



SLOVENSKI STANDARD

SIST HD 625.1 S1:1999

01-julij-1999

Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests (IEC 60664-1:1992, modified)

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

Isolationskoordination für elektrische Betriebsmittel in Niederspannungsanlagen -- Teil 1: Grundsätze, Anforderungen und Prüfungen

Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension -
- Partie 1: Principes, prescriptions et essais

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Ta slovenski standard je istoveten z: **HD 625.1 S1:1996**

ICS:

29.080.30 Izolacijski sistemi Insulation systems

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HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 625.1 S1

September 1996

ICS 29.040.20

Descriptors: Low-voltage equipment, insulation, definitions, coordination, requirements, dimensioning rules, tests, measurements

English version

Insulation coordination for equipment within low-voltage systems
Part 1: Principles, requirements and tests
(IEC 664-1:1992, modified)

Coordination de l'isolement des
matériels dans les systèmes
(réseaux) à basse tension
Partie 1: Principes, prescriptions
et essais
(CEI 664-1:1992, modifiée)

Isolationskoordination für elektrische
Betriebsmittel in
Niederspannungsanlagen
Teil 1: Grundsätze, Anforderungen
und Prüfungen
(IEC 664-1:1992, modifiziert)

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This Harmonization Document was approved by CENELEC on 1996-03-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

Up-to-date lists and bibliographical references concerning such national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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 664-1:1992, prepared by SC 28A, Insulation coordination for low-voltage equipment, of IEC TC 28, Insulation coordination, together with common modifications prepared by the Technical Committee CENELEC TC 28A, Insulation coordination for low-voltage equipment, was submitted to the formal vote and was approved by CENELEC as HD 625.1 S1 on 1996-03-05.

The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 1996-09-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 1997-03-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 1997-03-01

For products which have complied with the relevant national standard before 1997-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-03-01.

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, and D are informative.
Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 664-1:1992 was approved by CENELEC as a Harmonization Document with agreed common modifications as given below.

COMMON MODIFICATIONS**1.3.10 Overvoltage category**

A numeral defining an impulse withstand level.
No change in the note.

2.2 Voltages and voltage ratings

Second alinea:

Instead of "an overvoltage category according ..."

Read "an impulse withstand category (overvoltage category) ..."

2.2.2.1 Impulse withstand categories (overvoltage categories)

Impulse withstand categories are means to distinguish different degrees of availability of equipment with regard to required expectations on continuity of service and on an acceptable risk of failure. By selection of impulse withstand levels of equipment, insulation coordination can be achieved in the whole installation, reducing the risk of failure to an acceptable level providing a basis for overvoltage control.

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A higher characteristic numeral of an impulse withstand category indicates a higher specific impulse withstand of the equipment and offers a wider choice of methods for overvoltage control.

The concept of impulse withstand categories is used for equipment energised directly from the mains. The application of impulse withstand categories is based on the requirement with regard to additional protection against overvoltages as specified in IEC 364-4-443.

NOTE: Overvoltages of atmospheric origin are not significantly physically attenuated downstream in most installations. Investigations have shown that the concept of a probabilistic approach has proven reasonable and useful.

2.2.2.1.1 Equipment energised directly from the low-voltage mains

Specification of a specific impulse withstand category (overvoltage category) shall be based on the following general explanation:

- Equipment of impulse withstand category I is equipment which is intended to be connected to the fixed electrical installations of buildings. Protective means are taken outside the equipment - either in the fixed installation or between the fixed installation and the equipment - to limit transient overvoltages to the specific level.
- Equipment of impulse withstand category II is equipment to be connected to the fixed electrical installations of buildings.

NOTE: Examples of such equipment are household appliances, portable tools and similar loads.

- Equipment of impulse withstand category III is equipment which is part of the fixed electrical installations and other equipment where a higher degree of availability is expected.

NOTE: Examples of such equipment are distribution boards, circuit breakers, wiring systems (IEV 826-06-01, including cables, bus-bars, junction boxes, switches, socket-outlets) in the fixed installation, and equipment for industrial use and some other equipment, e.g. stationary motors with permanent connection to the fixed installation.

- Equipment of impulse withstand category IV is for use at or in the proximity of the origin of the electrical installations of buildings upstream of the main distribution board.

NOTE: Examples of such equipment are electricity meters, primary overcurrent protection devices and ripple control units.

2.2.2 Table I

Table I - Rated impulse voltage of equipment

Nominal voltage of the installation * (V)		Required impulse withstand voltage (kV) for			
Three-phase systems	Single-phase systems with middle point	Equipment at the origin of the installation (impulse withstand category IV)	Equipment which is part of the fixed installation (impulse withstand category III)	Equipment to be connected to the fixed installation (impulse withstand category II)	Specially protected equipment (impulse withstand category I)
	120- 240	4	2,5	1,5	0,8
230/400 277/480		6	4	2,5	1,5
400/690		8	6	4	2,5
1000		Values subject to systems engineers or for lack of information, the values of the above line can be chosen			
* According to IEC 38					
Category I is addressed to particular equipment engineering, category II is addressed to product committees for equipment for connection to the mains, category III is addressed to product committees of installation material and some special product committees, category IV is addressed to supply authorities and systems engineers (see also introduction).					

4.1.2 Paragraph above the last one - Read:

"Partial discharge tests shall be specified unless it can be shown that PD are not likely to appear (the peak value of the voltage is below 500 V) or that insulation, for example ceramics, has an adequate life in the presence of partial discharges.

