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Lightning protection system components (LPSC) – Part 6: Requirements for lightning strike counters (LSC)

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

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LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

Part 6: Requirements for lightning strike counters (LSC)

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The text of this standard is based on the following documents:

FDIS	Report on voting
81/392/FDIS	81/400/RVD

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

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

A list of all the parts in the IEC 62561 series, published under the general title *Lightning protection system components (LPSC),* can be found on the IEC website.

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INTRODUCTION

This Part 6 of IEC 62561 deals with the requirements and tests for lightning protection system components (LPSC) used for the installation of a lightning protection system (LPS) designed and implemented according to the 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 6 of IEC 62561 specifies the requirements and tests for devices intended to count the number of lightning strike pulses 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).

NOTE Lightning strike counters may also be suitable for use in hazardous atmospheres. Regard should then be taken of the extra requirements necessary for the components to be installed in such conditions.

2 Normative references

The following referenced documents are indispensable for the application 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 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

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*

IEC 61180-1, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 62305-1:2010, *Protection against lightning – Part 1: General principles*

ISO 4892-2:2006, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 4892-3:2006, *Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps*

ISO 4892-4, *Plastics – Methods of exposure to laboratory light sources – Part 4: Open-flame carbon-arc lamps*

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

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

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3 Terms and definitions

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

3.1
lightning strike counter
device intended to count the number of lightning strikes based on current flowing in a conductor

3.2
threshold current
I_{tc}
peak value of the discharge current with an 8/20 waveform that the lightning strike counter will count in 100 % of the cases

3.3
maximum counting discharge current
$I_{mcw,\ 8/20}$
peak value of a current through the conductor having an 8/20 waveform and magnitude according to the counting and withstand current test

NOTE 8/20 waveform can be used only for lightning strike counters connected to SPDs Type 2.

3.4
maximum withstand discharge current
$I_{mcw,\ 10/350}$
peak value of a current through the conductor having an 10/350 waveform and magnitude according to the counting and withstand current test

3.5
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
– where indicated by the classification, protection of the electrical apparatus against harmful ingress of water

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

4 Requirements

4.1 General

The lightning strike counter shall be designed in such a way that in normal use their 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.

4.2 Documentation

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

Compliance is checked by inspection.

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4.3 Marking

All products complying with this standard 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 position of the assembly if necessary;

d) the degree of protection (IP) if applicable;

e) conformity to the present standard (of which in particular I_{tc} and I_{mcw} if applicable).

For small devices, if the place available is not sufficient for all the indications to appear, the indications cited in a) and b) above shall at least be reproduced on the apparatus and visible once installed. The indications cited in c), d) and e), can be carried on the packaging and/or in installation data sheet and/or the catalogue of the manufacturer.

Compliance is checked in accordance with 6.7.

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

4.4 Design

The design of the lightning counter shall be such that it carries out its function of counting the number of lightning strikes flowing in a conductor.

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

Lightning strike counters 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 the operation environmental conditions such as temperature and humidity

The threshold current I_{tc}, the maximum counting discharge current ($I_{mcw,8/20}$) and the maximum discharge withstand current ($I_{mcw,10/350}$) are declared by the manufacturer. At $I_{tc}/2$, the surge lightning strike counter shall not operate. Compliance is checked in accordance with 6.6.2, 6.6.3 and 6.6.4.

The size of 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.

The fixing system of the lightning strike counter should not apply an unacceptable stress to the conductor.

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

5 Classification

Lightning strike counters are classified according to their application, threshold currents and maximum counting and withstand current.

Application: for connection on LPS conductors, for connection on SPD conductors and for connection on both conductors.

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NOTE This standard is applicable to those lightning strike counters that may be mounted in SPD enclosures but may not be required for those lightning strike counters which are integral to an SPD.

The values I_{tc} and I_{mcw} should comply with Table 1.

Table 1 – Typical values for I_{tc} and I_{mcw}

Application	Values for I_{tc}		Values for I_{mcw}				
Connection on LPS conductors	–	1 kA 8/20[b]	–	–	–	–	100 kA 10/350[a]
Connection on SPD conductors	500 A 8/20[b]	–	20 kA 8/20[b]	40 kA 8/20[b]	60 kA 8/20[b]	80 kA 8/20[b]	100 kA 8/20[b]
Connection on LPS and SPD conductors	–	1 kA 8/20[b]	–	–	–	–	100 kA 10/350[a]

[a] The 10/350 impulse is defined by three parameters, a peak current value I_{peak}, a charge Q and a specific energy W/R (see IEC 62305-1).

[b] The 8/20 impulse is defined according to IEC 60060-1.

6 Tests

6.1 General test conditions

The tests in accordance with this standard 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 The applicant may also submit an additional set of specimens which may be used should one specimen fail. The testing laboratory will then, without further request, test the additional set of specimens and will reject 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 lightning strike counters submitted for testing shall be identified by means of the following elements:

– marks and indications specified in 4.3;

– assembly instructions with reference and date.

The lightning strike counters shall be mounted in accordance with the instructions specified by the manufacturer in his assembly instructions.

The number of samples is 3 for the electric tests and 1 for the other tests.

