

## **Piksekaitse. Osa 3: Ehitistele tekitatavad füüsilised kahjustused ja oht elule**

Protection against lightning - Part 3: Physical damage to structures and life hazard

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 62305-3:2011 sisaldab Euroopa standardi EN 62305-3:2011 ingliskeelset teksti.

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**Protection against lightning -  
Part 3: Physical damage to structures and life hazard  
(IEC 62305-3:2010, modified)**

Protection contre la foudre -  
Partie 3: Dommages physiques sur les  
structures et risques humains  
(CEI 62305-3:2010, modifiée)

Blitzschutz -  
Teil 3: Schutz von baulichen Anlagen und  
Personen  
(IEC 62305-3:2010, modifiziert)

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European Committee for Electrotechnical Standardization  
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## Foreword

The text of the International Standard IEC 62305-3:2010, prepared by IEC TC 81, Lightning protection, together with common modifications prepared by the Technical Committee CENELEC TC 81X, Lightning protection, was submitted to the formal vote and was approved by CENELEC as EN 62305-3 on 2011-01-02.

This European Standard supersedes EN 62305-3:2006 + corr. Nov.2006 + corr. Sep.2008 + A11:2009.

This EN 62305-3:2011 includes the following significant technical changes with respect to EN 62305-3:2006 + corr. Nov.2006 + corr. Sep.2008 + A11:2009:

- 1) Minimum thicknesses of metal sheets or metal pipes given in Table 3 for air-termination systems are assumed as not able to prevent hot-spot problems.
- 2) Steel with electro-deposited copper is introduced as material suitable for LPS.
- 3) Some cross-sectional areas of LPS conductors were slightly modified.
- 4) For bonding purposes, isolating spark gaps are used for metal installations and SPD for internal systems.
- 5) Two methods – simplified and detailed – are provided for evaluation of separation distance.
- 6) Protection measures against injuries of living beings due to electric shock are considered also inside the structure.
- 7) Improved information for LPS in the case of structures with a risk of explosion are given in Annex D (normative).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- |  |       |            |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2012-01-02 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn   | (dow) | 2014-01-02 |

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## Endorsement notice

The text of the International Standard IEC 62305-3:2010 was approved by CENELEC as a European Standard with agreed common modifications as given below.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

[2] IEC 61400-24      NOTE Harmonized as EN 61400-24.

## COMMON MODIFICATIONS

### Through the complete document:

**Replace** all references to IEC 62305 by references to EN 62305.

**Replace** all references to IEC 62561 by references to EN 50164.

## 2 Normative references

**Replace** this subclause by:

The following referenced documents are indispensable for the application 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.

EN 50164-1	Lightning Protection Components (LPC) – Part 1: Requirements for connection components
EN 50164-2	Lightning Protection Components (LPC) – Part 2: Requirements for conductors and earth electrodes
EN 50164-3	Lightning Protection Components (LPC) – Part 3: Requirements for isolating spark gaps
EN 50164-4	Lightning Protection Components (LPC) – Part 4: Requirements for conductor fasteners
EN 50164-5	Lightning Protection Components (LPC) – Part 5: Requirements for earth electrode inspection housings and earth electrode seals
EN 50164-6	Lightning Protection Components (LPC) – Part 6: Requirements for lightning strike counters
EN 50164-7	Lightning Protection Components (LPC) – Part 7: Requirements for earthing enhancing compounds

NOTE The above mentioned standards EN 50164 series will ultimately be replaced by EN 62561 series. EN 50164 series will still be valid for 72 months from the issuing date of each part of the EN 50164 series.

EN 60079-10-1:2009	Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres (IEC 60079-10-1:2008)
EN 60079-10-2:2009	Explosive atmospheres – Part 10-2: Classification of areas – Combustible dust atmospheres (IEC 60079-10-2:2009)
EN 60079-14:2008	Explosive atmospheres – Part 14: Electrical installations design, selection and erection (IEC 60079-14:2007)
EN 61557-4	Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 4: Resistance of earth connection and equipotential bonding (IEC 61557-4)
EN 61643-11	Low-voltage surge protective devices – Part 1: Surge protective devices connected to low-voltage power distribution systems – Requirements and tests (IEC 61643-1)
EN 61643-21	Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signalling networks – Performance requirements and testing methods (IEC 61643-21)
EN 62305-1:2011	Protection against lightning – Part 1: General principles (IEC 62305-1:2010, modified)
EN 62305-2:2011	Protection against lightning – Part 2: Risk management (IEC 62305-2:2010, modified)
EN 62305-4:2011	Protection against lightning – Part 4: Electrical and electronic systems within structures (IEC 62305-4:2010, modified)

