SLOVENSKI STANDARD
SIST EN 62305-2:2012

01-julij-2012

Nadomešča:
SIST EN 62305-2:2006

Zaščita pred delovanjem strele - 2. del: Vodenje rizika (IEC 62305-2:2010, spremenjen)

Protection against lightning - Part 2: Risk management

Blitzschutz - Teil 2: Risiko-Management

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Protection contre la foudre - Partie 2: Evaluation des risques

Ta slovenski standard je istoveten z: EN 62305-2:2012

SIST EN 62305-2:2012
https://standards.iteh.ai/catalog/standards/sist/[illegible]-4660-a065-92fbafa05d79/sist-en-62305-2-2012

ICS:

91.120.40 Zaščita pred strelo Lightning protection

SIST EN 62305-2:2012 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62305-2

May 2012

ICS 29.020; 91.120.40

Supersedes EN 62305-2:2006 + corr. Nov.2006

English version

Protection against lightning - Part 2: Risk management

(IEC 62305-2:2010, modified)

Protection contre la foudre -
Partie 2: Evaluation des risques
(CEI 62305-2:2010, modifiée)

Blitzschutz -
Teil 2: Risiko-Management
(IEC 62305-2:2010, modifiziert)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 62305-2:2012 E

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Foreword

This document (EN 62305-2:2012) consists of the text of IEC 62305-2:2010 prepared by IEC/TC 81, "Lightning protection", together with the common modifications prepared by CLC/TC 81X, "Lightning protection".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-03-19
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2014-01-13

This document supersedes EN 62305-2:2006 + corrigendum November 2006.

EN 62305-2:2012 includes the following significant technical changes with respect to EN 62305-2:2006:

1) risk assessment for services connected to structures is excluded from the scope;
2) injuries of living beings caused by electric shock inside the structure are considered;
3) tolerable risk of loss of cultural heritage is lowered from 10^{-3} to 10^{-4};
4) extended damage to surroundings structures or to the environment is considered;
5) improved formulas are provided for evaluation of
   - collection areas relevant to flashes nearby a structure,
   - collection areas relevant to flashes to and nearby a line,
   - probabilities that a flash can cause damage,
   - loss factors even in structures with risk of explosion,
   - risk relevant to a zone of a structure,
   - cost of loss.
6) tables are provided to select the relative amount of loss in all cases;
7) impulse withstand voltage level of equipments was extended down to 1 kV.

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Notes and tables, which are additional to those in IEC 62305-2:2010 are prefixed “Z”.

In this document, the common modifications to IEC 62305-2:2010 are indicated by a vertical line in the left margin of the text.

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

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Introduction

Lightning flashes to earth may be hazardous to structures and to lines.

The hazard to a structure can result in

– damage to the structure and to its contents,
– failure of associated electrical and electronic systems,
– injury to living beings in or close to the structure.

Consequential effects of the damage and failures may be extended to the surroundings of the structure or may involve its environment.

To reduce the loss due to lightning, protection measures may be required. Whether they are needed, and to what extent, should be determined by risk assessment.

The risk, defined in this part of EN 62305 as the probable average annual loss in a structure due to lightning flashes, depends on

– the annual number of lightning flashes influencing the structure,
– the probability of damage by one of the influencing lightning flashes,
– the mean amount of consequential loss.

Lightning flashes influencing the structure may be divided into

– flashes terminating on the structure,
– flashes terminating near the structure, direct to connected lines (power, telecommunication lines,) or near the lines.

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Flashes to the structure or a connected line may cause physical damage and life hazards. Flashes near the structure or line as well as flashes to the structure or line may cause failure of electrical and electronic systems due to overvoltages resulting from resistive and inductive coupling of these systems with the lightning current.

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Moreover, failures caused by lightning overvoltages in users' installations and in power supply lines may also generate switching type overvoltages in the installations.

NOTE Malfunctioning of electrical and electronic systems is not covered by the EN 62305 series. Reference should be made to EN 61000-4-5 [2]1).

The number of lightning flashes influencing the structure depends on the dimensions and the characteristics of the structure and of the connected lines, on the environmental characteristics of the structure and the lines, as well as on lightning ground flash density in the region where the structure and the lines are located.

The probability of lightning damage depends on the structure, the connected lines, and the lightning current characteristics, as well as on the type and efficiency of applied protection measures.

The annual mean amount of the consequential loss depends on the extent of damage and the consequential effects which may occur as result of a lightning flash.

The effect of protection measures results from the features of each protection measure and may reduce the damage probabilities or the amount of consequential loss.

