



**SLOVENSKI STANDARD**  
**oSIST FprEN 62305-1:2009**  
**01-december-2009**

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Protection against lightning -- Part 1: General principles

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

Protection contre la foudre -- Partie 1: Principes généraux

**Ta slovenski standard je istoveten z: FprEN 62305-1:2009**

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Titre : Protection contre la foudre - Partie 1:  
Principes généraux

Title : Protection against lightning - Part 1:  
General Principles

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.

<b>ATTENTION VOTE PARALLÈLE CEI – CENELEC</b> 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.	<b>ATTENTION IEC – CENELEC PARALLEL VOTING</b> 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.
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PROTECTION AGAINST LIGHTNING –****Part 1: General principles**

## FOREWORD

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International Standard IEC 62305-1 has been prepared by IEC technical committee 81: Lightning protection.

The text of this second edition of IEC 62305-1 is compiled from and replaces IEC 62305-1, 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 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.

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## INTRODUCTION

There are no devices nor methods capable of modifying the natural weather phenomena to the extent that they can prevent lightning discharges. Lightning flashes to, or nearby, structures (or lines connected to the structures) are hazardous to people, to the structures themselves, their contents and installations as well as to lines. This is why the application of lightning protection measures is essential.

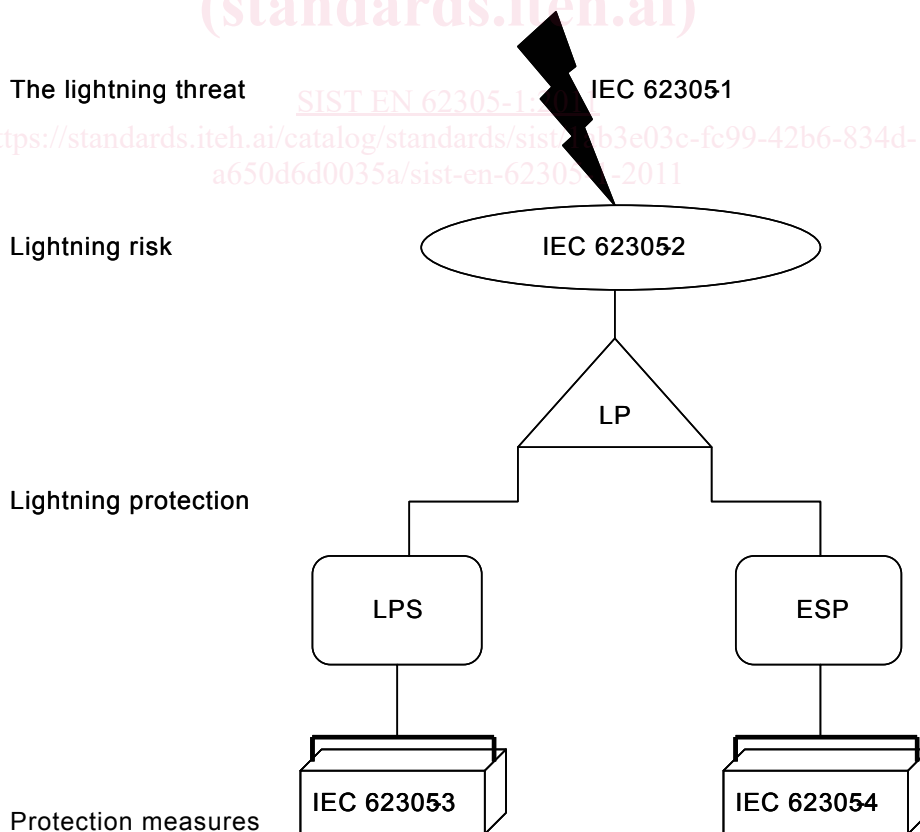
The need for protection, the economic benefits of installing protection measures and the selection of adequate protection measures should be determined in terms of risk management. Risk management is the subject of IEC 62305-2.

Protection measures considered in this standard are proved to be effective in risk reduction.

