SLOVENSKI STANDARD
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Protection against lightning -- Part 4: Electrical and electronic systems within structures

Protection contre la foudre -- Partie 4: Réseaux de puissance et de communication dans les structures

Ta slovenski standard je istoveten z: **FprEN 62305-4:2009**

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Also of interest to the following committees Intéresse également les comités suivants SC 37A,TC 64,TC 77	Supersedes document Remplace le document 81/298/CD - 81/305/CC

Proposed horizontal standard
Norme horizontale suggérée

☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the TC/SC secretary
Les autres CE/SC sont requis d'indiquer leur intérêt, si nécessaire, dans ce CDV à l'intention du secrétaire du CE/SC

Functions concerned
Fonctions concernées

☒ Safety Sécurité	☐ EMC CEM	☐ Environment Environnement	☐ Quality assurance Assurance qualité

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Titre : Protection contre la foudre - Partie 4: Réseaux de puissance et de communication dans les structures

Title : Protection against lightning. Part 4: Electrical and electronic systems within structures

Note d'introduction

Introductory note

This CDV is circulated in English only in the absence of a French version from the French national committee within two months from date of request.

ATTENTION **VOTE PARALLÈLE** **CEI – CENELEC** L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle. Les membres du CENELEC sont invités à voter via le système de vote en ligne du CENELEC.	**ATTENTION** **IEC – CENELEC** **PARALLEL VOTING** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) for an International Standard is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PROTECTION AGAINST LIGHTNING –

Part 4: Electrical and electronic systems within structures

FOREWORD

1) The International Electrotechnical Commission (IEC) 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, 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 62305-4 has been prepared by IEC technical committee 81: Lightning protection.

The text of this second edition of IEC 62305-4 is compiled from and replaces IEC 62305-4, first edition (2006).

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

FDIS	Report on voting
81/xxx/FDIS	81/xxx/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, as closely as possible, in accordance with the ISO/IEC Directives, Part 2.

IEC 62305 consists of the following parts, under the general title *Protection against lightning:*

Part 1: General principles

Part 2: Risk management

Part 3: Physical damage to structures and life hazard

Part 4: Electrical and electronic systems within structures

The Committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

Lightning as a source of harm is a very high-energy phenomenon. Lightning flashes release many hundreds of mega-joules of energy. When compared with the milli-joules of energy that may be sufficient to cause damage to sensitive electronic equipment in electrical and electronic systems within a structure, it is clear that additional protection measures will be necessary to protect some of this equipment.

The need for this International Standard has arisen due to the increasing cost of failures of electrical and electronic systems, caused by electromagnetic effects of lightning. Of particular importance are electronic systems used in data processing and storage as well as process control and safety for plants of considerable capital cost, size and complexity (for which plant outages are very undesirable for cost and safety reasons).

Lightning can cause different types of damage in a structure, as defined in IEC 62305-1:

D1 injuries to living beings due to touch and step voltages;

D2 physical damage due to mechanical, thermal, chemical and explosive effects;

D3 failures of electrical and electronic systems due to electromagnetic effects.

IEC 62305-3 deals with the protection measures to reduce the risk of physical damage and life hazard, but does not cover the protection of electrical and electronic systems.

This Part 4 of IEC 62305 therefore provides information on protection measures to reduce the risk of permanent failures of electrical and electronic systems within structures.

Permanent failure of electrical and electronic systems can be caused by the lightning electromagnetic impulse (LEMP) via:

a) conducted and induced surges transmitted to equipment via connecting wiring;

b) the effects of radiated electromagnetic fields directly into equipment itself.

Surges to the structure can originate from sources external to the structure or from within the structure itself:

– surges which originate externally from the structure are created by lightning flashes striking incoming lines or the nearby ground, and are transmitted to electrical and electronic systems within the structure via these lines.

– surges which originate internally within the structure are created by lightning flashes striking the structure itself or the nearby ground.

NOTE - Surges can also originate internally within the structure, from switching effects e.g. switching of inductive loads.

The coupling can arise from different mechanisms:

– resistive coupling (e.g. the earth impedance of the earth-termination system or the cable shield resistance),

– magnetic field coupling (e.g. caused by wiring loops in the electrical and electronic system or by inductance of bonding conductors),

– electric field coupling (e.g. caused by rod antenna reception).

NOTE The effects of electric field coupling are generally very small when compared to the magnetic field coupling and can be disregarded.

Radiated electromagnetic fields can be generated via

– the direct lightning current flowing in the lightning channel,

– the partial lightning current flowing in conductors (e.g. in the down conductors of an external LPS in accordance with IEC 62305-3 or in an external spatial shield in accordance with this standard).

PROTECTION AGAINST LIGHTNING –

Part 4: Electrical and electronic systems within structures

1 Scope

This part of IEC 62305 provides information for the design, installation, inspection, maintenance and testing of electrical and electronic system protection (ESP), and measures to reduce the risk of permanent failures due to lightning electromagnetic impulse (LEMP) within a structure.

This standard does not cover protection against electromagnetic interference due to lightning, which may cause malfunctioning of electronic systems. However, the information reported in Annex A can also be used to evaluate such disturbances. Protection measures against electromagnetic interference are covered in IEC 60364-4-44 and in the IEC 61000 series [1][1].

This standard provides guidelines for cooperation between the designer of the electrical and electronic system, and the designer of the protection measures, in an attempt to achieve optimum protection effectiveness.

This standard does not deal with detailed design of the electrical and electronic systems themselves.

