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TECHNICAL SPECIFICATION

SPECIFICATION TECHNIQUE

Lightning protection system components (LPSC) – Part 8: Requirements for components for isolated LPS

Composants de système de protection contre la foudre (CSPF) – Partie 8: Exigences pour les composants de système isolé de protection contre la foudre

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LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

Part 8: Requirements for components for isolated LPS

FOREWORD

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Technical Specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62561-8, which is a Technical Specification, has been prepared by IEC technical committee 81: Lightning protection.

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.

This bilingual version (2018-02) corresponds to the monolingual English version, published in 2018-01.

The text of this Technical Specification is based on the following documents:

Enquiry draft	Report on voting
81/562/DTS	81/574/RVDTS

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

The French version of this standard has not been voted upon.

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

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

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –

Part 8: Requirements for components for isolated LPS

1 Scope

This document specifies the requirements and tests for insulating stand-offs, used in conjunction with an air-termination system and down-conductors with the aim of maintaining the proper separation distance, and the requirements and tests for insulating down-conductors, including their specific fasteners, able to reduce the separation distance.

Testing of insulating stand-offs and insulating down-conductors components for an explosive atmosphere is not covered by this document.

Requirements and tests for other types of components for isolated LPS are under consideration.

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 60060-2:2010, *High-voltage test techniques – Part 2: Measuring systems*

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

IEC 60068-2-75:2014, *Environmental testing – Part 2:Tests – Test Eh: Hammer tests*

IEC 61083-1, *Instruments and software used for measurement in high-voltage impulse tests – Part 1: Requirements for instruments*

IEC 61083-2, *Instruments and software used for measurement in high-voltage and high-current tests – Part 2: Requirements for software for tests with impulse voltages and currents*

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

IEC 62561-1:2017, *Lightning protection system components (LPSC) – Part 1: Requirements for connection components*

IEC 62561-2:2012, *Lightning protection system components (LPSC) – Part 2: Requirements for conductors and earth electrodes*

IEC 62561-4, *Lightning protection system components (LPSC) – Part 4: Requirements for conductor fasteners*

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

ISO 4892-3:2016, *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 6988:1985, *Metallic and other non-organic coatings – Sulfur dioxide test with general condensation of moisture*

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

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
insulating stand-off
non-metallic or composite component, consisting of the insulator and fixation parts, designed to retain, support and insulate the air-termination system and/or down-conductors at a required separation distance

3.2
effective length correction factor
k_x
factor evaluating the different withstand voltage of air gaps and insulators under test voltages and environmental influences like pollution and/or UV light degradation

3.3
steepness correction factor for insulating stand-offs
c_{is_st}
factor considering the effect of higher steepness and the probability of occurrence of subsequent negative short strokes on the flashover voltage of an insulating stand-off

Note 1 to entry: The value is defined in the test procedure.

3.4
effective length of an insulating stand-off
l_{eff}
length (distance) of an air gap with equivalent break down behaviour to an insulating stand-off

3.5
corrected distance value of an insulating stand-off
l_{st}
shortest measured clearance distance between two conductive elements of different electrical potential, e.g. between a metallic conductor fastener and a mounting assembly

3.6
equivalent separation distance
s_e
corrected distance value to be used instead of the insulating length of a stand-off distance value equivalent to the separation distance of conventional down-conductors required in IEC 62305-3

3.7
down-conductor
conductor made of bare metal

3.8
insulating down-conductor
conductor provided with a layer of insulation with the purpose to reduce the separation distance

3.9
steepness correction factor for insulating down-conductors
c_{dc_st}
factor considering the effect of higher steepness and the probability of occurrence of subsequent negative short strokes on the withstand voltage of insulating down-conductors during testing

Note 1 to entry: The value is defined in the test procedure.

3.10
partial insulating down-conductor
conductor provided with a layer of insulation with the purpose to reduce the separation distance, supported by insulating stand-offs

3.11
clearance of the comparison arrangement
s_c
gap distance of the comparison arrangement used for verification of the effective length correction factor k_x and separation distance s_e

3.12
time to chopping
T_c
virtual parameter defined as the interval between the virtual origin and the instant of chopping

3.13
effective material insulating factor
k_m
coefficient of material, which depends on the electrical insulation material

Note 1 to entry: See IEC 62305-3.

