



SLOVENSKI STANDARD
SIST EN 60505:2011

01-oktober-2011

Vrednotenje in kvalificiranje električnih izolacijskih sistemov

Evaluation and qualification of electrical insulation systems

Bewertung und Kennzeichnung von elektrischen Isoliersystemen

Evaluation et qualification des systèmes d'isolation électrique

Ta slovenski standard je istoveten z: EN 60505:2011

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EUROPEAN STANDARD
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Evaluation and qualification of electrical insulation systems
(IEC 60505:2011)

Evaluation et qualification des systèmes
d'isolation électrique
(CEI 60505:2011)

Bewertung und Kennzeichnung von
elektrischen Isoliersystemen
(IEC 60505:2011)

This European Standard was approved by CENELEC on 2011-08-15. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CENELEC

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

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Foreword

The text of document 112/174/FDIS, future edition 4 of IEC 60505, prepared by IEC TC 112, Evaluation and qualification of electrical insulating materials and systems, was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60505:2011.

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) 2012-05-15
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2014-08-15

This document supersedes EN 60505:2004.

The main change with respect to EN 60505:2004 is that Annex A: Glossary is now available in an Internet version (<http://std.iec.ch/iec60505>) as well as a hardcopy version. The internet version contains an abridged text version and a multimedia supplement.

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.

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The text of the International Standard IEC 60505:2011 was approved by CENELEC as a European Standard without any modification.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-1	NOTE	Harmonized as EN 60068-1.
IEC 60068-2 series	NOTE	Harmonized in EN 60068-2 series.
IEC 60068-2-1	NOTE	Harmonized as EN 60068-2-1.
IEC 60068-2-2	NOTE	Harmonized as EN 60068-2-2.
IEC 60068-2-10	NOTE	Harmonized as EN 60068-2-10.
IEC 60068-2-14	NOTE	Harmonized as EN 60068-2-14.
IEC 60068-2-27	NOTE	Harmonized as EN 60068-2-27.
IEC 60112	NOTE	Harmonized as EN 60112.
IEC 60212	NOTE	Harmonized as EN 60212.
IEC 60216 series	NOTE	Harmonized in EN 60216 series.
IEC 60216-1	NOTE	Harmonized as EN 60216-1.
IEC 60243-1	NOTE	Harmonized as EN 60243-1.
IEC 60243-2	NOTE	Harmonized as EN 60243-2.
IEC 60243-3	NOTE	Harmonized as EN 60243-3.
IEC 60664-4	NOTE	Harmonized as EN 60664-4.
IEC 60270:2000	NOTE	Harmonized as EN 60270:2001 (not modified).

IEC 60371-2	NOTE	Harmonized as EN 60371-2.
IEC 60587	NOTE	Harmonized as EN 60587.
IEC 60721 series	NOTE	Harmonized in EN 60721 series.
IEC 60811-3-1	NOTE	Harmonized as EN 60811-3-1.
IEC 61033	NOTE	Harmonized as EN 61033.
IEC 61710	NOTE	Harmonized as EN 61710.
IEC 62231	NOTE	Harmonized as EN 62231.
IEC 62271-304	NOTE	Harmonized as CLC/TS 62271-304.
ISO 62	NOTE	Harmonized as EN ISO 62.
ISO 175	NOTE	Harmonized as EN ISO 175.
ISO 877-1	NOTE	Harmonized as EN ISO 877-1.
ISO 877-2	NOTE	Harmonized as EN ISO 877-2.
ISO 4611	NOTE	Harmonized as EN ISO 4611.

