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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 17: Non-contact AC voltage indicators

Sécurité électrique dans les réseaux de distribution basse tension au plus égale à 1 000 V C.A. et 1 500 V C.C. – Dispositifs de contrôle, de mesure ou de surveillance de mesures de protection – Partie 17: Indicateurs de tension alternative sans contact

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Part 17: Non-contact AC voltage indicators

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

FDIS	Report on voting
85/790/FDIS	85/803/RVD

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

The language used for the development of this International Standard is English.

A list of all parts of the IEC 61557 series, published under the general title *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures*, can be found on the IEC website.

This International Standard is to be used in conjunction with IEC 61557-1:2019.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The purpose of this document is to specify the minimum construction and performance requirements of the non-contact AC voltage indicator in normal use and in case of reasonably foreseeable misuse to reduce the risk of hazard during and after the voltage test.

The most reasonably foreseeable misuse of the non-contact AC voltage indicator is that the operator uses it to check the absence of hazardous voltages followed by an unsafe interpretation of the negative indication with respect to the current situation.

The assessment of the absence of hazardous live voltage is performed by using a 2-pole low-voltage detector in compliance with IEC 61243-3.

ELECTRICAL SAFETY IN LOW VOLTAGE DISTRIBUTION SYSTEMS UP TO 1 000 V AC AND 1 500 V DC – EQUIPMENT FOR TESTING, MEASURING OR MONITORING OF PROTECTIVE MEASURES –

Part 17: Non-contact AC voltage indicators

1 Scope

This part of IEC 61557 defines minimum performance requirements for non-contact AC voltage indicators to reduce the risk of electric shock for the testing person and bystanders caused by the wrong interpretation of the indication.

Products designed and manufactured in accordance with this document are for use by (electrically) skilled persons only. Non-contact AC voltage indicators are not designed for testing the absence of the operating voltage.

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 61010-031:2015, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test*
IEC 61010-031:2015/AMD1:2018[1]

IEC 61326-1:2020, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

IEC 61557-1:2019, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61557-1 and the following 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

[1] A consolidated version of this document exists, comprising IEC 61010-31:2015 and IEC 61010-31:2015/AMD1:2018.

3.1
non-contact AC voltage indicator
hand-held and battery-powered probe without direct contact with the live part, indicating the potential between the live part and the human body, which is usually close to the earth potential

3.2
protective fingerguard
part of the enclosure that indicates the limit of safe access and reduces the risk of the operator touching hazardous live parts

[SOURCE: IEC 61010-031:2015, 3.1.3]

3.3
sensitivity range
range of voltage where the non-contact AC voltage indicator is triggering

4 Requirements

4.1 General

The requirements of IEC 61557-1:2019, Clause 4 and the following requirements apply.

4.2 Influencing quantities – Operating uncertainty (B), percentage operating uncertainty (B [%])

IEC 61557-1:2019, 4.2 does not apply.

4.3 Rated operating conditions

The following rated operating conditions shall apply:

a) ambient temperature range from: −10 °C to +45 °C;
b) maximum relative humidity 95 % at temperatures up to 31 °C, decreasing linearly to 50 % relative humidity at 45 °C;
c) distance through air between live conductor and probe tip: ≤ 2 mm;
d) position within a solid angle of 30° around the vertical axis between probe tip and conductor;
e) capacitance greater than or equal to 100 pF between the hand-held part and reference earth, see Figure 2.

4.4 Battery test facility

In addition to IEC 61557-1:2019, 4.4, the following applies.

Non-contact AC voltage indicators shall have a self-test capability. As a minimum, the self-test function shall confirm correct operation of the batteries and of the voltage indication.

4.5 Safety

The requirements in accordance with IEC 61557-1:2019, 4.5, do not apply. The following requirements shall apply instead.

All electrical safety aspects are covered by IEC 61010-031.

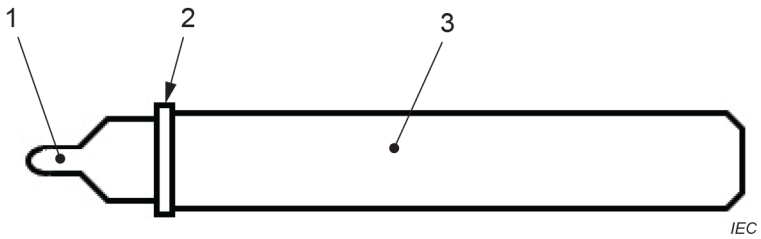
The hand-held parts of the non-contact AC voltage indicator and the probe tip shall be separated by a protective fingerguard, see Figure 1.

The clearance and creepage distance between the outmost tip of the probe and the hand-held part of the fingerguard shall fulfil the requirements for double or reinforced insulation in accordance with IEC 61010-031.

The probe tip shall be insulated by double or reinforced insulation from the handheld parts. The insulation shall fulfil the relevant requirements of IEC 61010-031.

Non-contact AC voltage indicators shall be designed for measurement category III at a minimum and for a minimum rated voltage to earth of 300 V.