EN 62561 series <sup>1)</sup>	Lightning Protection System Components (LPSC) (IEC 62561 series)
EN 62561-1 <sup>2)</sup>	Lightning Protection System Components (LPSC) – Part 1: Requirements for connection components (IEC 62561)
EN 62561-3 <sup>2)</sup>	Lightning Protection System Components (LPSC) – Part 3: Requirements for isolating spark gaps (IEC 62561-3)
ISO 3864-1	Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs in workplaces and public areas

### 3 Terms and definitions

#### Definition 3.16

**Add** at the end of the paragraph: "... as defined in the EN 50164 series."

#### Definition 3.17

**Add** at the end of the paragraph: "... as defined in the EN 50164 series."

### 4 Lightning protection system (LPS)

#### 4.3 Continuity of steelwork in reinforced concrete structures

**Replace** NOTE 2 by:

NOTE 2 When the continuity of steelwork in reinforced concrete is intended to be established by clamping, specifically designed clamps complying with and tested according to EN 50164-1, should be used.

### 5 External lightning protection system

#### 5.5.1 General

After the first paragraph, **add** the following paragraph:

All components shall comply with the EN 50164 series.

#### 5.5.3 Connections

In the 2<sup>nd</sup> paragraph, **replace** "the future IEC 62561-1" with "EN 50164-1".

#### 5.6.2 Dimensions

**Replace** the first paragraph by:

Materials, configurations and minimum cross-sectional areas of air-termination conductors, air-termination rods, down-conductors and earth lead-in rods are given in Table 6 and shall comply with the requirements and tests according to the EN 50164 series.

**Add** at the beginning of the second paragraph "Materials, ..." and **replace** at the end of the paragraph "IEC 62561 series" with "EN 50164 series".

In Table 7, **delete** the NOTE "f".

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<sup>1)</sup> In preparation.

<sup>2)</sup> At draft stage.

## **Annex E (informative) Guidelines for the design, construction, maintenance and inspection of lightning protection systems**

### **E.4.2.3.2 Mechanical design**

In the first sentence of the NOTE, **replace** “may” with “should” and “IEC 62561” with “EN 50164”.

In the last paragraph, **replace** “could” with “should” and “IEC 62561” with “EN 50164”.

### **E.4.3.3 Welding or clamping to the steel-reinforcing rods**

In the NOTE, **replace** “IEC 62561 series of standards are suitable” with “EN 50164 series of standards should be used”.

### **E.4.3.7 Down-conductors**

**Replace** the 12<sup>th</sup> paragraph (i.e. after Figure E.9) by:

“If steel structures are used as down-conductors, every steel column should be connected to the steel reinforcing rods of the concrete foundation according to Figure E.7 by purposely designed bonding points complying with EN 50164 series.”

### **E.5.2.4.1 General information**

**Replace** the first paragraph by:

“The maximum permissible temperature for a conductor will not be exceeded if its cross-section complies with Table 6 and the EN 50164 series.”

### **E.5.2.4.2 Non-isolated air-termination**

After the 2<sup>nd</sup> paragraph, **add** the following NOTE:

NOTE For more details see EN 50164 series.

### **E.5.5 Components**

**Replace** the 1<sup>st</sup> paragraph by:

“Components of LPS should withstand the electromagnetic effects of lightning current and predictable accidental stresses without being damaged. This can be achieved by choosing components that have successfully been tested in accordance with the EN 50164 series.

All components shall comply with the EN 50164 series.”

### **E.5.6.1 Mechanical design**

At the end of the 6<sup>th</sup> paragraph, **add** the following:

“...according to the EN 50164 series.”

#### **E.5.6.2.1 Materials**

At the end of the 1<sup>st</sup> line, **add** the following:

“and the EN 50164 series”

##### **E.5.6.2.2.1 Metals in soil and air**

**Replace** the NOTE by:

NOTE Isolating spark gaps having a protection level  $U_p$  of 2,5 kV and a minimum  $I_{imp}$  of 50 kA (10/350  $\mu$ s) complying with EN 50164-3 are suitable.

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## INTRODUCTION

This part of IEC 62305 deals with the protection, in and around a structure, against physical damage and injury to living beings due to touch and step voltages.

The main and most effective measure for protection of structures against physical damage is considered to be the lightning protection system (LPS). It usually consists of both external and internal lightning protection systems.

An external LPS is intended to

- a) intercept a lightning flash to the structure (with an air-termination system),
- b) conduct the lightning current safely towards earth (using a down-conductor system),
- c) disperse the lightning current into the earth (using an earth-termination system).