NOTE The use of the same sample for several tests is possible after agreement of the manufacturer.

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 test by more than 3 K. The lightning strike counters shall be protected from excessive heating or excessive external cooling.

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6.2 Resistance to UV radiation tests

This test is necessary for lightning strike counters designed to be installed outdoors or in specific environments.

Non-metallic lightning strike counter housings for outdoor application shall withstand UV effects.

In order that a lightning strike counter meets the requirements of this standard, environmental tests shall be carried out as per Annex A.

One counter shall be assembled and mounted rigidly on an insulating plate (e.g. brick, polytetrafluorethylene (PTFE) in accordance with the manufacturer's installation instructions.

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

The specimen is 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.

NOTE 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 lightning strike counters designed to be installed outdoors or in specific environments.

The specimen used and complied with 6.2 test, shall be subjected to corrosion tests as per Annex B, consisting of a salt mist treatment, as specified in Clause B.1, followed by a humid sulphurous atmosphere treatment, as specified in Clause B.2, and an additional ammonia atmosphere treatment for specimens made of copper alloy with a copper content less than 80 % as specified in Clause B.3.

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

One does not take into account traces of rust on the edges, nor a yellowish veil, disappearing by simple friction. White rust is not considered as corrosive deterioration.

6.4 Mechanical tests

A used specimen complying with 6.2 and 6.3 shall be stressed three times by a mechanical test.

The lightning strike counter is subjected to a mechanical test by applying mechanical impacts.

The impacts are carried out on the accessible parts of the lightning strike counter, which may be mechanically stressed accidentally.

The specimen is assembled under its normal operating conditions specified in the manufacturer's documentation.

The lightning strike counter is mounted on a pendulum hammer test apparatus according to Clause 4 of IEC 60068-2-75:1997 as shown in Figure 1. The striking element material shall be polyamide as per Table 1 of IEC 60068-2-75:1997 and its mass shall be 200 g as per Table 2 of IEC 60068-2-75:1997.

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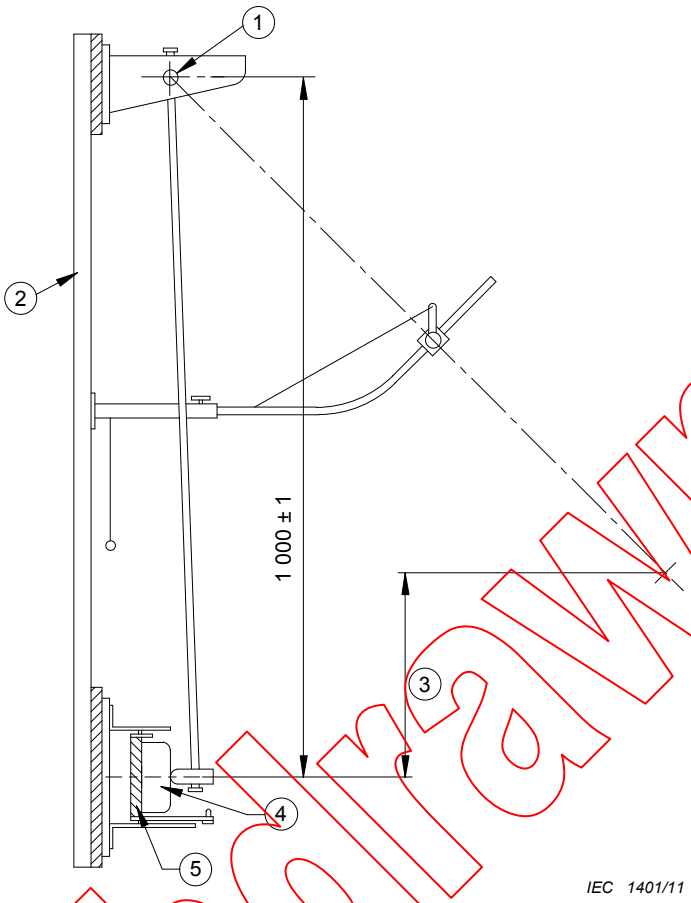

Key
1 pendulum
2 frame
3 height of fall
4 arrangement of specimens
5 mounting fixture

Figure 1 – Pendulum hammer test apparatus

The hammer is allowed to fall from a height of 200 mm so that one impact on each side is applied, as far as possible perpendicular to the length of the arrangement. The drop height is the vertical distance between the position of the point of control, when the pendulum is released, and the position of this point at the time of the impact.

The point of control is located on the surface of the striking part where the line passing by the point of intersection of the axes of the steel tube of the pendulum and the part of striking, perpendicular to the plan crossing the two axes, comes into contact with surface.

The impacts are not applied to the display window or to the connectors.

NOTE In theory, the centre of gravity of the striking part should be the point of control. As, in practice, it is difficult to determine the centre of gravity, the point of control has been chosen as described above.

After the test, the lightning strike counter shall show no cracks or similar damage visible to normal or corrected vision without magnification and shall not present damage which can potentially affect its later use.

After the test, the lightning strike counter shall not have increased nor decreased the count value in the display (especially for electromechanical lightning strike counters).

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