

English Version

**Lightning protection system components (LPSC) - Part 5:
Requirements for earth electrode inspection housings and earth
electrode seals
(IEC 62561-5:2017)**

Composants de système de protection contre la foudre
(CSPF) - Partie 5: Exigences pour les regards de visite et
les joints d'étanchéité des électrodes de terre
(IEC 62561-5:2017)

Blitzschutzsystembauteile (LPSC) - Teil 5: Anforderungen
an Revisionskästen und Erderdurchführungen
(IEC 62561-5:2017)

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

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European foreword

The text of document 81/565/FDIS, future edition 2 of IEC 62561-5, prepared by IEC/TC 81, "Lightning protection", was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62561-5:2017.

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) 2018-06-01
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-12-01

This document supersedes EN 62561-5:2011.

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.

Endorsement notice

The text of the International Standard IEC 62561-5:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 62305 (series) NOTE Harmonized as EN 62305 (series).

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 When 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.cenelec.eu.

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

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
4 Classification	8
4.1 Earth electrode inspection housings.....	8
4.2 Earth electrode seals	8
5 Requirements	8
5.1 General.....	8
5.2 Installation instructions	8
5.3 Earth electrode inspection housing	8
5.4 Earth electrode seal.....	8
5.5 Marking.....	8
6 Tests	9
6.1 General test conditions	9
6.2 Earth electrode inspection housing	9
6.2.1 General	9
6.2.2 Load test	9
6.3 Earth electrode seal test.....	11
6.3.1 Earth electrode in watertight housing.....	11
6.3.2 Earth electrode in or through watertight concrete.....	11
6.4 Installation instructions	13
6.4.1 General conditions for tests	13
6.4.2 Acceptance criteria	14
6.5 Marking.....	14
6.5.1 General conditions for tests	14
6.5.2 Acceptance criteria	14
7 Electromagnetic compatibility (EMC)	14
8 Structure and content of the test report.....	14
8.1 General.....	14
8.2 Report identification	15
8.3 Specimen description.....	15
8.4 Standards and references	15
8.5 Test procedure.....	15
8.6 Testing equipment, description	15
8.7 Measuring instruments description	16
8.8 Results and parameters recorded	16
8.9 Statement of pass/fail	16
Bibliography.....	17
Figure 1 – Test arrangement for load test	10
Figure 2 – Test arrangement for sealing test.....	11

Figure 3 – Example for a test arrangement for depth of penetration of water under pressure 13

Table 1 – Parameters for concrete used for the test arrangement 12

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

Part 5: Requirements for earth electrode inspection housings and earth electrode seals

FOREWORD

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International Standard IEC 62561-5 has been prepared by IEC technical committee 81: Lightning protection.

This second edition cancels and replaces the first edition, published in 2011. This edition constitutes a technical revision.

This edition includes the following major technical changes with respect to the previous edition.

- Testing requirements have been added for the sealing of earth electrode installed in or through watertight concrete.

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

FDIS	Report on voting
81/565/FDIS	81/568/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.

INTRODUCTION

This part of IEC 62561 deals with the requirements and tests for lightning protection system components (LPSC), specifically earth electrode inspection housings and earth electrode seals, used for the installation of a lightning protection system (LPS) designed and implemented according to IEC 62305 (all parts).

LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

Part 5: Requirements for earth electrode inspection housings and earth electrode seals

1 Scope

This part of IEC 62561 specifies the requirements and tests for earth electrode inspection housings (earth housing) installed in the earth and for earth electrode seals.

Lightning protection system components (LPSC) can also be suitable for use in hazardous atmospheres. There are therefore additional requirements when installing the components under such conditions.

NOTE Different requirements and test procedures are given in EN 124 (all parts) and EN 1253 (all parts).

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

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, which can be consulted 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

earth electrode inspection housing

metallic or non-metallic enclosure that houses the down conductor/earth termination connection for inspection and testing purposes and consists of a housing and a removable lid

3.2

earth electrode seal

water pressure seal used in conjunction with an earth electrode that passes through or enters the foundation or wall of the building, so preventing ground water from entering the building

3.3

earth electrode

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

EXAMPLES Earth rods, earth conductors and earth plates.

