

INTERNATIONAL STANDARD

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

**Protection contre la foudre –
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PROTECTION AGAINST LIGHTNING –

Part 4: Electrical and electronic systems within structures

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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'.

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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).