

# SLOVENSKI STANDARD

## oSIST FprEN 62305-3:2009

01-december-2009

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

Protection contre la foudre -- Partie 3: Dommages physiques sur les structures et risques humains

Ta slovenski standard je istoveten z: **FprEN 62305-3:2009**

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Titre : Protection contre la foudre - Partie 3: Dommages physiques sur les structures et risques humains  
Title : Protection against lightning - Part 3: Physical damages to structures and life hazard

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**Note d'introduction**
**Introductory note**

This CDV is circulated in English only in the absence of a French version from the French national committee within two months from date of request.

<p align="center"><b>ATTENTION VOTE PARALLÈLE CEI – CENELEC</b></p> <p>L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle. Les membres du CENELEC sont invités à voter via le système de vote en ligne du CENELEC.</p>	<p align="center"><b>ATTENTION IEC – CENELEC PARALLEL VOTING</b></p> <p>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) for an International Standard is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.</p>
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**IEC 62305-3, Ed.2: Protection against lightning –  
Part 3: Physical damage to structures and life hazard**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## PROTECTION AGAINST LIGHTNING –

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

## FOREWORD

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International standard IEC 62305-3 has been prepared by IEC technical committee 81: Lightning protection.

The text of this second edition of IEC 62305-3 is compiled from and replaces IEC 62305-3, first edition (2006).

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

FDIS	Report on voting
81/xxx/FDIS	81/xxx/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 close as possible, in accordance with the ISO/IEC Directives, Part 2.

IEC 62305 consists of the following parts, under the general title *Protection against lightning*:

Part 1: General principles

Part 2: Risk management

Part 3: Physical damage to structures and life hazard

Part 4: Electrical and electronic systems within structures

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC website "<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.

In the United States, based on the requirements of NFPA 780: Standard for the Installation of Lightning Protection Systems 2008 Edition and practical experience in the use of horizontal earth electrodes, the minimum length of horizontal earth electrodes is not required to be twice that required for vertical electrodes.

In France, Portugal and Spain:

- natural components cannot substitute as lightning protection components but may be used to complete/enhance the LPS;
- aluminium solid round diameters should be extended from 8 mm to 10 mm;
- stranded conductors cannot be used as down-conductors;
- diameter of solid round conductors should be extended from 16 mm to 18 mm;
- hot dip galvanized steel solid tape thickness should be extended from 2 mm to 3,5 mm.

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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 TR 61400-24: 2002, Wind turbine generator systems – Part 24: Lightning.

#### 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 60079-10:2002, *Electrical apparatus for explosive gas atmospheres – Part 10: Classification of hazardous areas*

IEC 60079-14:2002, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 61241-10:2004, *Electrical apparatus for use in the presence of combustible dust – Part 10: Classification of areas where combustible dusts are or may be present*

IEC 61241-14:2004, *Electrical apparatus for use in the presence of combustible dust – Part 14: Selection and installation*

IEC 61643-12:2002, *Low-voltage surge protective devices – Part 12: Surge protective devices connected to low voltage power distribution systems – Selection and application principles*

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 62561-1<sup>1</sup>, *Lightning Protection System Components (LPSC) – Part 1: Requirements for connection components*.

<sup>1</sup> In preparation

IEC 62561-2<sup>1</sup> *Lightning Protection System Components (LPSC) – Part 2: Requirements for conductors and earth rods.*

IEC 62561-3<sup>1</sup>, *Lightning Protection System Components (LPSC) – Part 3: Requirements for isolating spark gaps.*

IEC TR 61400-24: 2002, *Wind turbine generator systems – Part 24: Lightning protection*

IEC 61400-1: 2005, *Wind turbines – Part 1 : Design requirements*

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

EN TR 50469: 2005, *Lightning protection system – Symbols*

EN 13501:2007, *Fire classification of construction products and buildings elements*

### 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

#### 3.7

#### **down-conductor system**

part of an external LPS intended to conduct lightning current between the air-termination system and the earth-termination system

<sup>1</sup> In preparation

**3.8****ring conductor**

conductor forming a loop around the structure and interconnecting the down-conductors for distribution of lightning current among them

**3.9****earth-termination system**

part of an external LPS which is intended to conduct and disperse lightning current into the earth

**3.10****earth electrode**

part or a group of parts of the earth-termination system which provides direct electrical contact with the earth and disperses lightning current to the earth

**3.11****ring earth electrode**

earth electrode forming a closed loop around the structure below or on the surface of the earth

**3.12****foundation earth electrode**

conductive part buried in the soil under a building foundation or, preferably, embedded in concrete of a building foundation, generally in form of a closed loop

[IEV 826-13-08]

**3.13****conventional earth impedance**

ratio of the peak values of the earth-termination voltage and the earth-termination current which, in general, do not occur simultaneously

**3.14****earth-termination voltage**

potential difference between the earth-termination system and the remote earth

**3.15****natural component of LPS**

conductive component installed not specifically for lightning protection which can be used in addition to the LPS or in some cases could provide the function of one or more parts of the LPS

NOTE Examples of the use of this term include:

- natural air-termination;
- natural down-conductor;
- natural earth electrode.