4 Classification

4.1 Earth electrode inspection housings

- a) heavy duty usage for slow moving vehicular traffic, multi-axle, etc;
- b) medium duty usage for slow moving automobiles, etc;
- c) light duty usage for walkways, etc.

4.2 Earth electrode seals

No classifications.

5 Requirements

5.1 General

All earth electrode inspection housings and earth electrode seals shall be so designed and constructed that in normal use their performance is reliable and without danger to persons and the surroundings.

The choice of a material depends on its ability to match the particular application requirements.

5.2 Installation instructions

The manufacturer or supplier of the earth electrode inspection housing and earth electrode seals shall provide adequate information in his literature to ensure that the installer can select and install the materials in a suitable and safe manner, in accordance with IEC 62305-3.

Compliance is checked by review as per 6.4.

5.3 Earth electrode inspection housing

The design of the earth electrode inspection housing shall be such that it carries out its function of enclosing the down conductor/earth rod termination in an acceptable and safe manner, and has sufficient internal dimensions to permit the assembly/disassembly of the earth rod clamp. The housing body shall be deep enough to permit the lid to sit flush on the body without fouling on the rod/conductor/clamp assembly.

The material of the earth electrode inspection housing shall be compatible with its surrounding environment and shall comply with the tests given in 6.2.

5.4 Earth electrode seal

The design of the earth electrode seal shall be such that, in an acceptable and safe manner, it carries out its function of preventing ground water bypassing the earth electrode and entering the foundation or wall of a building.

The material of the earth electrode seal shall be compatible with its surrounding environment and comply with the tests given in 6.3.

5.5 Marking

All products complying with this document shall be marked at least with:

- a) the manufacturer's or responsible vendor's name or trade mark or identifying symbol;
- b) part number;
- c) classification as per Clause 4;

d) load withstand force in kN.

Where this proves to be impractical, the marking in accordance with the identifying symbol may be given on the smallest packing unit.

NOTE Marking can be applied for example by moulding, pressing, engraving, printing adhesive labels or water slide transfers.

Compliance is checked in accordance with 6.5.

6 Tests

6.1 General test conditions

The tests in accordance with this document are type tests. These tests are of such a nature that, after they have been performed, they need not be repeated unless changes are made to the materials, design or type of manufacturing process, which might change the performance characteristics of the product.

Unless otherwise specified, tests are carried out with the specimens prepared as in normal use according to the manufacturer's or supplier's instructions.

All tests are carried out on new specimens.

Unless otherwise specified, three new specimens are subjected to the tests and the requirements are satisfied if all the tests are met. If only one of the specimens does not satisfy a test due to an assembly or a manufacturing fault, that test and any preceding one which may have influenced the results of the test shall be repeated. The tests which follow shall be carried out in the required sequence on another full set of specimens, all of which shall comply with the requirements.

The applicant, when submitting the first set of samples, can also submit an additional set of samples that may be necessary should one sample fail. The testing laboratory shall then, without further request, test the additional set of samples, and shall only reject if a further failure occurs. If the additional set of samples is not submitted at the same time, a failure of one sample shall entail rejection.

6.2 Earth electrode inspection housing

6.2.1 General

All tests shall be performed on three new lid specimens using one housing.

6.2.2 Load test

Concrete lid specimens shall be tested after a 28 day curing period. Lid specimens of all other materials shall be tested after a seven day curing period.

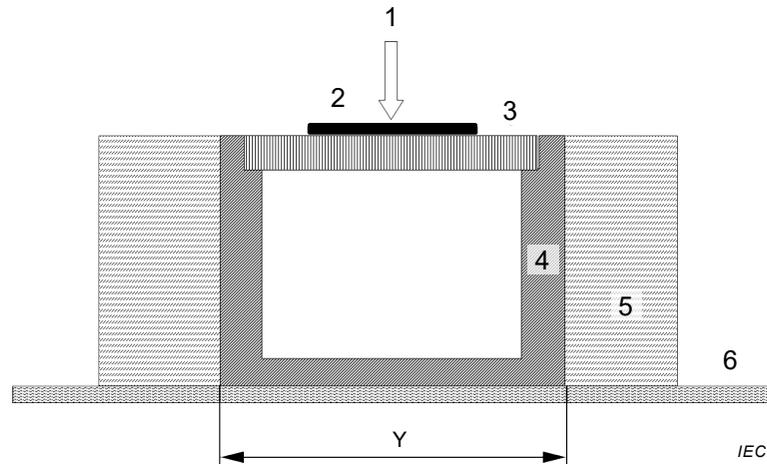
The test is carried out on a complete assembly and prepared according to the manufacturer's instructions.

