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

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This standard includes the English version of the European Standard.

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**Protection against lightning - Part 4: Electrical and electronic systems within structures
(IEC 62305-4:2024)**Protection contre la foudre - Partie 4: Réseaux de puissance et de communication dans les structures
(IEC 62305-4:2024)Blitzschutz - Teil 4: Elektrische und elektronische Systeme in baulichen Anlagen
(IEC 62305-4:2024)

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EN IEC 62305-4:2024 (E)**European foreword**

The text of document 81/733/FDIS, future edition 3 of IEC 62305-4, prepared by TC 81 "Lightning protection" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62305-4:2024.

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

IEC 60364-4-43	NOTE	Approved as HD 60364-4-43
IEC 60364-4-44:2007	NOTE	Approved as HD 60364-4-444:2010
IEC 60364-4-44:2007/A1:2015	NOTE	Approved as HD 60364-4-443:2016
IEC 61000 series	NOTE	Approved as EN IEC 61000 series
IEC 62475	NOTE	Approved as EN 62475
IEC 60060 series	NOTE	Approved as EN 60060 series
IEC 62793	NOTE	Approved as EN IEC 62793
IEC 60038	NOTE	Approved as EN 60038
IEC 61643-351	NOTE	Approved as EN 61643-351
IEC 61643-352	NOTE	Approved as EN IEC 61643-352

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60364-5-53	2019	Low-voltage electrical installations -- Part 5-53: Selection and erection of electrical equipment - Protection, isolation, switching, control and monitoring	-	-
IEC 60664-1	-	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	-
IEC 61000-4-5	-	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	-
IEC 61000-4-9	-	Electromagnetic compatibility (EMC) – Part 4-9: Testing and measurement techniques – Impulse magnetic field immunity test	EN 61000-4-9	-
IEC 61000-4-10	-	Electromagnetic compatibility (EMC) – Part 4-10: Testing and measurement techniques – Damped oscillatory magnetic field immunity test	EN 61000-4-10	-
IEC 61643-11 (mod)	2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods	EN 61643-11	2012
-	-		+ A11	2018
IEC 61643-12	2020	Low-voltage surge protective devices - Part 12: Surge protective devices connected to low-voltage power systems - Selection and application principles	-	-
IEC 61643-21	-	Low voltage surge protective devices - Part 21: Surge protective devices connected to telecommunications and signalling networks - Performance requirements and testing methods	EN 61643-21	-

EN IEC 62305-4:2024 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61643-22	-	Low-voltage surge protective devices - Part 22: Surge protective devices connected to telecommunications and signalling networks - Selection and application principles	CLC/TS 61643-22	-
IEC 61643-31	-	Low-voltage surge protective devices – Part 31: Requirements and test methods for SPDs for photovoltaic installations	EN 61643-31	-
IEC 61643-32	2017	Low-voltage surge protective devices – Part 32: Surge protective devices connected to the d.c. side of photovoltaic installations – Selection and application principles	-	-
IEC 62305-1	2024	Protection against lightning - Part 1: General principles	EN IEC 62305-1	2024
IEC 62305-2	2024	Protection against lightning - Part 2: Risk management	EN IEC 62305-2	2024
IEC 62305-3	2024	Protection against lightning - Part 3: Physical damage to structures and life hazard	EN IEC 62305-3	2024
IEC 62561	series	Lightning protection system components (LPSC) - Part 1: Requirements for connection components	EN IEC 62561	series



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NORME INTERNATIONALE



**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**





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INTERNATIONAL 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**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PROTECTION AGAINST LIGHTNING –

Part 4: Electrical and electronic systems within structures

FOREWORD

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IEC 62305-4 has been prepared by IEC technical committee 81: Lightning protection. It is an International Standard.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) addition of new informative Annex E and Annex F on the determination of current sharing using modelling and current sharing in PV installations respectively;
- b) addition of a new informative Annex G on methods of testing of system level behaviour;
- c) addition of a new informative Annex H on induced voltages in SPD-protected installations.

The text of this International Standard is based on the following documents:

Draft	Report on voting
81/733/FDIS	81/752/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62305 series, published under the general title *Protection against lightning*, can be found on the IEC website.

The following differing practices of a less permanent nature exist in the countries indicated below.

- 1) Subclause 5.6: In Japan, the minimum values of the cross-section are reduced from:
 - 16 mm² to 14 mm² for copper and 25 mm² to 22 mm² for aluminium, for bonding conductors connecting different bonding bars and conductors connecting the bars to the earth-termination system;
 - 6 mm² to 5 mm² for copper, 10 mm² to 8 mm² for aluminium and 16 mm² to 14 mm² for steel, for bonding conductors connecting internal metal installations to the bonding bars;
 - 16 mm² to 14 mm², 6 mm² to 5 mm² and 2,5 mm² to 2 mm² for copper, for earthing conductors to the SPD, conductors connecting SPDs and overcurrent protective devices to live conductors.
- 2) Subclause E.3.2.3: In South Africa SANS 10142-1:2020, Clause 6.1.6 [1]¹ states that 'The neutral conductor shall not be connected direct to earth or to the earth continuity conductor on the load side of the point of control'.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

¹ Numbers in square brackets refer to the Bibliography.

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 can be enough to cause damage to sensitive electronic equipment in electrical and electronic systems within a structure, 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 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.

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 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:

- conducted and induced surges transmitted to equipment via connecting wiring;
- 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 1 Surges can also originate internally within the structure, from switching effects, e.g. switching of inductive loads, tripping of circuit breakers, blowing of fuses.

NOTE 2 Further information about the protection against switching overvoltages created within structures can be found in IEC 60364-4-43 [2], IEC 60364-5-53 and IEC 61643-12.

Coupling can arise from different mechanisms, namely:

- 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 3 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, or its natural components, in accordance with IEC 62305-3 or in an external spatial shield in accordance with this document).

PROTECTION AGAINST LIGHTNING –

Part 4: Electrical and electronic systems within structures

1 Scope

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

This document does not cover protection against electromagnetic interference due to lightning, which can cause malfunctioning of internal 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 [3] and in the IEC 61000 series [4].

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

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60364-5-53:2019, *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Devices for protection for safety, isolation, switching, control and monitoring*

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

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

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

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

IEC 61643-11:2011, *Low-voltage surge protective devices– Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods*

IEC 61643-12:2020, *Low-voltage surge protective devices – Part 12: Surge protective devices connected to low-voltage power systems – Selection and application principles*

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

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

IEC 61643-31, *Low-voltage surge protective devices – Part 31: Requirements and test methods for SPDs for photovoltaic installations*

IEC 61643-32:2017, *Low-voltage surge protective devices – Part 32: Surge protective devices connected to the d.c. side of photovoltaic installations – Selection and application principles*

IEC 62305-1:2024, *Protection against lightning – Part 1: General principles*

IEC 62305-2:2024, *Protection against lightning – Part 2: Risk management*

IEC 62305-3:2024, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

IEC 62561 (all parts), *Lightning protection system components (LPSC)*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN