SLOVENSKI STANDARD
oSIST prEN 61557-5:2018

01-april-2018

Električna varnost v nizkonapetostnih razdelilnih sistemih izmenične napetosti do 1 kV in enosmerne napetosti do 1,5 kV - Oprema za preskušanje, merjenje ali nadzorovanje zaščitnih ukrepov - 5. del: Ozemljitvena upornost

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 5: Resistance to earth

Elektrische Sicherheit in Niederspannungsnetzen bis AC 1 000 V und DC 1 500 V - Geräte zum Prüfen, Messen oder Überwachen von Schutzmaßnahmen - Teil 5: Erdungwiderstand

Sécurité électrique dans les réseaux de distribution basse tension de 1 000 V c.a. et 1 500 V c.c. - Dispositifs de contrôle, de mesure ou de surveillance de mesures de protection - Partie 5: Résistance à la terre

Ta slovenski standard je istoveten z: **prEN 61557-5:2018**

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities
29.080.01	Električna izolacija na splošno	Electrical insulation in general
29.240.01	Omrežja za prenos in distribucijo električne energije na splošno	Power transmission and distribution networks in general

oSIST prEN 61557-5:2018 **en,fr,de**

85/633/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61557-5 ED3**	
DATE OF CIRCULATION: **2018-02-09**	CLOSING DATE FOR VOTING: **2018-05-04**
SUPERSEDES DOCUMENTS: **85/611/CD,85/625/CC**	

IEC TC 85 : MEASURING EQUIPMENT FOR ELECTRICAL AND ELECTROMAGNETIC QUANTITIES	
SECRETARIAT: China	SECRETARY: Mr Bo Chen
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 64	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING **Attention IEC-CENELEC parallel voting** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

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TITLE:

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 5: Resistance to earth

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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 5: Resistance to earth

FOREWORD

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International Standard IEC 61557-5 has been prepared by working group 8: Measuring and monitoring equipment for testing protective devices in energy distribution systems, of IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities

This third edition cancels and replaces the second edition published in 2007. This edition constitutes a minor revision.

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

a) Definitions and symbols modified in Clause 3
b) Subclauses in Clause 4 restructured and aligned with other parts of the series
c) Limits for reduced voltages 25V r.m.s or 35 V peak removed in Clause 4.5
d) Requirements for clamps added

e) Marking for rated voltages to earth and measurement category added in Clause 5

f) Warning about absence of hazardous voltage added in Clause 5

g) Percentage operating uncertainty renamed to operating uncertainty in Clause 6

h) Equation for uncertainty corrected in Table 1

i) New Annex A on test measurements with loop clamps added.

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

FDIS	Report on voting
xxx	xxx

Full information on the voting for the approval of this International Standard 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.

This part of IEC 61557 shall be used in conjunction with Part 1.

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 "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

The National Committees are requested to note that for this document the stability date is 2025.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

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

1 Scope

This part of IEC 61557 specifies the requirements for measuring equipment to measure the resistance to earth using an AC 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 60364-6:2016, *Low voltage electrical installations - Part 6: Verification*

IEC 61010-1:2010, ed. 3.0, AMD1:2016, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61010-2-030:2017, *Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-030: Particular requirements for equipment having testing or measuring circuits*

IEC 61010-2-032, *Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement*

IEC 61243-3, *Live working - Voltage detectors - Part 3: Two-pole low-voltage type*

3 Terms, definitions and symbols

For the purposes of this document, the terms, definitions and symbols given in IEC 61557-1 and 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
resistance to earth
R_A
real part of the impedance to earth

Note 1 to entry: resistance to ground (US)

Note 2 to entry: IEC 60364-6 uses the term ‘earth resistance’ which is considered to be the same

[SOURCE: IEV 195-01-18, modified: note 2 is added]

3.2
disturbance voltage
voltage produced between two points on two separate conductors by an electromagnetic disturbance, measured under specified conditions and superimposed on the measuring voltage

157 [SOURCE: IEV 161-04-01, modified: to explain the series]

158 **3.3**
159 **earth electrode**
160 conductive part, which may be embedded in a specific conductive medium, e.g. concrete or
161 coke, in electric contact with the Earth

162 [SOURCE: IEV 195-02-01]

163 **3.4**
164 **earth electrode terminal E**
165 connection point for a probe connected to the earth electrode to be tested and that is used for
166 the injection of the test current required for the purpose of measurement

167 **3.5**
168 **earth electrode probe terminal ES**
169 connection point for a probe connected to the earth electrode to be tested and that is used as
170 a voltage probe either connected direct to or nearest to the earth electrode for sampling
171 potentials during measurement

172 **3.6**
173 **auxiliary earth electrode terminal H**
174 terminal for connection to an additional temporary earth electrode that is used for injection of
175 a test current required for the purpose of measurements

176 **3.7**
177 **auxiliary earth electrode resistance R_H**
178 resistance of an additional earth electrode

179 **3.8**
180 **probe electrode terminal S**
181 additional temporary earth electrode used as a voltage probe for sampling potentials during
182 measurements

183 **3.9**
184 **probe electrode resistance**
185 **R_S**
186 resistance of an additional earth electrode

187

188 ## 4 Requirements

189 ### 4.1 General

190 In addition to the requirements of Clause 4 of IEC 61557-1:20xx, the requirements of Clause
191 4 shall apply.

192 ### 4.2 Output voltage

193 The output voltage present across the terminals E and H shall be an AC voltage.

194 ### 4.3 Disturbance voltage

195 If the influence of disturbance voltages from distribution systems as AC currents or as DC currents
196 exceeds the requirements of 6.2, this shall be stated by the manufacturer in the operating
197 instructions.

