

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Lightning protection system components (LPSC) –  
Part 6: Requirements for lightning strike counters (LSC)**  
(standards.iteh.ai)

**Composants des systèmes de protection contre la foudre (CSPF) –  
Partie 6: Exigences pour les compteurs de coups de foudre (LSC)**

IEC 62561-6:2018  
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# INTERNATIONAL STANDARD

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Partie 6: Exigences pour les compteurs de coups de foudre (LSC)**

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International Standard IEC 62561-6 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 significant technical changes with respect to the previous edition:

- a) removal of previous classification and introduction of a simple division into Type I for impulses (direct lightning current detection) and Type II for lightning surge current detection, with appropriate testing for each type;
- b) modification and addition of terms and definitions;
- c) addition of a new Annex C (tests flow chart).

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

FDIS	Report on voting
81/575/FDIS	81/578/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,
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## INTRODUCTION

This part of IEC 62561 deals with the requirements and tests for lightning protection system components (LPSC) that may be used to determine the number of impulses or nominal currents on specific conductors associated with a lightning protection system (LPS) designed and implemented according to IEC 62305 series of standards.

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## LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

### Part 6: Requirements for lightning strike counters (LSC)

#### 1 Scope

This part of IEC 62561 specifies the requirements and tests for devices intended to count the number of lightning strikes based on the current flowing in a conductor. This conductor may be part of a lightning protection system (LPS) or connected to an SPD installation or other conductors, which are not intended to conduct a significant portion of lightning currents.

LSCs may also be suitable for use in hazardous atmospheres and there are therefore extra requirements necessary for the components to be installed in such conditions.

#### 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 60068-2-52:1996, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium, chloride solution)*

IEC 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

ISO 6988:1985, *Metallic and other non-organic coatings – Sulphur dioxide test with general condensation of moisture*

#### 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

##### lightning strike counter

##### LSC

device intended to count the number of lightning strikes based on current flowing in a conductor

**3.2****lightning strike counter (Type I)**

LSC classified by its design to count impulse discharge currents

**3.3****lightning surge counter (Type II)**

LSC classified by its design to count nominal discharge currents

**3.4** $I_{imp}$ **impulse discharge current**

crest value of an impulse current 10/350 through the LSC with specified charge transfer  $Q$  and specified energy  $W/R$  in the specified time

**3.5** $I_{imp\ min}$ **minimum impulse discharge current counted**

minimum peak value of the impulse counting discharge current that the LSC will count

**3.6** $I_{imp\ max}$ **maximum impulse discharge current counted**

maximum peak value of the impulse counting discharge current that the LSC will count and withstand

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**3.7** $I_n$ **nominal discharge current counted**

crest value of a current through the LSC having a current wave shape of 8/20

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**3.8** $I_{n\ min}$ **minimum discharge current counted**

minimum peak value of the current that the LSC will count

**3.9** $I_{n\ max}$ **maximum discharge current counted**

maximum peak value of the current that the LSC will count and withstand

**3.10****degree of protection of enclosure****IP**

numerical classification according to IEC 60529, preceded by the symbol IP, applied to the enclosure of electrical apparatus to provide:

- protection of persons against contact with, or approach to, live parts and against contact with moving parts (other than smooth rotating shafts and the like) inside the enclosure,
- protection of the electrical apparatus against ingress of solid foreign objects, and
- protection of the electrical apparatus against harmful ingress of water where indicated by the classification.

[SOURCE: IEC 60050-426:2008, 426-04-02]

**3.11****point of strike**

point where a lightning flash strikes the earth, or protruding structure

Note 1 to entry: A lightning flash may have more than one point of strike.

### 3.12 strike

all strokes from a single lightning flash that attach to a point of strike on a structure

## 4 Classification

LSCs are classified by type:

- lightning strike counter (Type I) as defined in 3.2;
- lightning surge counter (Type II) as defined in 3.3.

LSCs are also classified by location:

- indoor LSCs are intended for use in enclosures and/or inside buildings or shelters;
- outdoor LSCs are intended for use without enclosures and outside of buildings or shelters.