An internal LPS prevents dangerous sparking within the structure using either equipotential bonding or a separation distance (and hence electrical insulation) between the external LPS (as defined in 3.2) components and other electrically conducting elements internal to the structure.

Main protection measures against injury to living beings due to touch and step voltages are intended to:

- 1) reduce the dangerous current flowing through bodies by insulating exposed conductive parts, and/or by increasing the surface soil resistivity,
- 2) reduce the occurrence of dangerous touch and step voltages by physical restrictions and/or warning notices.

The type and location of an LPS should be carefully considered in the initial design of a new structure, thereby enabling maximum advantage to be taken of the electrically conductive parts of the structure. By doing so, design and construction of an integrated installation is made easier, the overall aesthetic aspects can be improved, and the effectiveness of the LPS can be increased at minimum cost and effort.

Access to the ground and the proper use of foundation steelwork for the purpose of forming an effective earth-termination may well be impossible once construction work on a site has commenced. Therefore, soil resistivity and the nature of the earth should be considered at the earliest possible stage of a project. This information is fundamental to the design of an earth-termination system and may influence the foundation design work for the structure.

Regular consultation between LPS designers and installers, architects and builders is essential in order to achieve the best result at minimum cost.

If lightning protection is to be added to an existing structure, every effort should be made to ensure that it conforms to the principles of this standard. The design of the type and location of an LPS should take into account the features of the existing structure.

## PROTECTION AGAINST LIGHTNING –

### Part 3: Physical damage to structures and life hazard

#### 1 Scope

This part of IEC 62305 provides the requirements for protection of a structure against physical damage by means of a lightning protection system (LPS), and for protection against injury to living beings due to touch and step voltages in the vicinity of an LPS (see IEC 62305-1).

This standard is applicable to:

- a) design, installation, inspection and maintenance of an LPS for structures without limitation of their height,
- b) establishment of measures for protection against injury to living beings due to touch and step voltages.

NOTE 1 Specific requirements for an LPS in structures dangerous to their surroundings due to the risk of explosion are under consideration. Additional information is provided in Annex D for use in the interim.

NOTE 2 This part of IEC 62305 is not intended to provide protection against failures of electrical and electronic systems due to overvoltages. Specific requirements for such cases are provided in IEC 62305-4.

NOTE 3 Specific requirements for protection against lightning of wind turbines are reported in IEC 61400-24<sup>[2]</sup>.

#### 2 Normative references

The following referenced documents are indispensable for the application 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 60079-10-1:2008, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60079-10-2:2009, *Explosive atmospheres – Part 10-2: Classification of areas – Combustible dust atmospheres*

IEC 60079-14:2007, *Explosive atmospheres – Part 14: Electrical installations design, selection and erection*

IEC 61557-4, *Electrical safety in low-voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 4: Resistance of earth connection and equipotential bonding*

IEC 61643-1, *Low-voltage surge protective devices – Part 1: Surge protective devices connected to low-voltage power distribution systems – Requirements and tests*

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

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

IEC 62305-4, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

IEC 62561 (all parts)<sup>2</sup>, *Lightning protection system components (LPSC)*

IEC 62561-1<sup>3</sup>, *Lightning protection system components (LPSC) – Part 1: Requirements for connection components*

IEC 62561-3<sup>3</sup>, *Lightning protection system components (LPSC) – Part 3: Requirements for isolating spark gaps*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs in workplaces and public areas*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions, some of which have already been cited in Part 1 but are repeated here for ease of reference, as well as those given in other parts of IEC 62305, apply.

#### 3.1

##### **lightning protection system**

LPS

complete system used to reduce physical damage due to lightning flashes to a structure

NOTE It consists of both external and internal lightning protection systems.

#### 3.2

##### **external lightning protection system**

part of the LPS consisting of an air-termination system, a down-conductor system and an earth-termination system

#### 3.3

##### **external LPS isolated from the structure to be protected**

LPS with an air-termination system and down-conductor system positioned in such a way that the path of the lightning current has no contact with the structure to be protected

NOTE In an isolated LPS, dangerous sparks between the LPS and the structure are avoided.

#### 3.4

##### **external LPS not isolated from the structure to be protected**

LPS with an air-termination system and down-conductor system positioned in such a way that the path of the lightning current can be in contact with the structure to be protected

#### 3.5

##### **internal lightning protection system**

part of the LPS consisting of lightning equipotential bonding and/or electrical insulation of external LPS

#### 3.6

##### **air-termination system**

part of an external LPS using metallic elements such as rods, mesh conductors or catenary wires intended to intercept lightning flashes

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<sup>2</sup> In preparation.