The housing of the specimen shall be surrounded by a material relevant to a declared load rating in accordance with the manufacturer's instructions.

The thickness of the surrounding material shall be at least 0,5 times the nominal size of the housing and not greater than the nominal size of the housing.

The arrangement should be placed on a rigid support.

An example for the test arrangement is shown in Figure 1.



Key

- 1 force
- 2 circular steel plate
- 3 removable lid
- 4 housing
- 5 surrounding material
- 6 rigid support

Thickness of surrounding material (5) is equal to $0,5 \times Y$ up to $1 \times Y$.

Figure 1 – Test arrangement for load test

The product applicable for heavy duty usage (slow moving vehicular traffic, multi-axle, etc.) shall be subjected to a force of 30 kN vertically applied through a circular steel plate with a $170 \text{ mm} \pm 0,5 \text{ mm}$ diameter and a thickness of $20 \text{ mm} \pm 1 \text{ mm}$ with a radius of both edges (top and bottom) of minimum 2 mm.

The product applicable for medium duty usage (slow moving automobiles, etc.) shall be subjected to a force of 15 kN vertically applied through a circular steel plate with a $130 \text{ mm} \pm 0,5 \text{ mm}$ diameter and a thickness of $20 \text{ mm} \pm 1 \text{ mm}$ with an edge radius of approximately 2 mm.

The product applicable for light duty usage (walkways, etc.) shall be subjected to a force of 4 kN vertically applied through a circular steel plate with a $62 \text{ mm} \pm 0,5 \text{ mm}$ diameter and a thickness of $20 \text{ mm} \pm 1 \text{ mm}$ with an edge radius of approximately 2 mm.

The centre of the circular plate should be positioned over the centre of the lid.

The force shall be gradually applied over $60 \text{ s} \pm 10 \text{ s}$ and maintained for $120 \text{ s} \pm 5 \text{ s}$.

The tested load of the product should be declared by the manufacturer.

After the test, the specimens shall show no signs of disintegration, nor crack be visible to normal or corrected vision without additional magnification. One minute after the load has been removed, there shall be no permanent deformation exceeding 3 mm.

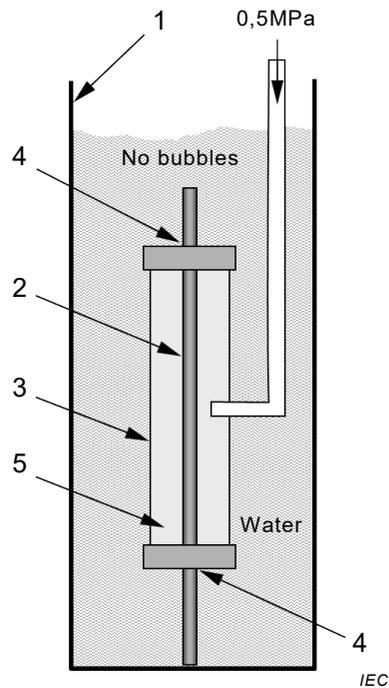
The specimen is deemed to have passed the tests if it meets the above requirements.

6.3 Earth electrode seal test

6.3.1 Earth electrode in watertight housing

Specimens are subjected to a sealing test as follows:

The earth electrode seal shall be assembled in a typical test bed that proves its intended application (as shown in Figure 2).



Key

- 1 tank filled with water
- 2 earth electrode rod
- 3 earth electrode seal arrangement
- 4 seals
- 5 air

Figure 2 – Test arrangement for sealing test

A minimum air pressure of 0,5 MPa shall be continuously applied to the seal arrangement for 24 h.

The specimens are deemed to have passed the test if no leakage is detected at the sealing points at the completion of the test.

6.3.2 Earth electrode in or through watertight concrete

6.3.2.1 General

The earth electrode seal shall be set in concrete according to the manufacturer's instructions in a specimen according to 6.3.2.2.

6.3.2.2 Specimen

The specimen shall be cubic with a minimum edge length of 150 mm. The composition of the concrete shall be in accordance with Table 1.

