



**SLOVENSKI STANDARD
SIST EN IEC 62305-1:2024**

01-december-2024

Nadomešča:

SIST EN 62305-1:2011

SIST EN 62305-1:2011/AC:2016

Zaščita pred delovanjem strele - 1. del: Splošna načela

Protection against lightning - Part 1: General principles

Blitzschutz - Teil 1: Allgemeine Grundsätze

Protection contre la foudre - Partie 1: Principes généraux

Ta slovenski standard je istoveten z: EN IEC 62305-1:2024

[SIST EN IEC 62305-1:2024](https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>

ICS:

91.120.40

Zaščita pred strelo

Lightning protection

SIST EN IEC 62305-1:2024

en

EUROPEAN STANDARD

EN IEC 62305-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2024

ICS 29.020; 91.120.40

Supersedes EN 62305-1:2011;
EN 62305-1:2011/AC:2016-11

English Version

Protection against lightning - Part 1: General principles (IEC 62305-1:2024)

Protection contre la foudre - Partie 1: Principes généraux
(IEC 62305-1:2024)Blitzschutz - Teil 1: Allgemeine Grundsätze
(IEC 62305-1:2024)

This European Standard was approved by CENELEC on 2024-10-17. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

<https://standards.iteh.ai/><https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 62305-1:2024 (E)**European foreword**

The text of document 81/737/FDIS, future edition 3 of IEC 62305-1, prepared by TC 81 "Lightning protection" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62305-1:2024.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2025-10-31 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2027-10-31 document have to be withdrawn

This document supersedes EN 62305-1:2011 and all of its amendments and corrigenda (if any).

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62305-1:2024 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 62561 series	NOTE	Approved as EN IEC 62561 series
IEC 62305-2:2024	NOTE	Approved as EN IEC 62305-2:2024 (not modified)
IEC 62793	NOTE	Approved as EN IEC 62793
IEC 61400-24	NOTE	Approved as EN IEC 61400-24
IEC 61000-4-5	NOTE	Approved as EN 61000-4-5
IEC 61643-31	NOTE	Approved as EN 61643-31
IEC 62475	NOTE	Approved as EN 62475
IEC 60071-2:2023	NOTE	Approved as EN IEC 60071-2:2023 (not modified)
IEC 61643-21	NOTE	Approved as EN 61643-21

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62305-3	2024	Protection against lightning - Part 3: Physical damage to structures and life hazard	EN IEC 62305-3	2024
IEC 62305-4	2024	Protection against lightning - Part 4: Electrical and electronic systems within structures	EN IEC 62305-4	2024

(<https://standards.iteh.ai>)
Document Preview

[SIST EN IEC 62305-1:2024](https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>



IEC 62305-1

Edition 3.0 2024-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Protection against lightning –
Part 1: General principles**

**Protection contre la foudre –
Partie 1: Principes généraux**

[SIST EN IEC 62305-1:2024](https://standards.iteh.ai/)

<https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.020, 91.120.40

ISBN 978-2-8322-8002-7

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	10
2 Normative references	10
3 Terms and definitions	10
4 Lightning current parameters	17
5 Damage due to lightning.....	18
5.1 Damage to a structure	18
5.1.1 General	18
5.1.2 Effects of lightning on a structure	18
5.1.3 Sources and causes of damage to a structure	19
5.2 Types of loss	20
6 Need for lightning protection.....	21
6.1 Risk and frequency	21
6.2 Need for lightning protection for reduction of risk R	22
6.3 Need for lightning protection for reduction of frequency of damage F	22
7 Protection measures.....	23
7.1 General.....	23
7.2 Protection measures to reduce injury to human beings by electric shock.....	23
7.3 Protection measures to reduce physical damage.....	24
7.4 Protection measures to reduce failure of internal systems.....	24
7.5 Protection measures selection	24
8 Basic criteria for protection of structures.....	24
8.1 General.....	24
8.2 Lightning protection levels (LPLs)	25
8.3 Lightning protection zones (LPZs).....	27
8.4 Protection of structures	29
8.4.1 Protection to reduce physical damage and life hazard	29
8.4.2 Protection to reduce the failure of internal systems.....	30
Annex A (informative) Parameters of lightning current	31
A.1 Lightning flashes to earth.....	31
A.2 Lightning current parameters	34
A.3 Fixing the maximum lightning current parameters for LPL I	39
A.3.1 General	39
A.3.2 First positive stroke and long stroke	39
A.3.3 First negative stroke	40
A.3.4 Subsequent stroke.....	40
A.4 Fixing the minimum lightning current parameters	40
Annex B (informative) Time functions of the lightning current for analysis purposes.....	42
Annex C (informative) Simulation of the lightning current for test purposes.....	47
C.1 General.....	47
C.2 Simulation of the specific energy of the first positive stroke and the charge of the long stroke	47
C.3 Simulation of the front current steepness of the impulses.....	48