The decision to provide lightning protection may be taken regardless of the outcome of risk assessment where there is a desire that there be no avoidable risk.

1) Figures in square brackets refer to the bibliography.

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1 Scope

This part of EN 62305 is applicable to risk assessment for a structure due to lightning flashes to earth.

Its purpose is to provide a procedure for the evaluation of such a risk. Once an upper tolerable limit for the risk has been selected, this procedure allows the selection of appropriate protection measures to be adopted to reduce the risk to or below the tolerable limit.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 62305-1:2011, *Protection against lightning – Part 1: General principles* (IEC 62305-1:2010, mod.)

EN 62305-3:2011, *Protection against lightning – Part 3: Physical damage to structures and life hazard* (IEC 62305-3:2010, mod.)

EN 62305-4:2011, *Protection against lightning – Part 4: Electrical and electronic systems within structures* (IEC 62305-4:2010, mod.)

3 Terms, definitions, symbols and abbreviations

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

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3.1 Terms and definitions

3.1.1
structure to be protected
structure for which protection is required against the effects of lightning in accordance with this standard

Note 1 to entry: A structure to be protected may be part of a larger structure.

3.1.2
structures with risk of explosion
structures containing solid explosives materials or hazardous zones as determined in accordance with EN 60079-10-1[3] and EN 60079-10-2[4]

3.1.3
structures dangerous to the environment
structures which may cause biological, chemical or radioactive emission as a consequence of lightning (such as chemical, petrochemical, nuclear plants, etc.)

3.1.4
urban environment
area with a high density of buildings or densely populated communities with tall buildings

Note 1 to entry: 'Town centre' is an example of an urban environment.

3.1.5
suburban environment
area with a medium density of buildings

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Note 1 to entry: 'Town outskirts' is an example of a suburban environment.

3.1.6
rural environment
area with a low density of buildings

Note 1 to entry: Countryside' is an example of a rural environment.

3.1.7
rated impulse withstand voltage level
U_W
impulse withstand voltage assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against (transient) overvoltages

[SOURCE: EN 60664-1:2007, definition 3.9.2, modified][5]

Note 1 to entry: For the purposes of this part of EN 62305, only the withstand voltage between live conductors and earth is considered.

3.1.8
electrical system
system incorporating low voltage power supply components

3.1.9
electronic system
system incorporating sensitive electronic components such as telecommunication equipment, computer, control and instrumentation systems, radio systems, power electronic installations

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3.1.10
internal systems
electrical and electronic systems within a structure

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3.1.11
line
power line or telecommunication line connected to the structure to be protected

3.1.12
telecommunication lines
lines intended for communication between equipment that may be located in separate structures, such as phone lines and data lines

3.1.13
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

3.1.14
dangerous event
lightning flash to or near the structure to be protected, or to or near a line connected to the structure to be protected that may cause damage

3.1.15
lightning flash to a structure
lightning flash striking a structure to be protected

3.1.16
lightning flash near a structure
lightning flash striking close enough to a structure to be protected that it may cause dangerous overvoltages

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3.1.17
lightning flash to a line
lightning flash striking a line connected to the structure to be protected

3.1.18
lightning flash near a line
lightning flash striking close enough to a line connected to the structure to be protected that it may cause dangerous overvoltages

3.1.19
number of dangerous events due to flashes to a structure
N_D
expected average annual number of dangerous events due to lightning flashes to a structure

3.1.20
number of dangerous events due to flashes to a line
N_L
expected average annual number of dangerous events due to lightning flashes to a line

3.1.21
number of dangerous events due to flashes near a structure
N_M
expected average annual number of dangerous events due to lightning flashes near a structure

3.1.22
number of dangerous events due to flashes near a line
N_I
expected average annual number of dangerous events due to lightning flashes near a line

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3.1.23
lightning electromagnetic impulse
LEMP
all electromagnetic effects of lightning current via resistive, inductive and capacitive coupling, which create surges and electromagnetic fields

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3.1.24
surge
transient created by LEMP that appears as an overvoltage and/or overcurrent

3.1.25
node
point on a line from which onward surge propagation can be assumed to be neglected

Note 1 to entry: Examples of nodes are a point on a power line branch distribution at an HV/LV transformer or on a power substation, a telecommunication exchange or an equipment (e.g. multiplexer or xDSL equipment) on a telecommunication line.

3.1.26
physical damage
damage to a structure (or to its contents) due to mechanical, thermal, chemical or explosive effects of lightning

3.1.27
injury to 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 1 to entry: Although living beings may be injured in other ways, in this part of EN 62305 the term ‘injury to living beings’ is limited to the threat due to electrical shock (type of damage D1).