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 60364-4-44:2001, *Electrical installations of buildings – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-53:2001, *Electrical installations of building – Part 5-53: Selection and erection of electrical equipment– Isolation, switching and control*

IEC 60664-1:2002, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 61000-4-5:1995, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-9:1993, *Electromagnetic compatibility (EMC) – Part 4-9: Testing and measurement techniques – Pulse magnetic field immunity test*

IEC 61000-4-10:1993, *Electromagnetic compatibility (EMC) – Part 4-10: Testing and measurement techniques – Damped oscillatory magnetic field immunity test*

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1 Figures in square brackets refer to the bibliography.

IEC 61000-5-2:1997, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 2: Earthing and cabling*

IEC 61643-1:2005, *Surge protective devices connected to low-voltage power distribution systems – Part 1: Performance requirements and testing methods*

IEC 61643-12:2002, *Low-voltage surge protective devices – Part 12: Surge protective devices connected to low-voltage power distribution systems – Selection and application principles*

IEC 61643-21:2000, *Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signalling networks – Performance requirements and testing methods*

IEC 61643-22:2004, *Low voltage surge protective devices – Part 22: Surge protective devices connected to telecommunications and signalling networks – Selection and application principles*

IEC 62305-1, *Protection against lightning. Part 1: General principles*

IEC 62305-2, *Protection against lightning. Part 2: Risk management*

IEC 62305-3, *Protection against lightning. Part 3: Physical damage to structures and life hazard*

ITU-T Recommendation K.20:2003, *Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents*

ITU-T Recommendation K.21:2003, *Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents*

ITU-T Recommendation K.45: 2003, *Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in other parts of IEC 62305, apply.

3.1
electrical system
system incorporating low voltage power supply components

3.2
electronic system
system incorporating sensitive electronic components such as telecommunication equipment, computer, control and instrumentation systems, radio systems, power electronic installations

3.3
internal systems
electrical and electronic systems within a structure

3.4
lightning protection
LP
complete system for the protection of structures and/or electrical and electronic systems from the effects of lightning, consisting of an LPS and ESP

3.5
lightning protection system
LPS
complete system used to reduce physical damage due to lightning flashes to a structure

NOTE It consists of both external and internal lightning protection systems.

3.6
lightning electromagnetic impulse
LEMP
all electromagnetic effects of lightning current via resistive, inductive and capacitive coupling that create surges and electromagnetic fields

3.7
surge
transient created by LEMP that appears as an overvoltage and/or overcurrent

3.8
rated impulse withstand voltage level
U_W
impulse withstand voltage assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against overvoltages

NOTE For the purposes of this standard, only withstand voltage between live conductors and earth is considered.

3.9
lightning protection level
LPL
number related to a set of lightning current parameters relevant to the probability that the associated maximum and minimum design values will not be exceeded in naturally occurring lightning

NOTE Lightning protection level is used to design protection measures in accordance with the relevant set of lightning current parameters.

3.10
lightning protection zone
LPZ
zone where the lightning electromagnetic environment is defined

NOTE The zone boundaries of an LPZ are not necessarily physical boundaries (e.g. walls, floor and ceiling).

3.11
electrical and electronic system protection
ESP
measures taken to protect internal systems against the effects of LEMP

NOTE This is part of the overall LP.

3.12
grid-like spatial shield
magnetic shield characterized by openings

NOTE For a building or a room, it is preferably built by interconnected natural metal components of the structure (e.g. rods of reinforcement in concrete, metal frames and metal supports).

3.13
earth-termination system
part of an external LPS which is intended to conduct and disperse lightning current into the earth

3.14
bonding network
interconnecting network of all conductive parts of the structure and of internal systems (live conductors excluded) to the earth-termination system

3.15
earthing system
complete system combining the earth-termination system and the bonding network

3.16
surge protective device
SPD
device intended to limit transient overvoltages and divert surge currents. It contains at least one non-linear component

3.17

SPD tested with I_{imp}
SPDs which withstand the partial lightning current with a typical waveform 10/350 μs and require a corresponding impulse test current I_{imp}

NOTE For power lines, a suitable test current I_{imp} is defined in the Class I test procedure of IEC 61643-1.

3.18
SPD tested with I_n
SPDs which withstand induced surge currents with a typical waveform 8/20 μs and require a corresponding impulse test current I_n

NOTE For power lines a suitable test current I_n is defined in the Class II test procedure of IEC 61643-1.

3.19

SPD tested with a combination wave
SPDs that withstand induced surge currents with a typical waveform 8/20 μs and require a corresponding impulse test current I_{sc}

NOTE For power lines a suitable combination wave test is defined in the Class III test procedure of IEC 61643-1 defining the open circuit voltage U_{oc} 1,2/50 μs and the short-circuit current I_{sc} 8/20 μs of a 2 Ω combination wave generator.

3.20
voltage-switching type SPD
SPD that has a high impedance when no surge is present, but can have a sudden change in impedance to a low value in response to a voltage surge

NOTE 1 Common examples of components used as voltage switching devices include spark gaps, gas discharge tubes (GDT), thyristors (silicon controlled rectifiers) and triacs. These SPDs are sometimes called "crowbar type".

NOTE 2 A voltage switching device has a discontinuous voltage/current characteristic.

3.21
voltage-limiting type SPD
SPD that has a high impedance when no surge is present, but will reduce it continuously with increased surge current and voltage

NOTE 1 Common examples of components used as non-linear devices are varistors and suppressor diodes. These SPDs are sometimes called "clamping type".