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Edition 3.0 2024-10
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

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 10: Combined measuring equipment for testing, measuring and monitoring of protective measures

IEC 61557-10:2024-10 CMV(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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 10: Combined measuring equipment for testing, measuring ~~or~~ and monitoring of protective measures

FOREWORD

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This commented version (CMV) of the official standard IEC 61557-10:2024 edition 3.0 allows the user to identify the changes made to the previous IEC 61557-10:2013 edition 2.0. Furthermore, comments from IEC TC 85 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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IEC 61557-10 has been prepared by IEC technical committee TC85: Measuring equipment for electrical and electromagnetic quantities. It is an International Standard.

This third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) The scope has been updated to include the combination of measuring functions covered by the IEC 61557 series with those not covered by the IEC 61557 series.
b) Reasonably foreseeable misuse is now considered.
c) An exemption has been added for terminals that can only be accessed by use of a tool.
d) Table 1 has been updated for clarification.
e) The voltage source used for the overload test takes into account the expected short-circuit currents for measurement categories in accordance with IEC 61010-2-030:2017.

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

Draft	Report on voting
85/887/CDV	85/914/RVC

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.

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/publications.

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

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.

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

- reconfirmed,
- withdrawn, or
- revised.

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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 10: Combined measuring equipment for testing, measuring ~~or~~ and monitoring of protective measures

1 Scope

This part of IEC 61557 specifies the requirements for ~~combined~~ measuring equipment that combines several measuring functions or methods of testing, measuring or monitoring, that are in accordance with the respective parts of IEC 61557, into one piece of apparatus.

Measuring equipment which combines measuring functions or methods of testing, measuring or monitoring covered by the respective parts of IEC 61557 with those not covered by the respective parts of IEC 61557 is also within the scope of this document. 1

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 61557-1:2019, *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 1: General requirements*

IEC 61557-2, *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 2: Insulation resistance*

IEC 61557-3, *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 3: Loop impedance*

IEC 61557-4, *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 4: Resistance of earth connection and equipotential bonding*

IEC 61557-5, *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 5: Resistance to earth*

IEC 61557-6, *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 6: Effectiveness of residual current devices (RCD) in TT, TN and IT systems*

IEC 61557-7, *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 7: Phase sequence*

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IEC 61010-2-030:~~2010~~2023, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-030: Particular requirements for equipment having testing ~~and~~ or measuring circuits*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61557-1, IEC 61557-2, IEC 61557-3, IEC 61557-4, IEC 61557-5, IEC 61557-6, IEC 61557-7 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
combined measuring equipment
~~equipment~~ device that combines, into one piece of apparatus, several measuring functions or methods of testing, measuring or monitoring, some or all of which are in accordance with other parts of IEC 61557

3.2
extraneous overvoltage
voltage applied to the measurement terminals of the combined measuring equipment to test the overvoltage withstand capability

4 Requirements

4.1 General

~~**4.1.1** The following requirements in addition to those given in all relevant parts of IEC 61557 shall apply.~~

~~**4.1.2** No hazard shall arise for the user when the highest extraneous overvoltage according to the respective parts of this document (see Table 1) is accidentally applied to each combination of tests and measurement terminals with every combination of function and range settings, even though some of these functions are not themselves covered by IEC 61557 Parts 2 to Parts 7.~~

~~**4.1.3** Terminals that are clearly identifiable as not test or measurement terminals and that will not retain the terminals of specified probes or accessories need not be tested.~~

~~The duration time shall be the longest possible indicated in the respective parts of IEC 61557.~~

In addition to the requirements of IEC 61557-1:2019, Clause 4 and all respective parts, the requirements of Clause 4 shall apply.

Under normal conditions and in cases of reasonably foreseeable misuse, no hazard shall arise when: **2**

- the maximum rated voltage or current of a measuring circuit terminal, or
- the maximum extraneous overvoltage according to the respective parts of IEC 61557 (see Table 1)

is applied to that terminal or to any other compatible terminal, with any combination of function and range settings.

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If the measuring device bears a marking or a pictogram in accordance with 5.2, the extraneous overvoltage can be reduced to 1,1 times of the maximum expected line to line voltage.

4.2 Extraneous overvoltage withstand capability

Terminals that are clearly not of similar types and that will not retain the connectors of the probe assembly or the accessory do not need to be tested.

Terminals that can only be accessed by use of a tool do not need to meet the requirements of this clause 3. The duration time shall be the longest possible indicated in the respective parts of IEC 61557.

Table 1 – Extraneous overvoltage ~~withstand capability~~

	Part of IEC 61557					
	2 Insulation	3 Loop	4 Protective bonding	5 Earth resistance	6 RCD	7 Phase sequence
AC extraneous overvoltage and duration time	1,2 × U_N 10 s	1,2 × U_O continuous and 1,1 x ~~phase-to-phase~~ line-to-line voltage 1 min	1,2 × U_O continuous	1,2 × U_O continuous	1,2 × U_O continuous and 1,1 x ~~phase-to-phase~~ line-to-line voltage 1 min	1,2 × U_O continuous
DC extraneous overvoltage and duration time	1,2 × U_N 10 s	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable 4

NOTE 1 U_O is the voltage referenced to earth (see IEC 61557-1:~~2007~~[1]2019, 3.3a).

