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Part 2: Requirements for conductors and earth electrodes

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



81/754/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 62561-2 ED3

DATE OF CIRCULATION:

2023-11-17

CLOSING DATE FOR COMMENTS:

2024-02-09

SUPERSEDES DOCUMENTS:

81/696/CD, 81/706B/CC

IEC TC 81 : LIGHTNING PROTECTION	
SECRETARIAT: Italy	SECRETARY: Mrs Marina Bernardi
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 37A, TC 64, TC 88	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	

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TITLE:

Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes

NOTE FROM TC/SC OFFICERS:

uploaded also a version with correspondence to last CC comments

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –**Part 2: Requirements for conductors and earth electrodes****FOREWORD**

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IEC 62561-2 has been prepared by IEC technical committee 81: Lightning protection.

This third edition cancels and replaces the second edition published in 2018. This edition constitutes a technical revision.

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

- a) definitions of new conductor types mentioned in the text of the document have been added;
- b) the document has been updated in line with the new edition of IEC 60068-2-52: 2017, on Salt mist treatment;

- c) the document has been updated in line with the new edition of ISO 22479:2019 on humid sulphurous atmosphere treatment;
- d) a new normative Annex H for material, configuration and cross-sectional area test has been introduced;
- e) a new normative Annex I for Applicability of previous tests has been introduced.
- f) equipotential earth grid has been introduced.

The text of this International 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 International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62561 series, published under the general title *Lightning protection system components (LPSC)*, 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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of August 2019 have been included in this copy.

196

INTRODUCTION

197 This part of IEC 62561 deals with the requirements and tests for lightning protection system
198 components (LPSC), specifically conductors and earth electrodes, used for the installation of
199 a lightning protection system (LPS) designed and implemented according to IEC 62305 (all
200 parts).

LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

Part 2: Requirements for conductors and earth electrodes

1 Scope

Part 2 of IEC 62561 specifies the requirements and tests for:

- metallic conductors (other than "natural" conductors) that form part of the air-termination and down-conductor systems,
- metallic earth electrodes that form part of the earth-termination system.

NOTE 1 Additional requirements can be necessary for conductors and earth electrodes intended for use in hazardous environments

NOTE 2 In CENELEC member countries, testing requirements of components for explosive atmospheres are specified in CLC/TS 50703-2.

NOTE 3 Reinforcement of roofs and walls of buildings may be used as air-termination system and as down conductor system. Such reinforcement is not covered in this standard because they are natural components.

2 Normative references

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.

IEC 60068-2-52: 2017, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium, chloride solution)*

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*

IEC 62561-1, *Lightning protection system components (LPSC) – Part 1, Requirements for connection components*

ISO 2178, *Non-magnetic coatings on magnetic substrates – Measurement of coating thickness – Magnetic method*

ISO 6892-1, *Metallic materials – Tensile testing – Part 1: Method of test at room temperature*

ISO 6957:1988, *Copper alloys – Ammonia test for stress corrosion resistance*

ISO 22479:2019, *Corrosion of metals and alloys — Sulphur dioxide test in a humid atmosphere (fixed gas method)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

air-termination system

part of an external lightning protection system (LPS) intended to intercept lightning flashes

EXAMPLES: Air-termination rods, air-termination conductors and catenary wires

3.2

air-termination rod

part of the air-termination system consisting of a metal rod for intercepting and conducting flashes to the down-conductor and earthing system of the lightning protection system (LPS)

3.3

air-termination conductor

part of the air-termination system consisting of a conductor for intercepting and conducting flashes to the down-conductor and earthing system of the lightning protection system (LPS)

3.4

catenary wire

part of the air-termination system consisting of an overhead wire for intercepting and conducting flashes to the down-conductor and earthing system of the lightning protection system (LPS)

3.5

down-conductor system

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

3.6

down-conductor

part of the down-conductor system intended to conduct lightning current from the air-termination system to the earth-termination system of the LPS

3.7

earth lead-in conductor

conductor installed between the down-conductor or test joint and the earth electrode intended to provide connection of the earth electrode with the test joint and can be partially buried in soil or partially embedded in concrete and partially placed in air. It may also provide mechanical protection against accidental stresses to the down conductor system.

