

TECHNICAL SPECIFICATION

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

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CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Insulating stand-off.....	9
4.1 Classification	9
4.1.1 General	9
4.1.2 According to conductor clamping arrangement.....	10
4.1.3 According to mounting	10
4.2 Requirements	10
4.2.1 General	10
4.2.2 Construction	10
4.2.3 Mechanical requirements	10
4.2.4 Electrical requirements	12
4.2.5 Documentation	13
4.2.6 Marking	13
4.3 Tests	13
4.3.1 General test conditions	13
4.3.2 General test setup	16
4.3.3 Documentation	17
4.3.4 Marking test.....	17
4.3.5 Environmental influence tests	17
4.3.6 Mechanical tests.....	18
4.3.7 Electrical test.....	23
4.4 Electromagnetic compatibility (EMC).....	24
4.5 Structure and content of the test report	24
4.5.1 General	24
4.5.2 Report identification.....	25
4.5.3 Specimen description	25
4.5.4 Characterization and condition of the test specimen and/or test assembly	25
5 Insulating down-conductor.....	26
5.1 Classification	26
5.2 Lightning current carrying capability.....	27
5.3 Preferred values of equivalent separation distance s_e	27
5.4 Requirements	27
5.4.1 General	27
5.4.2 Environmental requirements	27
5.4.3 Mechanical requirements	28
5.4.4 Electrical requirements	28
5.4.5 Documentation	28
5.4.6 Marking	29
5.5 Tests	29
5.5.1 General test conditions	29
5.5.2 General test setup	30
5.5.3 Documentation	31
5.5.4 Marking test.....	31

5.5.5	Environmental influence tests	31
5.5.6	Mechanical tests	32
5.5.7	Electrical tests	36
5.6	Electromagnetic compatibility (EMC)	41
5.7	Structure and content of the test report	41
5.7.1	General	41
5.7.2	Report identification	41
5.7.3	Specimen description	42
5.7.4	Characterization and condition of the test specimen and/or test assembly	42
5.7.5	Insulating down-conductor	42
5.7.6	Standards and references	42
5.7.7	Testing equipment, description	42
5.7.8	Measuring instruments description	43
5.7.9	Results and parameters recorded	43
Annex A (normative)	Environmental test – corrosion resistance	44
A.1	General	44
A.2	Salt mist test	44
A.3	Humid sulphurous atmosphere test	44
A.4	Ammonia atmosphere test	44
Annex B (normative)	Environmental test – resistance to ultraviolet light	45
B.1	General	45
B.2	The test	45
B.3	First alternative test to B.2	45
B.4	Second alternative test to B.2	45
Annex C (normative)	Flow chart of tests for insulating stand-offs	46
Annex D (normative)	Flow chart of tests for insulating down-conductors	47
Annex E (informative)	High voltage impulse test to determine the actual correction factor k_x for insulating stand-offs	48
E.1	Specimen preparation	48
E.2	Test setup	48
E.3	Test procedure	49
Annex F (informative)	Installation arrangement test to determine the influence of supporting structures on the separation distance	50
F.1	Specimen preparation for the high voltage installation arrangement test	50
F.2	Test procedure	50
Bibliography	52
Figure 1	– Typical insulating stand-off with a metallic fastener	11
Figure 2	– Typical insulating stand-off with a non-metallic fastener	12
Figure 3	– Typical insulating stand-off with a metallic fastener prepared for testing	14
Figure 4	– Typical insulating stand-off with a non-metallic fastener prepared for testing	15
Figure 5	– Basic arrangement for bending test	19
Figure 6	– Pendulum hammer test apparatus	20
Figure 7	– Basic arrangement for pull out test on rigidly fixed insulating stand-off	21
Figure 8	– Basic arrangement for pull out test on free standing insulating stand-off	22
Figure 9	– General description of the test arrangement for the high voltage impulse test of an insulating stand-off	23