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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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60216-2	-	Electrical insulating materials - Thermal endurance properties - Part 2: Determination of thermal endurance properties of electrical insulating materials - Choice of test criteria	EN 60216-2	-
IEC 60216-3	-	Electrical insulating materials - Thermal endurance properties - Part 3: Instructions for calculating thermal endurance characteristics	EN 60216-3	-
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 60493-1	-	Guide for the statistical analysis of ageing test - data Part 1: Methods based on mean values of normally distributed test results	-	-
IEC 60544-1	-	Electrical insulating materials - Determination of the effects of ionizing radiation - Part 1: Radiation interaction and dosimetry	EN 60544-1	-
IEC/TS 61251	-	Electrical insulating materials - A.C. voltage endurance evaluation - Introduction	-	-
IEC 62539	-	Guide for the statistical analysis of electrical insulation breakdown data	-	-



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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Evaluation and qualification of electrical insulation systems

Évaluation et qualification des systèmes d'isolation électrique

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	9
2 Normative references.....	9
3 Terms and definitions.....	9
3.1 General terms.....	10
3.2 Terms related to service stresses and ageing.....	10
3.3 Terms related to testing.....	11
4 Ageing.....	12
4.1 Ageing mechanism.....	12
4.2 Assessment of ageing mechanisms.....	14
4.3 Electrical ageing.....	15
4.4 Thermal ageing.....	17
4.5 Mechanical ageing.....	19
4.6 Environmental ageing.....	21
4.7 Accelerated ageing.....	22
4.8 Multifactor ageing.....	23
5 Basic evaluation considerations.....	23
5.1 Elements for preparing an evaluation method.....	23
5.1.1 Object.....	23
5.1.2 Service conditions.....	23
5.1.3 Life values.....	24
5.2 Types of evaluation procedures.....	24
5.3 Choice of the test object.....	26
5.4 Experimental test procedures.....	26
5.5 Conclusions for standardization practices.....	27
6 Functional ageing tests.....	27
6.1 Test objects.....	27
6.1.1 Construction of test objects.....	27
6.1.2 Number of test objects.....	28
6.1.3 Quality assurance tests.....	28
6.1.4 Preconditioning subcycle.....	28
6.1.5 Initial diagnostic tests.....	28
6.1.6 Reference EIS.....	28
6.2 Test conditions.....	28
6.2.1 Continuous and cyclic testing.....	28
6.2.2 Levels of test stresses, ageing factors and diagnostic factors.....	29
6.3 Determination of EIS service life.....	29
6.3.1 Extrapolation of life test results.....	29
6.3.2 Comparison of life test data.....	29
6.4 Diagnostics.....	30
6.4.1 Diagnostic tests – End point criteria.....	30
6.4.2 Additional specific tests.....	31
6.5 Analysing the data.....	31
6.6 Test report.....	31
Annex A (informative) Glossary.....	32

Bibliography.....	71
Figure 1 – Ageing of an EIS	13
Figure 2 – Intrinsic/extrinsic electrical ageing of practical EIS	15
Figure 3 – Intrinsic/extrinsic thermal ageing of practical EIS	17
Figure 4 – Intrinsic/extrinsic mechanical ageing of practical EIS	20
Figure 5 – Intrinsic/extrinsic environmental ageing of practical EIS	22
Figure 6 – Elements of evaluation methods.....	23
Figure 7 – Type of evaluation procedure	25
Figure 8 – Selection of test object.....	26
Figure 9 – Establishing the test method	27
Figure A.1 – Surface abrasion damage	32
Figure A.2 – Surface enamel peeling like string	32
Figure A.3 – Scheme of the measurement set-up for the charging/discharging current.....	33
Figure A.4 – Example of sample preparation.....	33
Figure A.5 – Charging/discharging current on HDPE film	34
Figure A.6 – Property versus time behaviour, detection of threshold (end point, p_L) and maintenance time.....	35
Figure A.7 – Correspondence between the ageing plots of the property p (in red), obtained at different stress levels, and the resulting life line	35
Figure A.8 – Example of charge injection of positive carriers (holes) from the anode and of negative charge carriers (electrons) from the cathode in a PE flat specimen, detected by space charge measurement performed by PEA method	36
Figure A.9 – Stress-strain curve for a typical material.....	37
Figure A.10 – Scheme of measurement set- up for charging/discharging current	38
Figure A.11 – Example of sample preparation.....	38
Figure A.12 – Charging/discharging current on HDPE film	38
Figure A.13 – Charging current at 135 °C and different values of DC electrical field	39
Figure A.14 – Charging current at 120 °C and different values of DC electrical field	39
Figure A.15 – Corona at post insulator head	40
Figure A.16 – Corona on top and arcing to ground.....	40
Figure A.17 – Stages of mechanical ductile fracture (cracking) (Source unknown).....	41
Figure A.18 – Photo showing orderings in epoxy structure and void.....	42
Figure A.19 – Discharge between conductors through air.....	44
Figure A.20 – Paper insulation degraded by electrical surface discharges	44
Figure A.21 – Example of electric strength test on XLPE sample 0,2 mm thick.....	45
Figure A.22 – Two parameters Weibull plot electric strength results performed on seven XLPE specimens, 0,2 mm thick.....	45
Figure A.23 – Loss angle of a dielectric	47
Figure A.24 – Loss factor for pre-treated and thermally aged (at 110 °C and 130 °C) XLPE cables measured at 90 °C plotted vs. frequency.....	47
Figure A.25 – Field lines from a positive charge above a plane conductor.....	48
Figure A.26 – Electrical tree.....	49
Figure A.27 – EPDM ashing and erosion on fitting	50
Figure A.28 – Failing external insulation	51