Annex D (informative) Test parameters simulating the effects of lightning current on LPS components.....	51
D.1 General.....	51
D.2 Current parameters relevant to the point of strike.....	51
D.3 Current sharing.....	52
D.4 Effects of lightning current causing possible damage.....	53
D.4.1 Thermal effects.....	53
D.4.2 Mechanical effects.....	57
D.4.3 Combined effects.....	61
D.4.4 Sparking.....	61
D.4.5 Soil ionization.....	61
D.5 LPS components, relevant problems and test parameters.....	61
D.5.1 General.....	61
D.5.2 Air terminations.....	61
D.5.3 Down conductors.....	62
D.5.4 Connecting components.....	63
D.5.5 Earth terminations.....	64
D.6 Surge protective devices (SPDs).....	64
D.6.1 General.....	64
D.6.2 SPD containing spark gaps.....	64
D.6.3 SPD containing metal-oxide varistors.....	65
D.7 Summary of the test parameters to be adopted in testing LPS components.....	66
Annex E (informative) Surge currents due to lightning at different installation points.....	67
E.1 General.....	67
E.2 Surge currents due to flashes to the structure (source of damage S1).....	67
E.2.1 Surge currents flowing through external conductive parts and lines connected to the structure.....	67
E.2.2 Factors influencing the sharing of the lightning current and related charge in power lines.....	67
E.2.3 Surge currents flowing through line conductors connected to the structure.....	68
E.2.4 Surge currents flowing through conductive parts and cables internal to the structure connected to LPS.....	69
E.2.5 Surge currents flowing through cables connected to different points of the earth-termination system within the same earth-termination system.....	70
E.3 Surge currents due to flashes to lines (source of damage S3).....	70
E.4 Surges due to flashes near the lines (source of damage S4).....	71
E.5 Surge currents due to induction effects (sources of damage S1 or S2).....	71
E.5.1 General.....	71
E.5.2 Surges inside an unshielded LPZ 1.....	72
E.5.3 Surges inside shielded LPZs.....	72
E.6 Conventional surge currents.....	72
Bibliography.....	75
Figure 1 – Connection between the various parts of the IEC 62305 series.....	9
Figure 2 – LPZ defined by an LPS (IEC 62305-3).....	28
Figure 3 – LPZ defined by LPS and SPM (IEC 62305-4).....	29
Figure A.1 – Definitions of impulse current parameters according to IEC 62475 [7].....	31
Figure A.2 – Definitions of long duration stroke parameters.....	32

