

## საქართველოს სტანდარტი

---

დაცვა ელვისგან - ნაწილი 4: ელექტრული და ელექტრონული სისტემები  
სტრუქტურებში

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

საქართველოს სტანდარტებისა და მეტროლოგიის  
ეროვნული სააგენტო  
თბილისი

საინფორმაციო მონაცემები

1 შემუშავებულია საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს სტანდარტების დეპარტამენტის მიერ

2 დამტკიცებულია და შემოღებულია სამოქმედოდ საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს 2019 წლის 30 სექტემბრის № 68 განკარგულებით

3 მიღებულია გარეკანის თარგმნის მეთოდით საერთაშორისო ელექტროტექნიკური კომისიის სტანდარტი იეკ 62305-4:2010 „დაცვა ელვისგან - ნაწილი 4: ელექტრული და ელექტრონული სისტემები სტრუქტურებში“

4 პირველად

5 რეგისტრირებულია საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს რეესტრში: 2019 წლის 30 სექტემბერი №268-1.3-015247

დაუშვებელია წინამდებარე სტანდარტის სრული ან ნაწილობრივი კვლავწარმოება, ტირაჟირება და გავრცელება სსიპ საქართველოს სტანდარტებისა და მეტროლოგიის ეროვნული სააგენტოს ნებართვის გარეშე

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

# INTERNATIONAL STANDARD

---

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





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2010 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00



IEC 62305-4

Edition 2.0 2010-12

# INTERNATIONAL STANDARD

---

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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 29.020; 91.120.40

ISBN 978-2-88912-283-7

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

## 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 Spatial shielding .....	30
6.2 Shielding of internal lines.....	30
6.3 Routing of internal lines .....	30
6.4 Shielding of external lines .....	31
6.5 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 Inspection procedure .....	34
9.3.2 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 .....	50
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.....	53
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 LPZs 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 $I_{0/MAX} = 100$ 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

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.



## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.

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.

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.

A bilingual version of this standard may be issued at a later date.