**3.16****connecting component**

part of an LPS which is used for the connection of conductors to each other or to metallic installations.

NOTE This also includes bridging component and expansion piece.

**3.17****fixing component**

part of an LPS which is used to fix the elements of the LPS to the structure to be protected,

**3.18****metal installations**

extended metal items in the structure to be protected which may form a path for lightning current, such as pipework, staircases, elevator guide rails, ventilation, heating and air-conditioning ducts, and interconnected reinforcing steel, structural metal parts.

**3.19****external conductive parts**

extended metal items entering or leaving the structure to be protected such as pipework, metallic cable elements, metal ducts, etc. which may carry a part of the lightning current

**3.20****electrical system**

system incorporating low voltage power supply components and possibly electronic components

**3.21****electronic system**

system incorporating sensitive electronic components such as telecommunication equipment, computer, control and instrumentation systems, radio systems, power electronic installations

**3.22****internal systems**

electrical and electronic systems within a structure

**3.23****lightning equipotential bonding****EB**

bonding to the LPS of separated conductive parts, by direct connections or via surge protective devices, to reduce potential differences caused by lightning current

**3.24****bonding bar**

metal bar on which metal installations, external conductive parts, electric power and telecommunication lines, and other cables can be bonded to an LPS

**3.25****bonding conductor**

conductor connecting separated conductive parts to LPS

**3.26****interconnected reinforcing steel**

steelwork within a concrete structure which is considered electrically continuous

**3.27****dangerous sparking**

electrical discharge due to lightning which causes physical damage in the structure to be protected

**3.28****separation distance**

distance between two conductive parts at which no dangerous sparking can occur

**3.29****surge protective device****SPD**

device that is intended to limit transient overvoltages and divert surge currents. It contains at least one non-linear component

**3.30****test joint**

joint designed to facilitate electrical testing and measurement of LPS components

**3.31****class of LPS**

number denoting the classification of an LPS according to the lightning protection level for which it is designed

**3.32****lightning protection designer**

specialist competent and skilled in the design of the LPS

**3.33****lightning protection installer**

person competent and skilled in the installation of the LPS

**3.34****structures with risk of explosion**

structures containing solid explosive materials or hazardous areas as determined in accordance with IEC 60079-10 and IEC 61241-10

**3.35****Isolating Spark Gap (ISG)**

component with discharge distance for isolating electrically conductive installation sections

NOTE In the event of a lightning strike, the installation sections are temporary connected conductively as the result of response of the discharge.

**3.36****Isolating interfaces**

devices which are capable of reducing conducted surges on lines entering the LPZ. These include: isolation transformers with earthed screen between windings, metal free fibre optic cables and opto-isolators

NOTE Insulation withstand characteristics of these devices shall be suitable for this application.

**4 Lightning protection system (LPS)****4.1 Class of LPS**

The characteristics of an LPS are determined by the characteristics of the structure to be protected and by the considered lightning protection level.

Four classes of LPS (I to IV) are defined in this standard corresponding to lightning protection levels defined in IEC 62305-1 (see Table 1).

**Table 1 – Relation between lightning protection levels (LPL) and class of LPS (see IEC 62305-1)**

LPL	Class of LPS
I	I
II	II
III	III
IV	IV

Each class of LPS is characterized by the following.

a) Data dependent upon the class of LPS:

- lightning parameters (see Tables 3 and 4 in IEC 62305-1);
- rolling sphere radius, mesh size and protection angle (see 5.2.2);
- typical distances between down-conductors (see 5.3.3);
- separation distance against dangerous sparking (see 6.3);
- minimum length of earth electrodes (see 5.4.2).

b) Factors not dependent upon the class of LPS:

- lightning equipotential bonding (see 6.2);
- minimum thickness of metal sheets or metal pipes in air-termination systems (see 5.2.5);
- LPS materials and conditions of use (see 5.5);
- material, configuration and minimum dimensions for air-terminations, down-conductors and earth-terminations (see 5.6);
- minimum dimensions of connecting conductors (see 6.2.2).