All measures for protection against lightning form the overall lightning protection. For practical reasons the criteria for design, installation and maintenance of lightning protection measures are considered in two separate groups:

- the first group concerns protection measures to reduce physical damage and life hazard in a structure is given in IEC 62305-3,
- the second group concerns protection measures to reduce failures of electrical and electronic systems in a structure is given in IEC 62305-4,

The connection between the parts of this standard is illustrated in Figure 1.



**Figure 1 The connection between the parts of this standard**

## PROTECTION AGAINST LIGHTNING –

### Part 1: General principles

#### 1 Scope

This part of IEC 62305 provides the general principles to be followed in the protection against lightning of structures including their installations and contents as well as persons,

The following cases are outside the scope of this standard:

- railway systems;
- vehicles, ships, aircraft, offshore installations;
- underground high pressure pipelines;
- pipe, power and telecommunication lines not connected to a structure.

NOTE Usually these systems are under special regulations made by various specific authorities.

#### 2 Normative references

[SIST EN 62305-1:2011](#)

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

IEC 62305-3, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

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

#### 3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

##### 3.1

##### **lightning flash to earth**

electrical discharge of atmospheric origin between cloud and earth consisting of one or more strokes

##### 3.2

##### **downward flash**

lightning flash initiated by a downward leader from cloud to earth

NOTE A downward flash consists of a first impulse, which can be followed by subsequent impulses. One or more impulses may be followed by a long stroke.

**3.3****upward flash**

lightning flash initiated by an upward leader from an earthed structure to cloud

NOTE An upward flash consists of a first long stroke with or without multiple superimposed impulses. One or more impulses may be followed by a long stroke.

**3.4****lightning stroke**

single electrical discharge in a lightning flash to earth

**3.5****short stroke**

part of the lightning flash which corresponds to an impulse current

NOTE This current has a time  $T_2$  to the half peak value on the tail typically less than 2 ms (see Figure A.1).

**3.6****long stroke**

part of the lightning flash which corresponds to a continuing current

NOTE The duration time  $T_{\text{long}}$  (time from the 10 % value on the front to the 10 % value on the tail) of this continuing current is typically more than 2 ms and less than 1 s (see Figure A.2)

**3.7****multiple strokes**

lightning flash consisting on average of 3-4 strokes, with typical time interval between them of about 50 ms

NOTE Events having up to a few dozen strokes with intervals between them ranging from 10 ms to 250 ms have been reported.

**3.8****point of strike**

point where a lightning flash strikes the earth, or protruding structure (e.g. structure, LPS, line, tree, etc.)

NOTE A lightning flash may have more than one point of strike.

**3.9****lightning current**

$i$

current flowing at the point of strike

**3.10****current peak value**

$I$

maximum value of the lightning current

**3.11****average steepness of the front of impulse current**

average rate of change of current within a time interval  $\Delta t = t_2 - t_1$

NOTE It is expressed by the difference  $\Delta i = i(t_2) - i(t_1)$  of the values of the current at the start and at the end of this interval, divided by the time interval  $\Delta t = t_2 - t_1$  (see Figure A.1).

**3.12****front time of impulse current**

$T_1$

virtual parameter defined as 1,25 times the time interval between the instants when the 10 % and 90 % of the peak value are reached (see Figure A.1)

**3.13****virtual origin of impulse current** $O_1$ 

point of intersection with time axis of a straight line drawn through the 10 % and the 90 % reference points on the stroke current front (see Figure A.1); it precedes by  $0,1 T_1$  that instant at which the current attains 10 % of its peak value

**3.14****time to half value of impulse current** $T_2$ 

virtual parameter defined as the time interval between the virtual origin  $O_1$  and the instant at which the current has decreased to half the peak value (see Figure A.1)

**3.15****flash duration** $T$ 

time for which the lightning current flows at the point of strike

**3.16****duration of long stroke current** $T_{\text{long}}$ 

time duration during which the current in a long stroke is between the 10 % of the peak value during the increase of the continuing current and 10 % of the peak value during the decrease of the continuing current (see Figure A.2)

**3.17****flash charge** $Q_{\text{flash}}$ 

the value resulting from the time integral of the lightning current for the entire lightning flash duration

**3.18****impulse charge** $Q_{\text{short}}$ 

the value resulting from the time integral of the lightning current in a impulse

**3.19****long stroke charge** $Q_{\text{long}}$ 

the value resulting from the time integral of the lightning current in a long stroke

**3.20****specific energy** $W/R$ 

the value resulting from the time integral of the square of the lightning current for the entire flash duration

NOTE It represents the energy dissipated by the lightning current in a unit resistance.