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3.1.28
failure of electrical and electronic systems
permanent damage of electrical and electronic systems due to LEMP

3.1.29
probability of damage
P_X
probability that a dangerous event will cause damage to or in the structure to be protected

3.1.30
loss
L_X
mean amount of loss (humans and goods) consequent on a specified type of damage due to a dangerous event, relative to the value (humans and goods) of the structure to be protected

3.1.31
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

3.1.32
risk component
R_X
partial risk depending on the source and the type of damage

3.1.33
tolerable risk
R_T
maximum value of the risk which can be tolerated for the structure to be protected

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3.1.34
zone of a structure
Z_S
part of a structure with homogeneous characteristics where only one set of parameters is involved in assessment of a risk component

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3.1.35
section of a line
S_L
part of a line with homogeneous characteristics where only one set of parameters is involved in the assessment of a risk component

3.1.36
lightning protection zone
LPZ
zone where the lightning electromagnetic environment is defined

Note 1 to entry: The zone boundaries of an LPZ are not necessarily physical boundaries (e.g. walls, floor and ceiling).

3.1.37
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 1 to entry: Lightning protection level is used to design protection measures according to the relevant set of lightning current parameters.

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3.1.38
protection measures
measures to be adopted in the structure to be protected, in order to reduce the risk

3.1.39
lightning protection
LP
complete system for protection of structures against lightning, including their internal systems and contents, as well as persons, in general consisting of an LPS and SPM

3.1.40
lightning protection system
LPS
complete system used to reduce physical damage due to lightning flashes to a structure

Note 1 to entry: It consists of both external and internal lightning protection systems.

3.1.41
LEMP protection measures
SPM
measures taken to protect internal systems against the effects of LEMP

Note 1 to entry: This is part of overall lightning protection.

3.1.42
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

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3.1.43
lightning protective cable
special cable with increased dielectric strength and whose metallic sheath is in continuous contact with the soil either directly or by use of conducting plastic covering

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3.1.44
lightning protective cable duct
cable duct of low resistivity in contact with the soil

EXAMPLE Concrete with interconnected structural steel reinforcements or metallic duct.

3.1.45
surge protective device
SPD
device intended to limit transient overvoltages and divert surge currents; contains at least one non-linear component

3.1.46
coordinated SPD system
SPDs properly selected, coordinated and installed to form a system intended to reduce failures of electrical and electronic systems

3.1.47
isolating interfaces
devices which are capable of reducing conducted surges on lines entering the LPZ

Note 1 to entry: These include isolation transformers with earthed screen between windings, metal-free fibre optic cables and opto-isolators.

Note 2 to entry: Insulation withstand characteristics of these devices are suitable for this application intrinsically or via SPD.

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3.1.48
lightning equipotential bonding
EB
bonding to LPS of separated metallic parts, by direct conductive connections or via surge protective devices, to reduce potential differences caused by lightning current

3.1.49
zone 0
place in which an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently

[SOURCE:IEC 60050-426:2008, 426-03-03, modified][6]

3.1.50
zone 1
place in which an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally

[SOURCE:IEC 60050-426:2008, 426-03-04, modified][6]

3.1.51
zone 2
place in which an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only

Note 1 to entry: In this definition, the word "persist" means the total time for which the flammable atmosphere will exist. This will normally comprise the total of the duration of the release, plus the time taken for the flammable atmosphere to disperse after the release has stopped.

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Note 2 to entry: Indications of the frequency of the occurrence and duration may be taken from codes relating to specific industries or applications.

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[SOURCE:IEC 60050-426:2008, 426-03-05, modified][6]

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3.1.52
zone 20
place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is present continuously, or for long periods, or frequently

[SOURCE:EN 60079-10-2:2009, 6.2, modified] [4]

3.1.53
zone 21
place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is likely to occur in normal operation occasionally

[SOURCE:EN 60079-10-2:2009, 6.2, modified] [4]

3.1.54
zone 22
place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is not likely to occur in normal operation but, if it does occur, will persist for a short period only

[SOURCE:EN 60079-10-2:2009, 6.2, modified] [4]

3.2 Symbols and abbreviations

a	Amortization rate	Annex D
A_D	Collection area for flashes to an isolated structure	A.2.1.1
A_{DJ}	Collection area for flashes to an adjacent structure	A.2.5
A_D'	Collection area attributed to an elevated roof protrusion	A.2.1.2
A_I	Collection area for flashes near a line	A.5