3.14
installation arrangement
installation containing one or more insulating down-conductors and additional installation means (according to the manufacturer's instruction) to keep the defined separation distance and to support the insulating down-conductor mechanically

Note 1 to entry: One example is given in Figure F.1.

4 Insulating stand-off

4.1 Classification

4.1.1 General

Classification of the product depends on the withstand capability of mechanical forces.

4.1.2 According to conductor clamping arrangement

a) Conductor fasteners that are designed to clamp the conductor.

b) Conductor fasteners that are designed to clamp but allow axial movement of the conductor.

4.1.3 According to mounting

a) Free standing.

b) Rigidly fixed on a structure.

4.2 Requirements

4.2.1 General

An insulating stand-off shall retain, support and insulate the conductor when subjected to the stress of a lightning discharge under high impulse voltage and shall withstand the mechanical and environmental influences such as perpendicular and axial compression loads caused by the weight of the supported conductor along with snow, ice, wind and thermal expansion/contraction of the conductor.

An insulating stand-off shall be compatible with the conductor it is supporting and the surface to which it is fixed.

4.2.2 Construction

4.2.2.1 General

An insulating stand-off shall be so designed and constructed that:

– the surface is free from burrs, flash moulding, deformation and similar inconsistencies which are likely to inflict injury to the installer or user.

  Compliance is checked by visual inspection.

– it carries the perpendicular and axial compression loads caused by the weight of the supported conductor along with snow, ice, wind and thermal expansion/contraction of the conductor.

  Compliance is checked in accordance with 4.3.6.2 and 4.3.6.4.

4.2.2.2 Corrosion resistance

An insulating stand-off shall withstand the effects of corrosion typical of the environment to which it is exposed.

Compliance is checked by testing in accordance with 4.3.5.1.

4.2.2.3 UV light resistance

An insulating stand-off shall withstand the effects of UV exposure typical of the environment to which it is exposed.

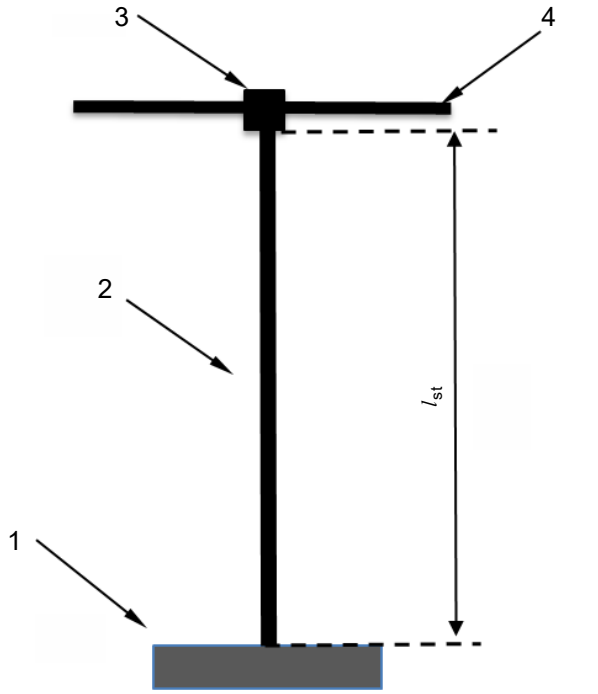
Compliance is checked by testing in accordance with 4.3.5.2.

4.2.3 Mechanical requirements

4.2.3.1 General

An insulating stand-off may consist of a mounting assembly, an insulator and a conductor fastener as shown in Figure 1 and/or Figure 2. The manufacturer of the insulating stand-off shall guarantee with appropriate mechanical tests or calculations that the stand-off fulfils the requirements stated in his documentation.

