

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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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	9
2 Normative references	9
3 Terms and definitions	10
4 Design and installation of SPM	13
4.1 General.....	13
4.2 Design of SPM	16
4.3 Lightning protection zones (LPZ).....	17
4.4 Basic SPM	20
5 Earthing and bonding	21
5.1 General.....	21
5.2 Earth-termination system.....	22
5.3 Bonding network.....	24
5.4 Bonding bars	28
5.5 Bonding at the boundary of an LPZ	29
5.6 Material and dimensions of bonding components.....	29
6 Magnetic shielding and line routing.....	30
6.1 General	30
6.2 Spatial shielding.....	30
6.3 Shielding of internal lines	30
6.4 Routing of internal lines.....	30
6.5 Shielding of external lines	31
6.6 Material and dimensions of magnetic shields.....	31
7 Coordinated SPD system.....	31
8 Isolating interfaces	32
9 SPM management	32
9.1 General.....	32
9.2 SPM management plan	32
9.3 Inspection of SPM	33
9.3.1 General	33
9.3.2 Inspection procedure	34
9.3.3 Inspection documentation.....	34
9.4 Maintenance.....	35
Annex A (informative) Basis of electromagnetic environment evaluation in an LPZ	36
Annex B (informative) Implementation of SPM for an existing structure.....	60
Annex C (informative) Selection and installation of a coordinated SPD system	76
Annex D (informative) Factors to be considered in the selection of SPDs.....	82
Bibliography.....	87
Figure 1 – General principle for the division into different LPZ	13
Figure 2 – Examples of possible SPM (LEMP protection measures).....	15
Figure 3 – Examples for interconnected LPZ.....	19
Figure 4 – Examples for extended lightning protection zones	20

Figure 5 – Example of a three-dimensional earthing system consisting of the bonding network interconnected with the earth-termination system	22
Figure 6 – Meshed earth-termination system of a plant	23
Figure 7 – Utilization of reinforcing rods of a structure for equipotential bonding	25
Figure 8 – Equipotential bonding in a structure with steel reinforcement	26
Figure 9 – Integration of conductive parts of internal systems into the bonding network	27
Figure 10 – Combinations of integration methods of conductive parts of internal systems into the bonding network	28
Figure A.1 – LEMP situation due to lightning strike	37
Figure A.2 – Simulation of the rise of magnetic field by damped oscillations	40
Figure A.3 – Large volume shield built by metal reinforcement and metal frames	41
Figure A.4 – Volume for electrical and electronic systems inside an inner LPZ n.....	42
Figure A.5 – Reducing induction effects by line routing and shielding measures	43
Figure A.6 – Example of SPM for an office building.....	45
Figure A.7 – Evaluation of the magnetic field values in case of a direct lightning strike	46
Figure A.8 – Evaluation of the magnetic field values in case of a nearby lightning strike	48
Figure A.9 – Distance s_a depending on rolling sphere radius and structure dimensions	51
Figure A.10 – Types of grid-like large volume shields	52
Figure A.11 – Magnetic field strength $H_{1/MAX}$ inside a grid-like shield type 1.....	53
Figure A.12 – Magnetic field strength $H_{1/MAX}$ inside a grid-like shield type 1 according to mesh width	54
Figure A.13 – Low-level test to evaluate the magnetic field inside a shielded structure	55
Figure A.14 – Voltages and currents induced into a loop formed by lines	56
Figure B.1 – SPM design steps for an existing structure	63
Figure B.2 – Possibilities to establish LPZ in existing structures	67
Figure B.3 – Reduction of loop area using shielded cables close to a metal plate	69
Figure B.4 – Example of a metal plate for additional shielding	70
Figure B.5 – Protection of aerials and other external equipment	71
Figure B.6 – Inherent shielding provided by bonded ladders and pipes	72
Figure B.7 – Ideal positions for lines on a mast (cross-section of steel lattice mast).....	72
Figure B.8 – Upgrading of the SPM in existing structures.....	74
Figure C.1 – Surge voltage between live conductor and bonding bar	79
Figure D.1 – Installation example of test class I, class II and class III SPDs	83
Figure D.2 – Basic example for different sources of damage to a structure and lightning current distribution within a system	84
Figure D.3 – Basic example of balanced current distribution	85
Table 1 – Minimum cross-sections for bonding components	30
Table 2 – SPM management plan for new buildings and for extensive changes in construction or use of buildings	33
Table A.1 – Parameters relevant to source of harm and equipment.....	38
Table A.2 – Examples for $I_{0MAX} = 100$ kA and $w_m = 2$ m	48
Table A.3 – Magnetic attenuation of grid-like spatial shields for a plane wave.....	49
Table A.4 – Rolling sphere radius corresponding to maximum lightning current	51

Table A.5 – Examples for $I_{0/MAX} = 100$ kA and $w_m = 2$ m corresponding to $SF = 12,6$ dB	51
Table B.1 – Structural characteristics and surroundings	60
Table B.2 – Installation characteristics	61
Table B.3 – Equipment characteristics	61
Table B.4 – Other questions to be considered for the protection concept	61
Table D.1 – Preferred values of I_{imp}	82

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PROTECTION AGAINST LIGHTNING –

Part 4: Electrical and electronic systems within structures

FOREWORD

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

This second edition cancels and replaces the first edition, published in 2006, and constitutes a technical revision.

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

- 1) Isolating interfaces capable of reducing conducted surges on lines entering the structure are introduced.
- 2) Minimum cross-sections for bonding components are slightly modified.
- 3) First negative impulse current is introduced for calculation purposes as electromagnetic source of harm to the internal systems.
- 4) Selection of SPD with regard to voltage protection level is improved to take into account oscillation and induction phenomena in the circuit downstream of SPD.
- 5) Annex C dealing with SPD coordination is withdrawn and referred back to SC 37A.

- 6) A new informative Annex D is introduced giving information on factors to be considered in the selection of SPDs.

This bilingual version (2012-06) corresponds to the monolingual English version, published in 2010-12.

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

FDIS	Report on voting
81/373/FDIS	81/383/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.

The French version of this standard has not been voted upon.

This publication has been drafted, as closely as possible, in accordance with the ISO/IEC Directives, Part 2.

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

The committee has decided that the contents of this publication will remain unchanged until the stability 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 injury to living beings by electric shock;
- D2 physical damage (fire, explosion, mechanical destruction, chemical release) due to lightning current effects, including sparking;
- D3 failure of internal systems due to LEMP.

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 1 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 2 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).