NOTE 2 U_N is the nominal output voltage (see IEC 61557-1:~~2007~~2019, 3.1 and IEC 61557-2:2007[2], 3.1)

NOTE 3 RCD is residual current device

4.3 Performance after application of extraneous overvoltage

If parts of the combined measuring equipment are defective after the extraneous overvoltage is applied, the defect shall be clearly indicated. Indications and displayed values shall not lead to erroneous interpretations of safe or unsafe situations or conditions. The indication shall be visible to the user when the instrument is in the normal position.

When the extraneous overvoltage is applied, protective components or protective circuits within the measuring equipment may be activated. The activation of ~~protective~~ these components or circuits in equipment for measuring or testing insulation resistance in accordance with IEC 61557-2 shall be clearly indicated if the operation of the equipment is impaired. The indication shall be visible to the user when the instrument is in the normal position. Indications and displayed values shall not lead to erroneous interpretations of safe or unsafe situations or conditions.

~~[1] IEC 61557-1:2007, *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*~~

~~[2] IEC 61557-2:2007, *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 2: Insulation resistance*~~

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Protective components or circuits shall have sufficient voltage rating and current ~~breakability~~ breaking capacity for the expected overload ~~current~~ condition.

5 Marking and operating instructions

5.1 General

~~The requirements specified in the respective parts of IEC 61557 shall apply.~~

In addition to IEC 61557-1:2019, Clause 5, and all other respective parts, the following information shall be provided on the combined measuring equipment.

If the requirements of 5.2 are applicable, the marking shall be clearly ~~readable~~ legible in the position of normal use.

If a pictogram in accordance with 5.2 is used, the meaning of the ~~relevant~~ pictogram shall be clearly explained in the ~~user manual~~ operating instructions.

5.2 ~~Marking and~~ Pictogram

When the combined measuring equipment bears ~~one of~~ the following marking or pictogram, the applied extraneous overvoltage can be reduced to a voltage of 1,1 times the maximum expected ~~phase-to-phase~~ line-to-line voltage:

a) Marking

DO NOT USE IN DISTRIBUTION SYSTEMS WITH VOLTAGES HIGHER THAN ... V.

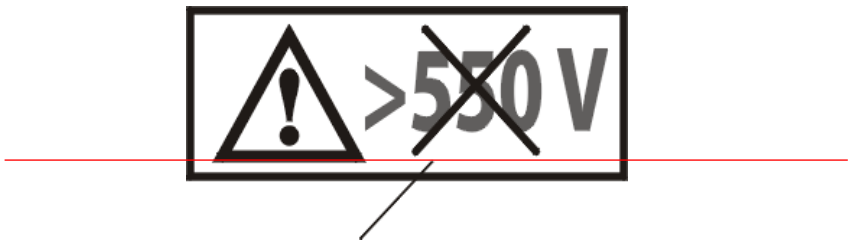
IEC

Figure 1 – Maximum distribution system voltage marking

The marking shown in Figure 1 shall be written in ~~the corresponding country~~ a language that can be easily understood by the user.

The value of the voltage shown on the marking shall be 1,1 times the maximum expected ~~phase-to-phase~~ line-to-line voltage.

b) Figure 2 shows an example of a pictogram for a 500 V AC system



The value of the voltage shown on the marking shall be 1,1 times the maximum expected phase-to-phase voltage

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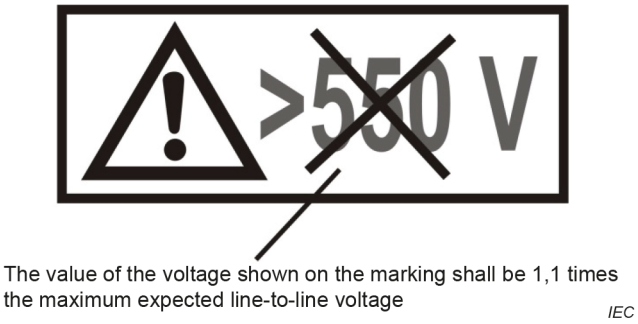

Figure 2 – Example of a pictogram for a 500V AC system

Combined measuring equipment bearing ~~one of the markings of a) or pictograms of b)~~ the marking in Figure 1 or the pictogram in Figure 2 shall withstand the ~~above~~ specified overvoltage for 1 min without any defect. The test configuration shall be in accordance with 4.2; protective devices may be activated in accordance with 4.3.

If the combined measuring equipment includes an insulation resistance measuring or testing function, this function shall also fulfil the overvoltage requirements in accordance with IEC 61557-2.

6 Tests

In addition to the tests specified in Clause 6 of the respective parts of IEC 61557, the following tests shall be performed:

- the overvoltage withstand capability for the combined measuring equipment shall be type tested by using an extraneous overvoltage either in accordance with ~~4.1 or in accordance with~~ 4.2;
- the technical specifications of protective devices shall be verified;
- the voltage source for the overload test shall be capable of ~~driving~~ providing the ~~highest~~ maximum expected overload current~~.~~, taking in account the expected short circuit currents for measurement categories according to IEC 61010-2-030:2023, Table AA.1 **5**. If certified protective devices are used, the test can be limited in accordance with IEC 61010-2-030:2023, 101.3~~.1~~;
- compliance with the requirements of Clause 5 shall be verified as a routine test.
- ~~compliance with the tests in Clause 6 shall be documented.~~

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