Figure A.29 – Failing external insulation	51
Figure A.30 – Critical failure of solid cable insulation (XLPE) by electrical breakdown	52
Figure A.31 – Example flashover	53
Figure A.32 – Substation – Outdoor installation	54
Figure A.34 – Internal interfaces in epoxy structure and void	56
Figure A.35 – Example of craze and crack development in an inter-lamellar space under mechanical tension T	57
Figure A.36 – Water treeing	58
Figure A.37 – After 11 years in service UV and moisture impact	59
Figure A.38 – Random (amorphous) structure of a molecular chain	59
Figure A.39 – Oriented structure (semi-crystalline) of a molecular chain	59
Figure A.40 – Typical morphology of melt-grown polyethylene spherulites	60
Figure A.41 – Areas in which PD generally occur	61
Figure A.42 – Classes of defect – Internal, surface and corona PD	61
Figure A.43 – Basic PD measurement circuit	62
Figure A.44 – Examples of PD patterns relevant to internal, surface and corona PD	62
Figure A.45 – GIS research – Metal conductor protrusion	63
Figure A.46 – Internally strained epoxy – Frozen in strains in epoxy resin due to thermal stress, measured by TMA curves	64
Figure A.47 – Externally strained parts in an on-load tap changer (OLTC)	64
Figure A.48 – A material being loaded in a) compression, b) tension, c) shear	65
Figure A.49 – Effect of thermal-mechanical stresses leading to interfacial electrical tracking	66
Figure A.50 – Stress-strain curve for a typical material	66
Figure A.51 – Over crimped rod; breaks during tensile test	67
Figure A.52 – Typical installation fault	68
Figure A.53 – Surface tracking on sheds and fitting end	68
Figure A.54 – Vented trees – Initiate at interface	69
Figure A.55 – Tape wrinkling	70
Table 1 – Ageing temperatures	19
Table 2 – Cyclical and continuous procedures	30

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**EVALUATION AND QUALIFICATION
OF ELECTRICAL INSULATION SYSTEMS**
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 60505 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems.

This fourth edition cancels and replaces the third edition, published in 2004, and constitutes a technical revision.

The main change with respect to the previous edition is that Annex A: Glossary is now available in an Internet version (<http://std.iec.ch/iec60505>) as well as a hardcopy version. The internet version contains an abridged text version and a multimedia supplement.

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

FDIS	Report on voting
112/174/FDIS	112/184/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.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

The life of an electrical insulation system (EIS) or systems frequently determines the life of electrical equipment which can be affected by electrical, thermal, mechanical or environmental stresses acting either individually or in combination.

Intended, estimated or proven service life times are essential parameters for describing the life of electrical insulation systems. In the early days of electrotechnical engineering, life figures were rather vague. The limitation of the life of the insulation under thermal stress was one of the first indicators of the effect of ageing in some equipment in service. As experience in using EIS increased, it was appreciated that there was a need to select specific materials having satisfactory life time at a given temperature, to enable the required service life to be achieved and to allow for the calculation of the thermal capability of equipment.

The user of this standard may evaluate existing test methods and provide correlation with his equipment. Therefore, the user of this standard is responsible for demonstrating the validity of the existing test method in accordance with the principles of this standard.