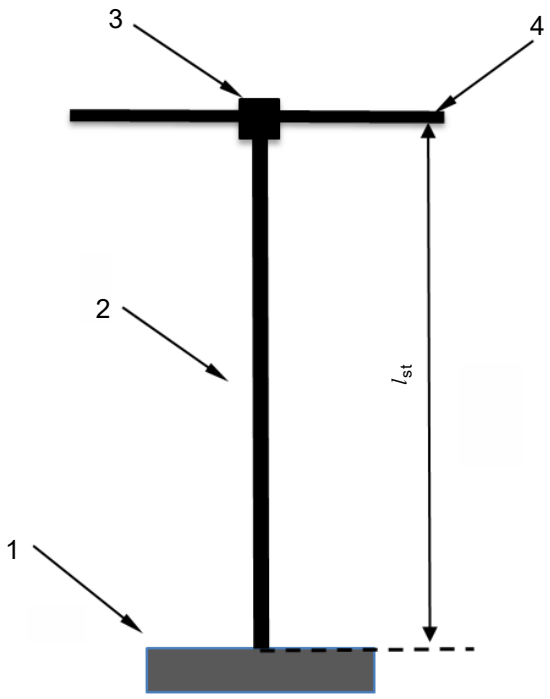
Compliance is checked by testing in accordance with 4.3.



Key

1 mounting assembly
2 insulator
3 metallic conductor fastener
4 conductor
l_{st} insulating length

Figure 1 – Typical insulating stand-off with a metallic fastener



Key

1 mounting assembly
2 insulator
3 non-metallic conductor fastener
4 conductor
l_{st} insulating length

Figure 2 – Typical insulating stand-off with a non-metallic fastener

4.2.3.2 Mounting assembly

The mounting assembly which holds the insulator in position on the structure shall withstand mechanical stress.

Compliance is checked by testing in accordance with 4.3.6.

4.2.3.3 Insulator

The insulator shall withstand mechanical stress, e.g. pull out force, impact strength, bending load.

Compliance is checked by testing in accordance with 4.3.6.

4.2.3.4 Conductor fastener

The conductor fastener which is part of the insulating stand-off shall comply with the requirements and tests of IEC 62561-4.

4.2.4 Electrical requirements

An insulating stand-off shall be able to withstand the very high impulse voltages generated by a lightning strike.

An insulating stand-off has an insulating length l_{st} which is different from its effective length l_{eff}. The isolating capability of an insulating stand-off may be provided by either

a) its effective length l_{eff}, or

b) its effective length correction factor k_x.

The effective length correction factor k_x is determined from the effective length l_{eff} and the insulating length l_{st} as follows:

$$k_x = \frac{l_{eff}}{l_{st}}$$

The effective length l_{eff} is the value which shall be compared to the required separation distance s according to IEC 62305-3. This effective length of the insulating stand-off shall be equal to or greater than the required separation distance s.

Compliance is checked by testing in accordance with 4.3.1, 4.3.2 and 4.3.7.

For the purpose of calculating the separation distance as used in IEC 62305-3, the value k_m can be set equal to the value k_x.

NOTE Based on experience, a value of k_x = 0,7 for GFRP, PE and PVC insulating stand-offs under normal operating conditions has been found to be typical.

4.2.5 Documentation

The manufacturer or supplier of the insulating stand-off shall provide adequate information in the installation instructions to ensure that the installer can select and install the component in a suitable and safe manner in accordance with the requirements of IEC 62305-3.

Compliance is checked by inspection in accordance with 4.3.3.

4.2.6 Marking

An insulating stand-off shall be marked with:

a) the manufacturer’s or responsible vendor’s name, logo or trademark;

b) product identification or type.

Where it is not possible to make these marks directly onto the product, they shall be provided on the smallest supplied packaging.

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

Compliance is checked by testing in accordance with 4.3.4.

4.3 Tests

4.3.1 General test conditions

Tests according to 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 insulating stand-off.

Unless otherwise specified, all tests are carried out with the specimens assembled and installed as in normal use according to the manufacturer's or supplier's instructions, using the recommended conductor materials, sizes and tightening torques.