The IP codes defined in IEC 60529 are particularly relevant to the intended location of an LSC but may not be applicable to an LSC integral with an SPD.

NOTE LSCs installed in outdoor enclosures or shelters are suitable for indoor use.

## 5 Requirements

### 5.1 General

The LSC shall be designed in such a way that in normal use its performance is reliable and without danger to persons and the surrounding.

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

### 5.2 Documentation

The manufacturer or supplier of the LSC shall provide adequate information in their literature to ensure that the installer can select and install the counter in a suitable and safe manner.

The ranges for operating temperature, humidity and altitude shall be declared by the manufacturer.

The following information shall also be provided (as applicable):

$$I_{\text{imp min}}; I_{\text{imp max}}; I_{\text{imp}}; I_{\text{n}}; I_{\text{n min}}; I_{\text{n max}};$$

Compliance is checked by inspection.

### 5.3 Marking

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

- a) the name of the manufacturer or his trademark;
- b) the reference of the type or the serial number;
- c) the classification;
- d)  $I_{\text{imp min}}; I_{\text{imp max}}; I_{\text{imp}}; I_{\text{n}}; I_{\text{n min}}; I_{\text{n max}};$
- e) the degree of protection (IP);
- f) conformity to this document.

If the device is small and sufficient space is not available for all the markings to appear, the indications cited in a) and b) above shall at least be reproduced on the apparatus and still visible after installation. The indications cited in c), d) e) and f) can be given on the packaging and/or in the installation data sheet (documentation) and/or the catalogue of the manufacturer.

Compliance is checked in accordance with 6.7.

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

## 5.4 Design

The lightning strike counter shall be designed to carry out its function of counting the number of lightning strikes causing a current to flow in a conductor.

These devices shall detect and record lightning strikes regardless of the polarity of the current.

LSCs intended to be used outdoors shall be able to withstand environmental conditions including temperature, dust and humidity. The minimum degree of protection is IP 43 obtained by itself or in combination with a box in accordance with IEC 60529.

The manufacturer shall provide information regarding the range of environmental operating conditions, such as temperature, altitude and humidity which the strike counter is designed to operate within.

LSCs shall be capable of counting and withstanding specified currents without unacceptable changes in their characteristics.

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Compliance is checked in accordance with 6.6.2, 6.6.3, 6.6.4 and 6.6.5.

The size of the characters in the display, if any, shall allow a normal reading of the number of lightning strikes recorded, when it is installed in accordance with the instructions of the manufacturer.

Compliance is checked by visual inspection.

The fixing system of the LSC should not apply an unacceptable stress or damage to the conductor.

Compliance is checked by visual inspection.

Their material shall be compatible with that of the conductor (galvanic coupling).

## 6 Tests

### 6.1 General test conditions

#### 6.1.1 General

The tests in accordance with this document are type tests.

Unless otherwise specified, tests are carried out with the specimens assembled and installed 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 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 and also 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.

NOTE 1 One set of three specimens can be used for more than one test, subjected to agreement by the manufacturer.

NOTE 2 The applicant, can also submit an additional set of specimens which can be used should one specimen fail. The testing laboratory will then, without further request, test the additional set of specimens and will reject the set only if a further failure occurs. If the additional set of specimens is not submitted at the same time, the failure of one specimen will entail rejection.

The LSC submitted for testing shall be identified by means of the following elements:

- marks and indications specified in 4.3;
- installation instructions with reference and date.

The LSC shall be mounted in accordance with the instructions specified by the manufacturer in his installation instructions.

Unless otherwise specified, the tests are carried out at an ambient temperature ranging between 5 °C and 35 °C and shall not vary during the duration of the test by more than 3 °C. The LSC shall be protected from excessive heating or excessive external cooling.

See Annex C for a flowchart for testing LSCs.

### 6.1.2 Impulse discharge current count for LSCs Type I

The impulse discharge current passing through the device under test is defined by the crest value  $I_{imp}$ , the charge  $Q$  and the specific energy  $W/R$ . The impulse current shall show no polarity reversal and shall reach  $I_{imp}$  within 50  $\mu$ s.