Figure 10 – Specimen preparation for UV light test	32
Figure 11 – Basic arrangement for lateral load test	33
Figure 12 – Typical arrangement for axial movement test	34
Figure 13 – Basic arrangement for the lightning current carrying capability test	37
Figure 14 – General description of the test setup for the high voltage impulse test of the insulating down-conductor.....	38
Figure 15 – Test arrangement for insulating down-conductors.....	39
Figure 16 – Test arrangement for partial insulating down-conductors.....	40
Figure C.1 – Tests for insulating stand-offs.....	46
Figure D.1 – Tests for insulating down-conductors	47
Figure E.1 – General description of the test arrangement to determine the actual correction factor k_x for insulating stand-offs	48
Figure F.1 – Example for installation arrangement test – specimen under test	50
Table 1 – Type test requirements for an insulating stand-off	16
Table 2 – Lightning impulse current (I_{imp}) parameters.....	27
Table 3 – Type test requirements for an insulating down-conductor and fasteners	30

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LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC) –**Part 8: Requirements for components for isolated LPS**

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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.

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.

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.

A bilingual version of this publication may be issued at a later date.

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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 2 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 2 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.

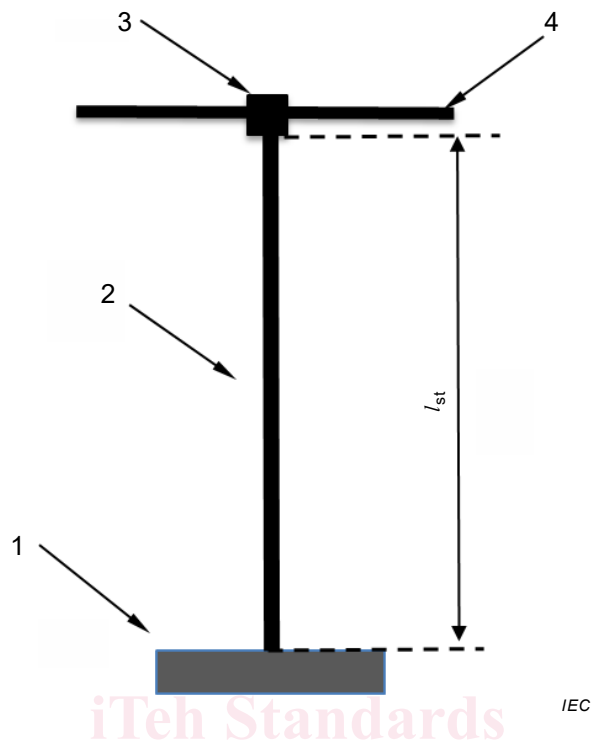
Compliance is checked by testing in accordance with 4.3.5.2.

4.2.3 Mechanical requirements

4.2.3.1 General

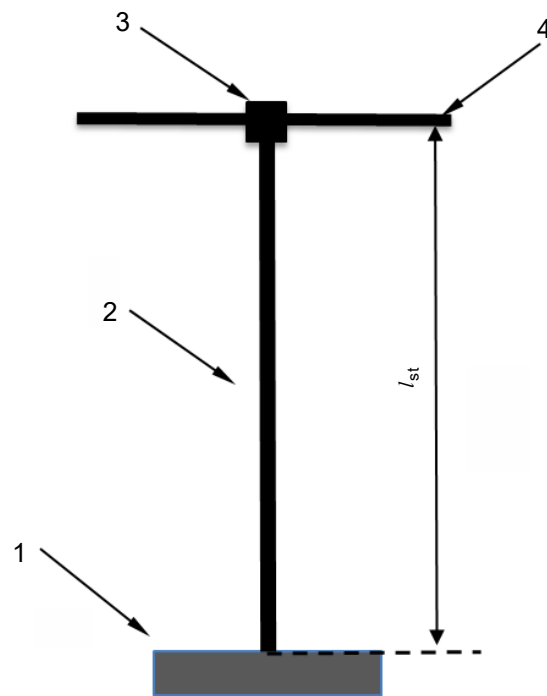
An insulating stand-off may consist of a mounting assembly, an insulator and a conductor fastener as shown in Figure 1 and/or Figure 2. The manufacturer of the insulating stand-off shall guarantee with appropriate mechanical tests or calculations that the stand-off fulfils the requirements stated in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



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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.