

ISBN 978-0-626-33816-9

**SANS 62305-4:2011**

Edition 2

**IEC 62305-4:2010**

Edition 2

## **SOUTH AFRICAN NATIONAL STANDARD**

### **Protection against lightning**

### **Part 4: Electrical and electronic systems within structures**

This national standard is the identical implementation of IEC 62305-4:2010, and is adopted with the permission of the International Electrotechnical Commission.

---

Published by SABS Standards Division  
1 Dr Lategan Road Groenkloof ☒ Private Bag X191 Pretoria 0001  
Tel: +27 12 428 7911 Fax: +27 12 344 1568

[www.sabs.co.za](http://www.sabs.co.za)

© SABS

**SABS**

---

**SANS 62305-4:2011**

Edition 2

**IEC 62305-4:2010**

Edition 2

**Table of changes**

<b>Change No.</b>	<b>Date</b>	<b>Scope</b>

**National foreword**

This South African standard was prepared by National Committee SABS/TC 067/SC 06, *Electricity distribution systems and components – Installations*, in accordance with procedures of the SABS, in compliance with annex 3 of the WTO/TBT agreement.

This SANS document was published in June 2011.

This SANS document supersedes SANS 62305-4:2007 (edition 1).

**Compliance with this document cannot confer immunity from legal obligations.**

**Reaffirmed and reprinted in May 2017.  
This document will be reviewed every five years  
and be reaffirmed, amended, revised or withdrawn.**



IEC 62305-4

Edition 2.0 2010-12

# INTERNATIONAL STANDARD

---

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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE **XC**

---

ICS 29.020; 91.120.40

ISBN 978-2-88912-283-7

## 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