**3.21****specific energy of impulse current**

the value resulting from the time integral of the square of the lightning current for the duration of the impulse

NOTE The specific energy in a long stroke current is negligible.

**3.22****structure to be protected**

structure for which protection is required against the effects of lightning in accordance with this standard

NOTE A structure to be protected may be a part of a larger structure.

**3.23****line**

power line or telecommunication line connected to the structure to be protected

**3.24****telecommunication lines**

lines intended for communication between equipment that may be located in separate structures, such as phone line and data line

**3.25****power lines**

distribution lines feeding electrical energy into a structure to power electrical and electronic equipment located there, such as low voltage (LV) or high voltage (HV) electric mains

**3.26****lightning flash to a structure**

lightning flash striking a structure to be protected

**3.27****lightning flash near a structure**

lightning flash striking close enough to a structure to be protected that it may cause dangerous overvoltages

**3.28****electrical system**

system incorporating low voltage power supply components

**3.29****electronic system**

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

**3.30****internal systems**

electrical and electronic systems within a structure

**3.31****physical damage**

damage to a structure (or to its contents) or to a line due to mechanical, thermal, chemical and explosive effects of lightning

**3.32****injury of living beings**

permanent injuries, including loss of life, to people or to animals by electric shock due to touch and step voltages caused by lightning

Note: Although living beings may be injured in other ways, in this standard the term injury to living beings is limited to the threat due to electrical shock (type of damage D1).

**3.33****failure of electrical and electronic systems**

permanent damage of electrical and electronic systems due to LEMP

**3.34****lightning electromagnetic impulse**

LEMP

all electromagnetic effects of lightning current via resistive, inductive and capacitive coupling which create surges and radiated electromagnetic fields.

**3.35****surge**

transient created by LEMP which appears as an overvoltage and/or an overcurrent

**3.36****lightning protection zone**

LPZ

zone where the lightning electromagnetic environment is defined

NOTE The zone boundaries of an LPZ are not necessarily physical boundaries (e.g. walls, floor and ceiling).

**3.37****risk**

$R$

value of probable average annual loss (humans and goods) due to lightning, relative to the total value (humans and goods) of the structure to be protected

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**3.38****tolerable risk**

$R_T$

maximum value of the risk which can be tolerated for the structure to be protected

**3.39****lightning protection level**

LPL

number related to a set of lightning current parameters values relevant to the probability that the associated maximum and minimum design values will not be exceeded in naturally occurring lightning

NOTE Lightning protection level is used to design protection measures according to the relevant set of lightning current parameters.

**3.40****protection measures**

measures to be adopted for the structure to be protected to reduce the risk

**3.41a****lightning protection**

LP

complete system for the protection of structures and/or electrical and electronic systems in those structures from the effects of lightning, in general consisting of an LPS and ESP

**3.41****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.

**3.42****external lightning protection system**

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

**3.43****internal lightning protection system**

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

**3.44****air-termination system**

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

**3.45****down-conductor system**

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

**3.46****earth-termination system**

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

**3.47****external conductive parts**

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

**3.48****lightning equipotential bonding**

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

**3.49****conventional earthing impedance**

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

**3.50****electrical and electronic system protection**

ESP

measures taken to protect internal systems against the effects of LEMP

NOTE This is part of overall lightning protection

**3.51****magnetic shield**

closed, metallic, grid-like or continuous screen enveloping the structure to be protected, or part of it, used to reduce failures of electrical and electronic systems

**3.52****surge protective device**

SPD

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