The design of the protective fingerguard shall fulfil the requirements of IEC 61010-031.



Key

1 probe-tip
2 protective fingerguard
3 hand-held part

Figure 1 – Non-contact AC voltage indicator

4.6 Electromagnetic compatibility

4.6.1 Immunity

For immunity requirements, IEC 61326-1:2020, Table 2 shall apply.

4.6.2 Emission

For emissions, either class A or class B limits in accordance with IEC 61326-1:2020, 7.2 shall apply.

4.7 Indication

The presence of voltage on a conductor within the specified sensitivity range of the non-contact AC voltage indicator shall be indicated visually. Additional means of indication, for example acoustic means or vibration, are permitted.

5 Marking and operating instructions

The requirements of IEC 61557-1:2019, Clause 5 do not apply. The following requirements shall apply instead.

The non-contact AC voltage indicator shall be marked in accordance with IEC 61010-031:2015, Table 1, with symbol 5 and symbol 7, and at least with the rated voltage to earth and measurement category, the rated frequency and the specified range of sensitivity.

The operating instructions shall be in accordance with the requirements of IEC 61010-031 and, the following information shall be provided in the operating instructions:

a) a clear warning that a non-contact AC voltage indicator shall not be used to test the absence of voltages;

b) a clear warning that non-contact AC voltage indicators shall be used by skilled persons only;

c) information about influencing factors on the sensitivity of indication (for example wearing protective gloves and/or shoes, presence of other energized conductors in the close neighbourhood);

d) a statement that disassembling and repair of non-contact AC voltage indicators shall be done by skilled persons only;

e) information about the type of energy source to be used;

f) the obligation to carry out a sensitivity test at the next applicable socket-outlet with live voltages before starting the work.

6 Tests

6.1 General

The requirements of IEC 61557-1:2019, Clause 6 do not apply. The following requirements shall apply instead.

6.2 Test of mechanical strength

Compliance with IEC 61557-1:2019, 4.7 shall be tested (type test).

A vibration test shall be carried out in accordance with IEC 61557-1. A drop test shall be carried out in accordance with IEC 61010-031. After these tests, the non-contact AC voltage indicator shall show no damages or cracks which could cause a hazard and shall show no loss of function and sensitivity.

Compliance shall be tested as follows:

a) visual inspection (type test and routine test);

b) verification of clearances and creepages;

c) test of dielectric strength of solid insulation between probe tip and hand-held parts;

d) test of indication in accordance with 6.3 (type test and routine test);

e) functional test of battery test facility and self-test (type test and routine test).

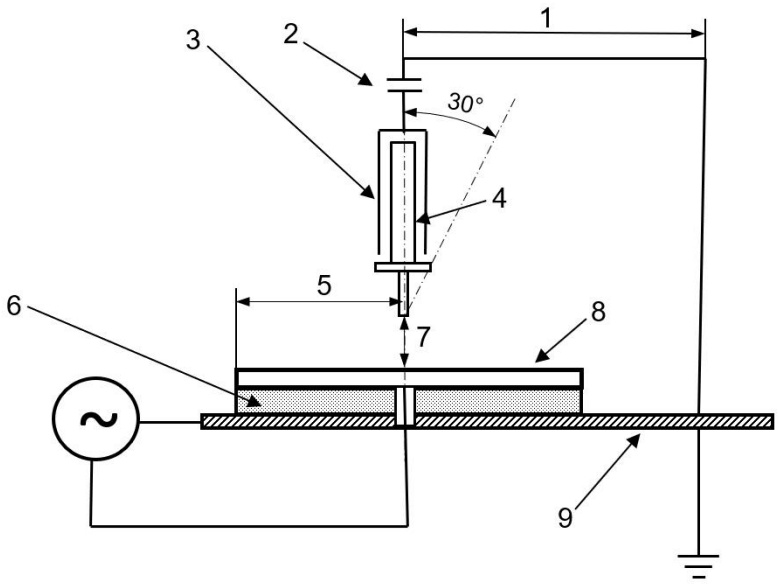
6.3 Test of indication (type test)

The sensitivity of the non-contact AC voltage indicator shall be tested at the lower level of the specified sensitivity range under the worst combination of operating conditions.

The test shall be carried out on an uninsulated cylindrical conductor with a cross section of nominally 1,5 mm^2 and a length of nominally 100 mm after the tests for mechanical strength.

During the test, the reference AC voltage of the live conductor shall be held at the specified frequency and shall be adjusted from 85 % to 100 % of the specified lower level of the voltage range to check the trigger point of the indication. The uncertainty of the voltage source should be considered.

An earthed source and test configuration in accordance with Figure 2 and Figure 3 shall be used for the test of indication.



Key

1 the distance is greater than 100 mm

2 the capacitance is 100 pF ±10 pF

3 metallic foil

4 device under test

5 the distance is approximately 50 mm

6 insulation plate of approximately 100 x 100 x 20 mm

7 the distance is 2 mm up to 2,4 mm

8 conductor at test voltage

9 metallic plate

Figure 2 – Test configuration to determine the trigger point of indication (front view)