198 ### 4.4 Permissible resistance of probe and auxiliary earth electrode

199 The measuring equipment shall be capable of determining whether the maximum permissible
200 resistances of the probes and auxiliary earth electrodes are exceeded.

4.5 Electrical safety

No hazardous touch voltages shall appear during the measurements. This can be achieved by a suitable design of the source for the output voltage by:

- limiting the open-circuit value of the output voltage to 50 V AC r.m.s. or 70 V peak;
- or, limiting the short-circuit output current to 3,5 mA AC r.m.s. or 5 mA peak in case the output voltage value could exceed U_L;
- if the output voltage source does not comply with either of the above requirements, automatic disconnection of the output voltage source shall operate within a permissible time period, in accordance with Figure 2 of IEC 61010-1:2010, AMD1:2016;

Terminals shall be rated for voltages less than or equal to 50 V, or at least for a working voltage equal to the nominal voltage of the distribution system and measurement category II in accordance with IEC 61010-2-030.

In case of ratings less than or equal to 50 V a warning shall be given in the operating instructions to check the absence of hazardous voltage on the earthing system with a voltage tester according to IEC 61243-3.

Test leads and accessories in accordance with IEC 61010-031, except earth spikes/rods, shall correspond at least to the rating of the terminals.

4.6 Clamps intended to measure earth loop resistances according to IEC 60364-6, Annex C, C.3

Clamps intended to measure the earth loop resistance, attached to the instrument or stand alone, shall be specified according to IEC 61010-2-032 as Type A or Type B.

If specified for Type A, the rating shall be at least for measurement category II.

If specified for Type B, the rating shall be at least measurement category II and a warning shall be given in the operating instructions, to check the absence of hazardous voltages on the earthing system with voltage testers in advance according to IEC 61243-3.

5 Marking and operating instructions

5.1 Marking

In addition to clause 5.1 of IEC 61557-1, the following information shall be provided on the measuring equipment:

- Measurement range within which the maximum operating uncertainty applies.
- Frequency of the output voltage.
- Name of the terminals (if applicable):
  - E: terminal for the earth electrode;
  - ES: terminal for the probe electrode placed nearest to the earth electrode;
  - S: terminal for the probe electrode;
  - H: terminal for the auxiliary earth electrode.
- Marking for the terminals H, S, E and ES according to the requirements of 4.5.
- Rated voltage to earth or measuring category and maximum voltage to earth followed by symbol 12 according to IEC 61010-1:2010.

5.2 Operating instructions

In addition to clause 5.2 of IEC 61557-1, the following information shall be provided in the operating instructions:

- The range of applications (e.g. for industrial plants or others) for the equipment for measuring resistance to earth;

– the influence of series disturbance voltages that are larger than the values stated in clause 4.3, if applicable;

– A statement relating to the correct operation of the hand-driven generator (if provided);

– The designations of terminals when different from 5.2.3.

– If applicable, a warning shall be given in the operating instructions that the absence of hazardous voltages on the earthing system in case of clamps type B shall be checked with voltage testers according to IEC 61243-3.

6 Tests

6.1 General

In addition to Clause 6 of IEC 61557-1, the following tests shall be performed.

6.2 Operating uncertainty

The maximum operating uncertainty within the measurement range to be marked or stated shall not exceed ±30 % with the measured value as fiducial value, as determined in accordance with Table 1 under the following reference conditions:

– nominal value of the supply voltage;

– nominal r.p.m. of the hand-driven generator when used as a supply;

– nominal frequency of the power supply in the case of mains-operated measuring equipment according to 6.2;

– reference temperature 23 °C ± 2 °C;

– reference position in accordance with the manufacturer's statement;

– resistances of probes and auxiliary earth electrodes 100 Ω;

– disturbance voltage 0 V.

Table 1 – Calculation of operating uncertainty

Intrinsic uncertainty or influence quantity	Reference conditions or specified operating range	Designation code	Requirements or test in accordance with the relevant parts of IEC 61557	Type of test
Intrinsic uncertainty	Reference conditions	*A*	Part 5, subclause 6.2	R
Position	Reference position ± 90°	*E1*	Part 1, subclause 4.2	R
Supply voltage	At the limits stated by the manufacturer	*E2*	Part 1, subclauses 4.2, 4.3	R
Temperature	0 °C and 35 °C	*E3*	Part 1, subclause 4.2	T
Series disturbance voltage	See 4.3	*E4*	Part 5, subclauses 4.3,	T
Resistance of the probes and auxiliary earth electrodes	0 to 100 R_A but ≤ 50 kΩ	*E5*	Part 5, subclause 6.2	T
System frequency	99 % and 101 % of the nominal frequency	*E7*	Part 5, subclause 4.3	T
System voltage	85 % and 110 % of the nominal voltage	*E8*	Part 5, subclause 4.3	T
Operating uncertainty	$B = \pm\sqrt{A^2 + \frac{4}{3}\sum_i E_i^2}$		Part 5, subclause 6.2	R
A = intrinsic uncertainty E_i = variations			$B\,[\%] = \pm\frac{B}{F}\cdot 100\,\%$	