerations

4.1 Relationship to Part 1 of IEC 60034-18

The principles of Part 1 of IEC 60034-18 should be followed unless the recommendations of this International Standard indicate otherwise.

4.2 Selection and designation of test procedures

One or more of the procedures in this International Standard should be suitable for the majority of evaluations. Evaluation is usually performed by the manufacturer of the machine/coils or by a third party laboratory. It is the manufacturer's responsibility to justify the most suitable procedure in Table 1 on the basis of past experience and knowledge of the insulation systems to be compared.

The test procedure should be selected from Table 1 and designated by IEC 60034-18-32 procedure N, where N is the designation given in the Table 1. Subclauses 4.3, 4.4 and 4.5 give guidance on how to select the test procedure.

Table 1 – Test procedure designations

Designation of test procedure N	Applied ageing voltage		Diagnostic tests		
	Mainwall insulation (6.3)	Interturn insulation (6.4)	Mainwall insulation (7.2.1)	Interturn insulation (7.2.2 or 7.2.3)	Stress grading (7.3)
AA	Constant	None	Not required (A)	No test (A)	Optional (D)
CA	Constant	None	Other test (C)	No test (A)	Optional (D)
AB	Constant	Yes	Not required (A)	Impulse test (B)	Optional (D)

NOTE 1 The meaning of the letters of the diagnostic test are as follows: A – No test; B – Impulse test; C – Other test (such as dissipation factor and partial discharge tests); D – Visual observation.

NOTE 2 Where a diagnostic test is not required on the mainwall insulation, the ageing voltage acts simultaneously as the diagnostic factor.

All the above tests are carried out at room temperature. However, if they are to be performed at any other temperature (see 6.2.2), the designation of the test procedure shall include the Celsius temperature in brackets, e.g. AA(190). Each of the procedures may be used for the full evaluation according to 4.5.1 or for the reduced evaluation according to 4.5.2.

Procedure AA is the preferred choice if the manufacturer has no past experience or knowledge of the candidate system and the behaviour of the mainwall insulation is defined.

4.3 Reference insulation system

A reference insulation system should be tested using a test procedure equivalent to that used for the candidate system (see IEC 60034-18-1). The reference insulation system should have service experience at not less than 75 % of the intended maximum rated voltage of the candidate system. When extrapolation of the insulation thickness is used, some information should be provided showing the correlation between electrical lifetime and electrical stress for the different insulation thicknesses.