Table 1 – Parameters for concrete used for the test arrangement

Component thickness	Water-Cement ratio W/C	Cement content	Compressive strength
> 40 cm	0,7	No requirement	C25/30 or higher
< 40 cm	0,6	280 kg/m ³ 270 kg/m ³ were additions are taken into account	

The concrete shall be compacted immediately after placing in the moulds.

6.3.2.3 Curing of specimen

Leave the specimen in the mould for at least 16 h, but not longer than 3 days, protected against shock, vibration and dehydration at a temperature of (20 ± 5) °C. After removal from the mould, cure the test specimen till immediately before testing, in water at a temperature of (20 ± 2) °C, or in a chamber at (20 ± 2) °C and a relative humidity ≥ 95 %.

6.3.2.4 Application of water pressure

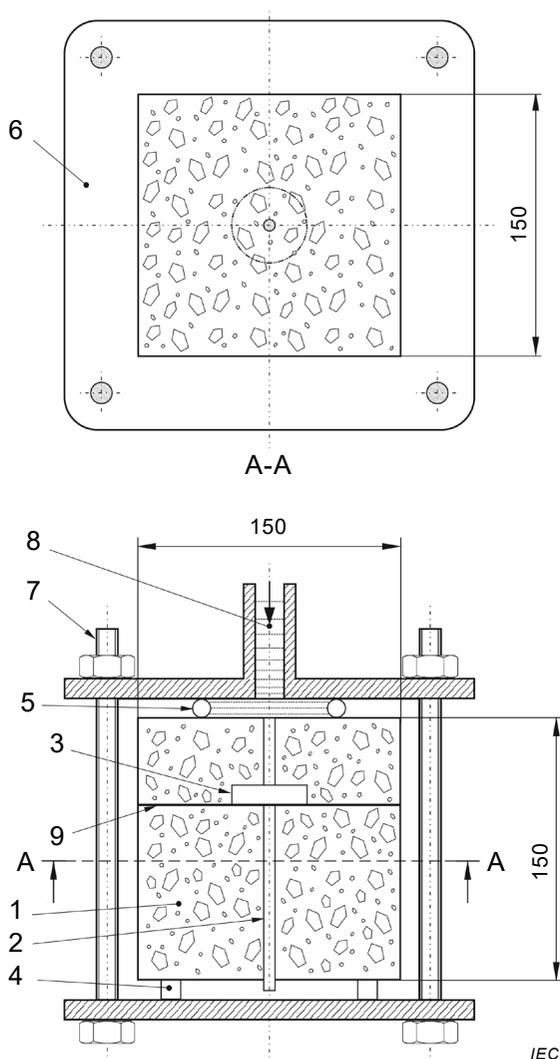
The test shall be started when the specimen is at least 28 days old. Place the specimen in the apparatus and apply a water pressure of (100 ± 10) kPa for (72 ± 2) h (as shown in Figure 3).

6.3.2.5 Examination of specimen

After the pressure has been applied for the specified time, remove the specimen from the apparatus. Wipe the face on which the water pressure was applied to remove excess water. Split the specimen in half, perpendicularly to the face on which the water pressure was applied. When splitting the specimen, and during the examination, place the face of the specimen exposed to the water pressure on the bottom. As soon as the split face has dried to such an extent that the water penetration front can be clearly seen, mark the water front on the specimen. Measure the maximum depth of penetration under the test area and record it.

6.3.2.6 Pass criteria

The specimen is deemed to have passed the test if the depth of water penetration does not exceed the point identified by line 9 in Figure 3.



Key

- 1 specimen made of concrete
- 2 earth electrode seal
(e.g. wall bushing or fixed earthing terminal)
- 3 water barrier
- 4 packing piece
- 5 sealing ring
- 6 screwed-on plate
- 7 bolt
- 8 water under pressure
- 9 permitted maximum water penetration

Figure 3 – Example for a test arrangement for depth of penetration of water under pressure

6.4 Installation instructions

6.4.1 General conditions for tests

The content of the installation instructions is checked as per its completeness by inspection.

6.4.2 Acceptance criteria

Installation instructions are deemed to have passed the test if they contain at least the following:

- the manufacturer's or responsible vendor's name or trade mark or identifying symbol;
- part number;
- classification as per Clause 4;
- load withstand force in kN.