Figure A.3 – Schematic representation (not to scale) of possible components of downward flashes (typical in flat territory and to lower structures) and multiple strokes downward flashes	32
Figure A.4 – Schematic representation (not to scale) of possible components of upward flashes (typical of exposed or higher structures or both)	33
Figure A.5 – Cumulative frequency distribution of lightning current parameters (dotted line through 50 % value)	38
Figure B.1 – Shape of the current rise of the first positive stroke	43
Figure B.2 – Shape of the current tail of the first positive stroke	43
Figure B.3 – Shape of the current rise of the first negative stroke	44
Figure B.4 – Shape of the current tail of the first negative stroke	44
Figure B.5 – Shape of the current rise of the subsequent negative strokes	45
Figure B.6 – Shape of the current tail of the subsequent negative strokes	45
Figure B.7 – Amplitude density of the lightning current according to LPL I	46
Figure C.1 – Example test generator for the simulation of the specific energy of the first positive stroke and the charge of the long stroke	48
Figure C.2 – Definition of the current steepness in accordance with Table C.3.....	49
Figure C.3 – Example test generator for the simulation of the front steepness of the first positive stroke for large test items.....	49
Figure C.4 – Example test generator for the simulation of the front steepness of the subsequent negative strokes for large test items.....	50
Figure D.1 – General arrangement of two conductors for the calculation of electrodynamic force.....	58
Figure D.2 – Typical conductor arrangement in an LPS.....	59
Figure D.3 – Diagram of the stresses F for the configuration of Figure D.2	59
Figure D.4 – Force per unit length F' along the horizontal conductor of Figure D.2.....	60
Table 1 – Effects of lightning on typical structures	19
Table 2 – Sources of damage, causes of damage, types of loss according to the point of strike	21
Table 3 – Maximum values of lightning parameters according to LPLs	26
Table 4 – Minimum values of lightning parameters and related rolling sphere radius corresponding to LPLs	26
Table 5 – Probabilities for the limits of the lightning current parameters.....	26
Table A.1 – Tabulated values of lightning current parameters (CIGRE [9], [10], [11])	35
Table A.2 – Logarithmic normal distribution of lightning current parameters – Mean μ and dispersion σ_{\log} calculated from 5 % and 95 % values (CIGRE [9], [10], [11]).....	36
Table A.3 – Values of probability P as function of the lightning current I peak value.....	37
Table B.1 – Parameters for Equation (B.1).....	42
Table C.1 – Test parameters of the first positive stroke.....	48
Table C.2 – Test parameters of the long stroke.....	48
Table C.3 – Test parameters of the strokes.....	49
Table D.1 – Summary of the lightning threat parameters to be considered in the calculation of the test values for the different LPS components and for the different LPLs	52
Table D.2 – Physical characteristics of typical materials used in LPS components	55

Table D.3 – Temperature rise for conductors of different sections as a function of W/R	55
Table E.1 – Conventional surge currents due to lightning flashes on low-voltage systems	73
Table E.2 – Conventional surge currents due to lightning flashes on telecommunication systems	74

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[SIST EN IEC 62305-1:2024](https://standards.itih.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024)

<https://standards.itih.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

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

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) reference to the IEC 62561 series [1]¹ is made in Annex D to provide a link to relevant lightning protection system components according to the IEC 62561 series;

¹ Numbers in square brackets refer to the Bibliography.

- b) risk management introduces the concept of types of loss with public relevance;
- c) the concept of frequency of damage that can impair the availability of the internal systems within the structure has been introduced;
- d) surge currents due to lightning flashes have been more accurately specified for SPD dimensioning in low-voltage power systems and in telecommunication systems.

The text of this International Standard is based on the following documents:

Draft	Report on voting
81/737/FDIS	81/756/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62305 series, published under the general title *Protection against lightning*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

[SIST EN IEC 62305-1:2024](https://standards.globalspec.com/stds/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024)

<https://standards.globalspec.com/stds/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>

INTRODUCTION

There are no devices or 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 [2].

NOTE In Germany, the need for lightning protection is determined by, and the class of required LPS shall be selected according to, a national annex to the third edition of IEC 62305-1 (including an option for a risk assessment following the third edition of IEC 62305-2).

Protection measures considered in the IEC 62305 series have been proven 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 concerning protection measures to reduce physical damage and life hazard in a structure is given in IEC 62305-3;
- the second group concerning 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 the IEC 62305 series is illustrated in Figure 1.

NOTE The implementation of an IEC 62793 [3] compliant TWS in the protection measures for a structure can assist in reducing physical damage, life hazard, and failure of electrical and electronic systems.

[SIST EN IEC 62305-1:2024](https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/7ac88a59-9570-47c7-9860-1374b72099af/sist-en-iec-62305-1-2024>