
**Uskladitev izolacije za opremo v okviru nizkonapetostnih sistemov – 1. del:
Načela, zahteve in preskusi**

Insulation coordination for equipment within low-voltage systems – Part 1:
Principles, requirements and tests

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SIST EN 60664-1:2004

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EUROPEAN STANDARD

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Insulation coordination for equipment within low-voltage systems
Part 1: Principles, requirements and tests
(IEC 60664-1:1992 + A1:2000 + A2:2002)

Coordination de l'isolement des matériels
dans les systèmes (réseaux)
à basse tension
Partie 1: Principes, prescriptions et essais
(CEI 60664-1:1992 + A1:2000 + A2:2002)

Isolationskoordination für elektrische
Betriebsmittel in Niederspannungsanlagen
Teil 1: Grundsätze, Anforderungen und
Prüfungen
(IEC 60664-1:1992 + A1:2000 + A2:2002)

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This European Standard was approved by CENELEC on 2003-04-01. 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 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 60664-1:1992 and its amendments A1:2000 and A2:2002, prepared by IEC TC 109, Insulation co-ordination for low-voltage equipment, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60664-1 on 2003-04-01 without any modification.

This European Standard supersedes HD 625.1 S1:1996 and its corrigendum November 1996.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-04-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, Annex ZA is normative and Annexes A, B, C, D and E are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

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The text of the International Standard IEC 60664-1:1992 and its amendments A1:2000 and A2:2002 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60038 (mod)	1983	IEC standard voltages ¹⁾	HD 472 S1 + corr. February	1989 2002
IEC 60050-151	1978	International Electrotechnical Vocabulary (IEV) - Part 151: Electrical and magnetic devices	-	-
IEC 60050-604	1987	Chapter 604: Generation, transmission and distribution of electricity - Operation	-	-
IEC 60060-1 + corr. March	1989 1990	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60068-1	1988	Environmental testing Part 1: General and guidance	EN 60068-1 ²⁾	1994
IEC 60068-2-2	1974	Part 2: Tests - Test B: Dry heat	EN 60068-2-2 ³⁾	1993
IEC 60068-2-3	1969	Part 2: Tests - Test Ca: Damp heat, steady state	HD 323.2.3 S2 ⁴⁾	1987
IEC 60068-2-14	1984	Part 2: Tests - Test N: Change of temperature	EN 60068-2-14 ⁵⁾	1999
IEC 60085	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990
IEC 60099-1	1991	Surge arresters Part 1: Non-linear resistor type gapped surge arresters for a.c. systems	EN 60099-1	1994
IEC 60112	1979	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions	HD 214 S2 ⁶⁾	1980
IEC 60216	Series	Guide for the determination of thermal endurance properties of electrical insulating materials	HD 611 EN 60216	Series Series
IEC 60243-1 (mod)	1988	Methods of test for electric strength of solid insulating materials Part 1: Tests at power frequencies	HD 559.1 S1 ⁷⁾	1991

¹⁾ The title of HD 472 S1 is: Nominal voltages for low voltage public electricity supply systems.

²⁾ EN 60068-1 includes corrigendum October 1988 + A1:1992 to IEC 60068-1.

³⁾ EN 60068-2-2 includes supplement A:1976 to IEC 60068-2-2.

⁴⁾ HD 323.2.3 S2 is superseded by EN 60068-2-78:2001, which is based on IEC 60068-2-78:2001.

⁵⁾ EN 60068-2-14 includes A1:1986 to IEC 60068-2-14.

⁶⁾ HD 214.1 S2 is superseded by EN 60112:2003, which is based on IEC 60112:2003.

⁷⁾ HD 559.1 S1 is superseded by EN 60243-1:1998, which is based on IEC 60243-1:1998.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60335-1 (mod)	1991	Safety of household and similar electrical appliances Part 1: General requirements	EN 60335-1 + corr. January + A11 + A12 + A13 + A14 + A15 + A16	1994 ⁸⁾ 1995 1995 1996 1998 1998 2000 2001
IEC 60364-4-41	1982 ⁹⁾	Electrical installations of buildings Part 4: Protection for safety Chapter 41: Protection against electric shock	-	-
IEC 60364-4-442	1993	Chapter 44: Protection against overvoltages Section 442: Protection of low-voltage installations against faults between high-voltage systems and earth	-	-
IEC 60364-4-443	1990 ¹⁰⁾	Section 443: Protection against overvoltages of atmospheric origin or due to switching	-	-
IEC 60364-5-537 + A1 (mod)	1981 1989	Part 5: Selection and erection of electrical equipment Chapter 53: Switchgear and controlgear Section 537: Devices for isolation and switching	HD 384.5.537 S2	1998
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 60536	1976	Classification of electrical and electronic equipment with regard to protection against electric shock	HD 366 S1	1977 ¹¹⁾
IEC 60664-4	1997	Insulation coordination for equipment within low-voltage systems Part 4: Consideration of high-frequency voltage stress	-	-
IEC 60664-5	- ¹²⁾	Part 5: A comprehensive method for determining clearances and creepage distances equal to or less than 2 mm	-	-
IEC 60669-1 (mod)	1981	Switches for household and similar fixed electrical installations Part 1: General requirements	EN 60669-1	1995 ¹³⁾
IEC 60730-1 (mod)	1986	Automatic electrical controls for household and similar use Part 1: General requirements	EN 60730-1 + corr. November	1991 ¹⁴⁾ 1993
IEC 61180-1	1992	High-voltage test techniques for low-voltage equipment Part 1: Definitions, test and procedure requirements	EN 61180-1	1994

⁸⁾ EN 60335-1:1994 is superseded by EN 60335-1:2002, which is based on IEC 60335-1:2001, mod.