The determination of the prospective life is a fundamental task when developing and designing an EIS. Estimated service life of an EIS needs to be established for several reasons:

- for type testing when introducing a new EIS into production;
- for quality assurance of production;
- for estimating the life expectancy of new equipment;
- for estimating the remaining life for maintenance purposes.

“Ageing” focuses on the mechanisms affecting the EIS performance. “Evaluation” links these potential mechanisms by “Analysis” and “Diagnostics” to the design of a specific kind of evaluation test procedure.

The keyword structure below meets such requirements and allows an easier choice of the parts of interest.

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graph TD; CONTENTS[CONTENTS] --> 1[1. Keywords]; CONTENTS --> 2[2. References]; CONTENTS --> 3[3. Definitions]; CONTENTS --> EIS[Evaluation of EIS]; EIS --> 4[4. Ageing]; EIS --> 5[5. Basic Consideration of Evaluation]; EIS --> 6[6. Functional Ageing Tests]; 4 --> 4.1[4.1 Ageing]; 4 --> 4.2[4.2 Assessment of Ageing Mechanisms]; 4 --> 4.3[4.3 Electrical Ageing]; 4 --> 4.4[4.4 Thermal Ageing]; 4 --> 4.5[4.5 Mechanical Ageing]; 4 --> 4.6[4.6 Environmental Ageing]; 4 --> 4.7[4.7 Accelerated Ageing]; 4 --> 4.8[4.8 Multifactor Ageing]; 5 --> 5.1[5.1 Element for preparing Evaluation]; 5 --> 5.2[5.2 Type of Evaluation]; 5 --> 5.3[5.3 Choice of Test Object]; 5 --> 5.4[5.4 Experimental Data Procedure]; 6 --> 6.1[6.1 Test Objects]; 6 --> 6.2[6.2 Test Conditions]; 6 --> 6.3[6.3 Determination of EIS Service Life]; 6 --> 6.4[6.4 Diagnostic]; 6 --> 6.5[6.5 Analyzing the Data]; 6 --> 6.6[6.6 Test Report];
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CONTENTS

- 1. Keywords
- 2. References
- 3. Definitions
- Evaluation of EIS
 - 4. Ageing
 - 4.1 Ageing
 - 4.2 Assessment of Ageing Mechanisms
 - 4.3 Electrical Ageing
 - 4.4 Thermal Ageing
 - 4.5 Mechanical Ageing
 - 4.6 Environmental Ageing
 - 4.7 Accelerated Ageing
 - 4.8 Multifactor Ageing
 - 5. Basic Consideration of Evaluation
 - 5.1 Element for preparing Evaluation
 - 5.2 Type of Evaluation
 - 5.3 Choice of Test Object
 - 5.4 Experimental Data Procedure
 - 6. Functional Ageing Tests
 - 6.1 Test Objects
 - 6.2 Test Conditions
 - 6.3 Determination of EIS Service Life
 - 6.4 Diagnostic
 - 6.5 Analyzing the Data
 - 6.6 Test Report

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EVALUATION AND QUALIFICATION OF ELECTRICAL INSULATION SYSTEMS

1 Scope

This International Standard establishes the basis for estimating the ageing of electrical insulation systems (EIS) under conditions of either electrical, thermal, mechanical, environmental stresses or combinations of these (multifactor stresses).

It specifies the principles and procedures that shall be followed, during the development of EIS functional test and evaluation procedures, to establish the estimated service life for a specific EIS.

This standard should be used by all IEC technical committees responsible for equipment having an EIS.

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 60216-2, *Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

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IEC 60216-3, *Electrical insulating materials – Thermal endurance properties – Part 3: Instructions for calculating thermal endurance characteristics*

IEC 60216-5, *Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

IEC 60493-1, *Guide for the statistical analysis of ageing test data – Part 1: Methods based on mean values of normally distributed test results*

IEC 60544-1, *Electrical insulating materials – Determination of the effects of ionizing radiation – Part 1: Radiation interaction and dosimetry*

IEC/TS 61251, *Electrical insulating materials – AC voltage endurance evaluation – Introduction*

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

3 Terms and definitions

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