The transfer of the charge  $Q$  shall occur within 5 ms and the specific energy  $W/R$  shall be dissipated within 5 ms.

The impulse duration shall not exceed 5 ms.

Table 1 gives values of  $Q$  (As) and  $W/R$  (kJ/ $\Omega$ ) for example values of  $I_{imp}$  (kA).

The relationships between  $I_{imp}$ ,  $Q$  and  $W/R$  are as follows:

$$Q = I_{imp} \times a$$

where  $a = 5 \times 10^{-4}$  s

$$W/R = I_{imp}^2 \times b$$

where  $b = 2,5 \times 10^{-4}$  s

**Table 1 – Preferred parameters for impulse discharge currents counted ( $I_{imp}$ )**

$I_{imp}$ (peak value) within 50 $\mu$ s kA	$Q$ within 5 ms As	$W/R$ within 5 ms kJ/ $\Omega$
100	50	2500
50	25	625
25	12,5	156
10	5	25
5	2,5	6,25
2	1	1
1	0,5	0,25

NOTE One of the possible test impulses which meet the above parameters is the 10/350 wave shape proposed in IEC 62305-1.

The following tolerances shall apply:

$I_{imp}$  +10 %;  
-10 %;

$Q$  +20 %;  
-10 %;

$W/R$  +45 %;  
-10 %.

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**6.1.3 Nominal discharge current count for LSCs Type II**

The nominal discharge current passing through the device under test is defined by the crest value  $I_n$  (see Table 2).

**Table 2 – Preferred parameters for nominal discharge currents counted ( $I_n$ )**

$I_n$ (8/20) kA (peak values)
100
80
60
40
20
1
0,5

The tolerances on the current wave shape passing through the device under test are as follows:

peak value  $\pm 10$  %;

front time  $\pm 20$  %;

time to half value  $\pm 20$  %.

A small overshoot or oscillation is tolerated provided that the amplitude of any oscillation is not more than 5 % of the crest value. Any polarity reversal after the current has fallen to zero shall not be more than 30 % of the crest value.

NOTE The test impulse that meets the above parameters is the 8/20 wave shape proposed in IEC 62475.

## 6.2 UV (Ultraviolet) light resistance

### 6.2.1 General

This test is necessary for LSCs designed to be installed outdoors or in specific environments.

Non-metallic LSC housings for outdoor application shall withstand UV effects.

One set of three new specimens shall be assembled and mounted rigidly on an insulating plate (e.g. brick, polytetrafluoroethylene [PTFE]) in accordance with the manufacturer's installation instructions.

The specimens shall be subjected to an environmental test consisting of an ultra violet light test as specified in Annex A.

### 6.2.2 Pass criteria

The specimens are deemed to have passed this part of the test if there are no signs of disintegration and no cracks visible to normal or corrected vision.

Ensure that the surface of the mounting plate is suitable to resist UV radiation.

## 6.3 Resistance tests to corrosion (for metallic parts)

This test is necessary for LSCs having metallic housing or parts designed to be installed outdoors or in specific environments.

The specimens used and compliant with the test in 6.2 shall be subjected to corrosion tests as per Annex B.

The specimens shall be subjected to an additional ammonia atmosphere treatment for those made of copper alloy with a copper content less than 80 % as specified in Clause B.4.

The manufacturer or supplier shall provide proof of the copper content of any part of the assembly made from a copper alloy.

After the parts have been dried during 10 min in a drying oven at a temperature of  $100\text{ °C} \pm 5\text{ °C}$ , they shall not present any trace of rust on surfaces.

Traces of rust on the edges or a yellowish stain removed by rubbing are not taken into account. White rust is not considered as corrosive deterioration.

## 6.4 Mechanical tests

All specimens complying with 6.2 and 6.3 shall be stressed three times by a mechanical test.

All specimens are subjected to a mechanical test by applying mechanical impacts.

The impacts are carried out on the LSC's accessible parts which in use may be mechanically stressed accidentally.