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**Zaščita pred delovanjem strele - 4. del: Električni in elektronski sistemi v zgradbah
(IEC 62305-4:2006)**

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

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Blitzschutz -- Teil 4: Elektrische und elektronische Systeme in baulichen Anlagen

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

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Protection against lightning
Part 4: Electrical and electronic systems within structures
(IEC 62305-4:2006)

Protection contre la foudre
Partie 4: Réseaux de puissance et de
communication dans les structures
(CEI 62305-4:2006)

Blitzschutz
Teil 4: Elektrische und elektronische
Systeme in baulichen Anlagen
(IEC 62305-4:2006)

This European Standard was approved by CENELEC on 2006-02-01. 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.

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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 document 81/265/FDIS, future edition 1 of IEC 62305-4, prepared by IEC TC 81, Lightning protection, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62305-4 on 2006-02-01.

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) 2006-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-02-01

This European Standard makes reference to International Standards. Where the International Standard referred to has been endorsed as a European Standard or a home-grown European Standard exists, this European Standard shall be applied instead. Pertinent information can be found on the CENELEC web site.

Endorsement notice

The text of the International Standard IEC 62305-4:2006 was approved by CENELEC as a European Standard without any modification.

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Part 4: Electrical and electronic systems within structures
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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 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 62305-4 has been prepared by IEC technical committee 81: Lightning protection.

The IEC 62305 series (Parts 1 to 5), is produced in accordance with the New Publications Plan, approved by National Committees (81/171/RQ (2001-06-29)), which restructures in a more simple and rational form and updates the publications of the IEC 61024 series, IEC 61312 series and the IEC 61663 series.

The text of this first edition of IEC 62305-4 is compiled from and replaces

- IEC 61312-1, first edition (1995);
- IEC 61312-2, first edition (1998);
- IEC 61312-3, first edition (2000);
- IEC 61312-4, first edition (1998).

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

FDIS	Report on voting
81/265/FDIS	81/270/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 close 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

Part 5: Services¹

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 [SIST EN 62305-4:2006](https://standards.iteh.ai/catalog/standards/sist/c220042c-8d86-45ee-b97a-4b9c391a4de1/sist-en-62305-4-2006)
- amended. <https://standards.iteh.ai/catalog/standards/sist/c220042c-8d86-45ee-b97a-4b9c391a4de1/sist-en-62305-4-2006>

¹ To be published.

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 62305-2:

- 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: [SIST EN 62305-4:2006](https://standards.iteh.ai/catalog/standards/sist/c220042c-8d86-45ee-b97a-4b9c591a4de1/sist-en-62305-4-2006)

- a) conducted and induced surges transmitted to apparatus via connecting wiring;
- b) the effects of radiated electromagnetic fields directly into apparatus itself.

Surges to the structure can be generated externally or internally:

- surges external to the structure are created by lightning flashes striking incoming lines or the nearby ground, and are transmitted to electrical and electronic systems via these lines;
- surges internal to the structure are created by lightning flashes striking the structure or the nearby ground.

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 according to IEC 62305-3 or in an external spatial shield according to this standard).

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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 a LEMP protection measures system (LPMS) for electrical and electronic systems within a structure, able to reduce the risk of permanent failures due to lightning electromagnetic impulse.

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]².

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.

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2 Normative references

SIST EN 62305-4:2006

<https://standards.iteh.ai/catalog/standards/sist/c220042c-8d86-45ee-b97a-49c59144d181/iec-62305-4-2006>

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*

² 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 61643-1:1998, *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 – Part 22: 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*

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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 overcurrent*

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 communication 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 electromagnetic impulse

LEMP

electromagnetic effects of lightning current

NOTE It includes conducted surges as well as radiated impulse electromagnetic field effects.

3.5

surge

transient wave appearing as overvoltage and/or overcurrent caused by LEMP

NOTE Surges caused by LEMP can arise from (partial) lightning currents, from induction effects in installation loops and as a remaining threat downstream of SPD.

3.6

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.

3.7

lightning protection level

LPL

number related to a set of lightning current parameters values 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 according to the relevant set of lightning current parameters.

3.8

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).

3.9

LEMP protection measures system

LPMS

complete system of protection measures for internal systems against LEMP

3.10

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).

3.11

earth-termination system

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

3.12

bonding network

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

3.13

earthing system

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

3.14

surge protective device

SPD

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