⁹⁾ IEC 60364-4-41:1992, mod., is harmonized as HD 384.4.41 S2:1996.

¹⁰⁾ IEC 60364-4-443:1995, mod., is harmonized as HD 384.4.443 S1:2000.

¹¹⁾ HD 366 S1 is superseded by EN 61140:2002, which is based on IEC 61140:2001.

¹²⁾ To be published.

¹³⁾ EN 60669-1:1995 is superseded by EN 60669-1:1999, which is based on IEC 60669-1:1998, mod.

¹⁴⁾ IEC 60730-1:1993, mod., is harmonized as EN 60730-1:1995. IEC 60730-1:1999, mod., is harmonized as EN 60730-1:2000. EN 60730-1:1991 and EN 60730-1:1995 remain valid until all part 2's which are used in conjunction with them have been withdrawn.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61180-2	1994	Part 2: Test equipment	EN 61180-2	1994
IEC Guide 104	1984	Guide to the drafting of safety publications, and the role of committees with safety pilot functions and safety group functions	-	-

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BASIC SAFETY PUBLICATION

**Coordination de l'isolement des matériels
dans les systèmes (réseaux) à basse tension –**

**Partie 1:
Principes, prescriptions et essais**

**Insulation coordination for equipment
within low-voltage systems –**

**Part 1:
Principles, requirements and tests**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATION COORDINATION FOR EQUIPMENT WITHIN LOW-VOLTAGE SYSTEMS –

Part 1: Principles, requirements and tests

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

This part of International Standard IEC 60664 has been prepared by Sub-Committee 28A: Insulation coordination for low-voltage equipment, of IEC Technical Committee 28: Insulation coordination.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This consolidated version of IEC 60664-1 is based on the first edition (1992) [documents 28A(CO)28+29+32+33 and 28A(CO)31+34+35+36], its amendment 1 (2000) [documents 28A/141/FDIS and 28A/146/RVD] and its amendment 2 (2002) [documents 109/3A/FDIS and 109/7/RVD].

It bears the edition number 1.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annexes A to E are for information only.

IEC 60664 consists of the following parts under the general title *Insulation coordination for equipment within low-voltage systems*:

Part 1: 1992, Principles, requirements and tests.

Part 2-1: 1997, Application guide – Dimensioning procedure worksheets and dimensioning examples

Part 3: 1992, Use of coatings to achieve insulation coordination of printed board assemblies.

Part 4: 1997, Consideration of high-frequency voltage stress

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2006. At this date, the publication will be

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

The contents of the corrigendum of November 2002 have been included in this copy.

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INTRODUCTION

This part of IEC 60664 is a revision of the 1st edition of IEC 60664 (including 60664A and amendment 1) which was published in 1980 as a report having the status of a basic safety publication following IEC Guide 104. It is now published as a standard. It is now numbered as part 1 (covering principles, requirements and tests) in the new layout of the IEC 60664 series in which some further parts are foreseen as follows:

- IEC 60664-2 will cover concise requirements for clearances, creepage distances and solid insulation.
- IEC 60664-3 will cover use of coatings to achieve insulation coordination of printed board assemblies.
- IEC 60664-4 will be in the form of an application guide covering:
 - 1) Dimensioning procedure worksheet and dimensioning examples.
 - 2) Interface requirements and transient overvoltage control means.
 - 3) Explanations to the pollution degrees.
 - 4) Dielectric testing.

This part has been revised to

- provide for distinguishing insulation coordination for:
 - low-voltage mains;
 - other installation systems;
 - internal circuits of equipment;
- indicate that controlled overvoltage conditions can either inherently exist in a system or be achieved by means of overvoltage attenuating means;
- emphasize that the overvoltage categories have a probabilistic implication rather than the meaning of physical attenuation of the transient overvoltage downstream in the installation;
- spell out clearly the remaining duties of specialized Technical Committees;
- take into account IEC 60364-4-41, IEC 60364-4-442 and 60364-4-443;
- incorporate requirements for solid insulation.

INSULATION COORDINATION FOR EQUIPMENT WITHIN LOW-VOLTAGE SYSTEMS –

Part 1: Principles, requirements and tests

SECTION 1: GENERAL AND DEFINITIONS

1.1 Scope

1.1.1 This part of IEC 60664 deals with insulation coordination for equipment within low-voltage systems. It applies to equipment for use up to 2 000 m above sea level having a rated voltage up to a.c. 1 000 V with rated frequencies up to 30 kHz or a rated voltage up to d.c. 1 500 V.

It specifies the requirements for clearances, creepage distances and solid insulation for equipment based upon their performance criteria. It includes methods of electric testing with respect to insulation coordination.

The minimum clearances specified in this part do not apply where ionized gases occur. Special requirements for such situations may be specified at the discretion of the relevant Technical Committee.

This part does not deal with distances

- through liquid insulation,
- through gases other than air,
- through compressed air.

NOTE 1 Extension of the scope up to 1 MHz is under consideration.

NOTE 2 Higher voltages may exist in internal circuits of the equipment.

NOTE 3 Requirements for altitudes exceeding 2 000 m can be derived from table A.2 of annex A.

1.1.2 The object of this basic safety standard is to guide Technical Committees responsible for different equipment in order to rationalize their requirements so that insulation coordination is achieved.

It provides the information necessary to give guidance to Technical Committees when specifying clearances in air, creepage distances and solid insulation for equipment.

1.2 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 Guide 104:1984, *Guide to the drafting of safety publications, and the role of committees with safety pilot functions and safety group functions*

IEC 60038:1983, *IEC standard voltages*

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*