6.5 Marking

6.5.1 General conditions for tests

The marking shall be inspected after rubbing it by hand for 15 s with a piece of cloth soaked with water, followed by rubbing it with another piece of cloth soaked with white spirit for 15 s.

Marking made by moulding, pressing or engraving is not subjected to this test.

6.5.2 Acceptance criteria

The specimen is deemed to have passed the test if the marking remains legible.

7 Electromagnetic compatibility (EMC)

Products covered by this document are, in normal use, passive in respect of electromagnetic influences (emission and immunity).

8 Structure and content of the test report

8.1 General

The purpose of Clause 8 is to provide general requirements for laboratory test reports. It is intended to promote clear, complete reporting procedures for laboratories submitting test reports.

The results of each test carried out by the testing laboratory shall be reported accurately, clearly, unambiguously and objectively, in accordance with any instructions in the test methods. The results shall be reported in a test report and shall include all the information necessary for the interpretation of the test results and all information required by the method used.

Particular care and attention shall be paid to the arrangement of the report, especially with regard to presentation of the test data and ease of assimilation by the reader. The format shall be carefully and specifically designed for each type of test carried out, but the headings shall be standardized as indicated herein.

The structure of each report shall include at least the information specified in 8.2 to 8.9.

8.2 Report identification

The following information shall be included¹:

- a) A title or subject of the report.
- b) Name and e-mail address or telephone number of the testing laboratory.
- c) Name, address and telephone number of the sub-testing laboratory where the test was carried out if different from the company which has been assigned to perform the test.
- d) Unique identification number (or serial number) of the test report.
- e) Name and address of the vendor.
- f) Report shall be paginated and the total number of pages indicated on each page, including appendices or annexes.
- g) Date of issue of the report.
- h) Date(s) test(s) was (were) performed.
- i) Signature and title, or an equivalent identification of the person(s) authorized to sign by the testing laboratory to attest to the content of the report.
- j) Signature and title of person(s) conducting the test(s).

8.3 Specimen description

- a) Sample description.
- b) Detailed description and unambiguous identification of the test specimen and/or test assembly, for example part number, type, classification, material, dimensions.
- c) Characterization and condition of the test specimen and/or test assembly.
- d) Sampling procedure, where relevant.
- e) Date of receipt of test samples.
- f) Photographs, drawings or any other visual documentation, if available.

8.4 Standards and references

- a) Identification of the test standard used and the date of issue of the standard.
- b) Reference to this document may only be made if the full set of tests is performed and reported, except where the deviations are clearly justified in 8.5 b).
- c) Other relevant documentation with the documentation date.

8.5 Test procedure

- a) Description of the test procedure.
- b) Justification for any deviations from, additions to or exclusions from the referenced standard.
- c) Any other information relevant to a specific test such as environmental conditions.
- d) Configuration of testing assembly and measuring set up.
- e) Location of the arrangement in the testing area and measuring techniques.

8.6 Testing equipment, description

Description of equipment used for every test conducted, for example presses, air compressors.

¹ It is suggested to insert in the test report a specific declaration to avoid its misuse. A declaration example is "This type test report may not be reproduced other than in full, except with the prior written approval of the issuing test laboratory. This type test report only covers the samples submitted for test and does not produce evidence of the quality for series production."

8.7 Measuring instruments description

Characteristics, serial number and calibration date of all instruments used for measuring the values specified in this document, for example dynamometers, air boost gauges.

8.8 Results and parameters recorded

- a) The required passing criteria for each test as defined in the standard.
- b) The relevant measured, observed or derived results of the tests.

The above shall be presented by tables, graphs, drawings, photographs or other documentation of visual observations as appropriate.

8.9 Statement of pass/fail

A statement of pass/fail is necessary, identifying the part of the test for which the specimen has failed and also a description of the failure.

Bibliography

- [1] EN 124 (all parts), *Gully tops and manhole tops for vehicular and pedestrian areas – Design requirements, type testing, marking, quality control*
 - [2] EN 1253 (all parts), *Gullies for buildings*
 - [3] EN 1253-1:2015, *Gullies for buildings – Part 1: Trapped floor gullies with a depth water seal of at least 50 mm*
 - [4] IEC 62305 (all parts), *Protection against lightning*
-