Annex ZA (normative)

Normative references to international publications
with their corresponding European publications

This Harmonisation document 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 Harmonisation document 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 38 (mod)	1983	IEC standard voltages ¹⁾	HD 472 S1	1989
IEC 50(151)	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices	-	-
IEC 50(604)	1987	Chapter 604: Generation, transmission and distribution of electricity - Operation	-	-
IEC 60-1	1989	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 68-1	1988	Environmental testing Part 1: General and guidance	EN 60068-1 ²⁾	1994
IEC 68-2-2	1974	Part 2: Tests - Test B: Dry heat	EN 60068-2-2 ³⁾	1993
IEC 68-2-3	1969	Part 2: Tests - Test Ca: Damp heat, steady state	HD 323.2.3 S2 ⁴⁾	1987
IEC 68-2-14	1984	Part 2: Tests - Test N: Change of temperature	HD 323.2.14 S2 ⁵⁾	1987
IEC 85	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990
IEC 99-1	1991	Surge arresters Part 1: Non-linear resistor type gapped surge arresters for a.c. systems	EN 60099-1	1994

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

2) EN 60068-1 includes the corrigendum October 1988 and A1:1992 to IEC 68-1.

3) EN 60068-2-2 includes supplement A:1976 to IEC 68-2-2.

4) HD 323.2.3 S2 includes A1:1984 to IEC 68-2-3.

5) HD 323.2.14 S2 includes A1:1986 to IEC 68-2-14.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 112	1979	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions	HD 214 S2	1980
IEC 216	series	Guide for the determination of thermal endurance properties of electrical insulating materials	HD 611 EN 60216-3-2	series 1995
IEC 243-1 (mod)	1988	Methods of test for electric strength of solid insulating materials Part 1: Tests at power frequencies	HD 559.1 S1	1991
IEC 335-1 (mod)	1991	Safety of household and similar electrical appliances Part 1: General requirements	EN 60335-1	1994
IEC 364-4-41	1982 ⁶⁾	Electrical installations of buildings Part 4: Protection for safety Chapter 41: Protection against electric shock	-	-
IEC 364-4-442	1992	Chapter 44: Protection against overvoltages Section 442: Protection of low-voltage installations against faults between high-voltage systems and earth	-	-
IEC 364-4-443	1990	Section 443: Protection against overvoltages of atmospheric origin or due to switching	-	-
IEC 364-5-537 (mod)	1981	Part 5: Selection and erection of electrical equipment Chapter 53: Switchgear and controlgear Section 537: Devices for isolation and switching	HD 384.5.537 S1	1987
A1	1989		-	-
IEC 529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 536	1976	Classification of electrical and electronic equipment with regard to protection against electric shock	HD 366 S1	1977
IEC 669-1 (mod)	1981	Switches for household and similar fixed electrical installations Part 1: General requirements	EN 60669-1	1995
IEC 730-1 (mod)	1986	Automatic electrical controls for household and similar use Part 1: General requirements	EN 60730-1 + corr. November	1991 ⁷⁾ 1993

6) IEC 364-4-41:1992 is harmonized as HD 384.4.41 S2.

7) IEC 730-1:1993 is harmonized as EN 60730-1:1995. EN 60730-1:1991 remains valid until all part 2's which are used in conjunction with it have been withdrawn.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC Guide 104	1984	Guide to the drafting of safety standards, and the role of Committees with safety pilot functions and safety group functions	-	-

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**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC
664-1**

Première édition
First edition
1992-10

**PUBLICATION FONDAMENTALE DE SÉCURITÉ
BASIC SAFETY PUBLICATION**

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

Partie 1:

Principes, prescriptions et essais

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**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 formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

This part of International Standard IEC 664 has been prepared by Sub-Committee 28A: Insulation coordination for low-voltage equipment, of IEC Technical Committee No. 28: Insulation coordination.

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It cancels and replaces IEC 664 (1980), amendment 1 (1989), and IEC 664A (1981).

It forms part 1 of IEC 664.

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IEC 664 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: Concise requirements for clearances, creepage distances and solid insulation. (Under consideration.)

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

Part 4: Application guide. (Under consideration.)

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

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

DIS	Reports on Voting	Amendments to DIS	Reports on Voting
28A(CO)28 28A(CO)29	28A(CO)31 28A(CO)34	28A(CO)32 28A(CO)33	28A(CO)35 28A(CO)36

Full information on the voting for the approval of this part of IEC 664 can be found in the Voting Reports indicated in the above table.

Annexes A to D are for information only.

INTRODUCTION

This part of IEC 664 is a revision of the 1st edition of IEC 664 (including 664A and amendment No. 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 664 series in which some further parts are foreseen as follows:

- IEC 664-2 will cover concise requirements for clearances, creepage distances and solid insulation.
- IEC 664-3 will cover use of coatings to achieve insulation coordination of printed board assemblies.
- IEC 664-4 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; [SIST HD 625.1 S1:1999](https://standards.iteh.ai/catalog/standards/sist/d9ad891f-6f2c-47ab-aaf5-77ac91c0e4ff/sist-hd-625-1-s1-1999)
 - internal circuits of equipment; <https://standards.iteh.ai/catalog/standards/sist/d9ad891f-6f2c-47ab-aaf5-77ac91c0e4ff/sist-hd-625-1-s1-1999>
- 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 364-4-41, IEC 364-4-442 and 364-4-443;
- 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 664 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.

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This part does not deal with distances

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

NOTES

- 1 Extension of the scope up to 1 MHz is under consideration.
- 2 Higher voltages may exist in internal circuits of the equipment.
- 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.