3.8

earth-termination system

part of an external lightning protection system, which is intended to conduct and disperse lightning current to the earth

3.9

earth electrode

ground electrode (USA)

conductive part that is in electric contact with local earth, directly or through an intermediate conductive medium

IEV 195-02-01 with modification (Examples)

EXAMPLES: Tape, wire, earth plate, lattice earth plate, meshed earth plate, solid earth rod, tubular earth rod

3.10**earth conductor****ground conductor** (USA)

conductor of low impedance which provide an electrical connection between a given point in equipment (an installation or system) and an earth electrode

IEV 461-06-19

3.11**earth plate**

metallic earth electrode consisting of “solid plate buried in the ground” “lattice plate buried in the ground”

3.12**earth rod**

earth electrode consisting of a solid or tubular metal rod driven into the ground

3.13**couplers for earth rods ~~earth rod coupler~~**

part of the earth-termination system that facilitates the coupling of one section of an earth rod to another for the purpose of deep driving

Note 1: Male-/female and plug/socket connections of earth rods are also defined as couplers

3.14**earth rod driving head**

tool used in those applications where it is necessary to drive the earth rod

3.15**type test**

test required to be made before supplying a type of material covered by IEC 62561-2 on a general commercial basis, in order to demonstrate satisfactory performance characteristics to meet the intended application

3.16**stranded conductor**

conductor consisting of a number of individual wires or strands all or some of which generally have helical form

NOTE 1 to entry: The cross-section of a stranded conductor can be circular or otherwise shaped.

NOTE 2 to entry: The term “strand” is also used to designate a single wire. [IEC 60050-461:2008, 461-01-07]

3.17**rope lay conductor**

conductor composed of a central core surrounded by one or more layers of helically laid groups of wires

3.18**smooth weave stranded conductor**

conductor constructed of multi-strand soft drawn wire, interwoven in a basket weave configuration so as to avoid fraying in application

3.19**equipotential earth grid**

mat consisting of an array of conductor intended for potential equalization

4 Requirements**4.1 General**

Conductors and earth electrodes shall be designed in such a manner that, when they are installed in accordance with the manufacturer's instructions, their performance shall be reliable, stable and safe to persons and surrounding equipment.

The choice of a material depends on its ability to match the particular application requirements such as life cycle of the material, effects from galvanic corrosion and compatibility with other interconnected materials or services.

Summaries of the requirements for tests are given in Annex C, Annex D and Annex H and the sequence of tests in Annex E, Annex F and Annex G.

4.2 Documentation and installation instructions

The manufacturer or supplier of the conductors and rods shall provide adequate information in their documentation or installation instructions, e.g. by drawings, photographs to ensure that the installer of the conductors and rods can select and install the materials in a suitable and safe manner, in accordance with IEC 62305-3 and IEC 62305-4.

To facilitate the installer the manufacturer or supplier may also recommend the proper tools for their installation and instruments in order to perform specified measurements by IEC 62305. In addition, where it is necessary to recommend a training for the safe selection and use of LPS components.

Documentation and installation instructions content shall not be in contradiction with the content of the relative testing report of each component.

Instructions are checked as per their completeness by review.

4.3 Air-termination conductors, air-termination rods, catenary wires and down conductors

The material, configuration and cross-sectional area of the conductors and rods, shall be in accordance with Table 1. Their mechanical and electrical characteristics shall be in accordance with Table 2

Other materials may be used if they possess equivalent mechanical and electrical characteristics and corrosion resistance properties for the intended application.

Other configurations may be used if the relevant dimensions are met.

If dimensions, materials or configurations other than those shown in Tables 1 & 2 are applied, it is possible to use such after a successful electrical test with lightning current as per Table B.1 class H of Annex B as well as all the tests required by IEC 62561-2.

363 Coated conductors and rods shall be corrosion resistant and the coating shall exhibit good
364 adherence to the base material.

365 Compliance is checked by inspection and by the tests as follows:

366 a) For coated specimens according to 5.2.8, 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.7 and 5.5.

367 b) For uncoated specimens according to 5.2.8, 5.2.6, 5.2.7 and 5.5

368 A summary of requirements for the cross-sectional area, mechanical and electrical
369 characteristics as well as tests is given in Annex C. The corresponding flow chart is shown in
370 Annex C.

371 **Table 1 – Material, configuration and cross-sectional area of air-termination conductors,**
372 **air-termination rods, catenary wires and down-conductors**

373