SLOVENSKI STANDARD
oSIST prEN IEC 61557-13:2022

01-september-2022

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 - 13. del: Ročne in ročno upravljane tokovne klešče in senzorji za merjenje uhajavih tokov v električnih razdelilnih sistemih

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 13: Hand-held and hand-manipulated current clamps and sensors for measurement of leakage currents in electrical distribution systems

Elektrische Sicherheit in Niederspannungsnetzen bis AC 1 000 V und DC 1 500 V – Geräte zum Prüfen, Messen oder Überwachen von Schutzmaßnahmen – Teil 13: Handgehaltene und handbediente Strommesszangen und Stromsonden zur Messung von Ableitströmen in elektrischen Anlagen

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 13: Pinces et capteurs de courant portatifs et manipulés à la main pour la mesure des courants de fuite dans les réseaux de distribution électriques

Ta slovenski standard je istoveten z: **prEN IEC 61557-13:2022**

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

oSIST prEN IEC 61557-13:2022 **en,fr,de**

85/834/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61557-13 ED2**	
DATE OF CIRCULATION: **2022-07-01**	CLOSING DATE FOR VOTING: **2022-09-23**
SUPERSEDES DOCUMENTS: **85/788/CD, 85/805A/CC**	

IEC TC 85 : MEASURING EQUIPMENT FOR ELECTRICAL AND ELECTROMAGNETIC QUANTITIES	
SECRETARIAT: China	SECRETARY: Ms Guiju HAN
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 62A,TC 66	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

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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 13: Hand-held and hand-manipulated current clamps and sensors for measurement of leakage currents in electrical distribution systems

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:

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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

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Part 13: Hand-held and hand-manipulated current clamps and sensors for measurement of leakage currents in electrical distribution systems

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International Standard IEC 61557-13 has been prepared by IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

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

a) The term "fixing device" has been removed
b) The measuring range was changed to a display range, the indication of DC or peak values was added in 4.1.
c) The frequency for the test of sensitivity for low-frequency magnetic was defined in 4.2;
d) The specified measuring range is now defined as the range of indicated values based on the operating uncertainty in 4.3.
e) Alignment of the structure with that of the whole IEC 61557 series;

f) The variation E_{12} (maximum load current), could be specified according to the manufacturer's specification.

The text of this standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

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

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

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

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 publication will remain unchanged until the stability date[1] indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

INTRODUCTION

During periodical inspections of electrical installations, it is increasingly difficult to carry out measurements of insulation resistances with devices in accordance with IEC 61557-2 when the installations cannot be switched off for long periods and when there are sensitive appliances connected. Therefore, the measurement of leakage currents can provide additional information about the safe or unsafe situation of an installation.

Furthermore, the user has the opportunity to place current clamps and sensors on different points of the distribution system for troubleshooting nuisance tripping of RCDs, alarms of RCMs and other problems caused by low-frequency leakage currents.

Unfortunately, the presence of high external magnetic fields has a big impact on the performance of commonly used current clamps and sensors. High uncertainty and non-repeatability of readings can lead to unsafe interpretations.

This standard defines performance classes for current clamps and sensors in relationship to ranges of high external magnetic fields and gives guidance to the user to choose the appropriate measuring device for a given situation.

The hand-held and hand-manipulated current clamps and sensors can be stand-alone instruments or accessories of instruments.

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

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Part 13: Hand-held and hand-manipulated current clamps and sensors for measurement of leakage currents in electrical distribution systems

1 Scope

This part of IEC 61557 defines special performance requirements for hand-held and hand-manipulated current clamps and sensors for measurement of leakage currents in electrical distribution systems up to 1 000 V AC and 1 500 V DC taking into account the influence of high external low-frequency magnetic fields and other influencing quantities.

This standard does not apply to current clamps or sensors which are used in combination with devices for insulation fault location in accordance with IEC 61557-9, unless it is specified by the manufacturer.

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 61010-1, *Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements*

IEC 61010-2-032:2019, *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 61557-1, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Part 1: General requirements*

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

IEC 61326-2-2, *Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2: Particular requirements - Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test*

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

3.1
hand-held and hand-manipulated current clamps and sensors
portable or hand-held device for measurement, display or for indication of types of leakage currents in distribution systems without interruption of this circuits including defined attached equipment

NOTE to entry: In the following text, only the expression “current sensors” is used.

3.2
measurement category
coordination of maximum transients to the working voltage

3.3
variation E_{11}
variation due to external low-frequency magnetic fields

3.4
variation E_{12}
variation due to load current during measurement using the differential method

NOTE to entry: For the differential method, see Annex A, Figure A.2.

3.5
variation E_{13}
variation due to touch current to earth caused by common mode voltage during hand-manipulation

3.6
variation E_{14}
variation due to frequency

3.7
variation E_{15}
repeatability of the measurement readings

NOTE to entry: Measurement readings can be due to at least 10 open/closed cycles.

3.8
operating class
performance class defining the influence of external low-frequency magnetic fields on the current sensors

3.9
leakage current
current driven by active conductors of a distribution system and/or loads to earth and/or protective conductors

3.10
load current
current flowing through the line conductor/s

3.11
rated burden
the value of the burden on which the accuracy requirements of a specification are based

[SOURCE: IEC 60050-321:1986, 321-01-26]

3.12
resolution
smallest change in the measurand, or quantity supplied, which causes a perceptible change in the indication

[SOURCE: IEC 60050-311:2001, 311-03-10]

4 Requirements

4.1 General requirements

In addition to the requirements of IEC 61557-1:2019, Clause 4, the following requirements shall apply.

Current sensors according to this standard shall be in accordance with IEC 61010-2-032.

Current sensors according to this standard shall have the ability to indicate leakage currents for a minimum range of 1 mA to 10 A AC and/or DC and shall be designed for a load current of at least 60 A. Multiple ranges are allowed.

The resolution shall be 0,1 mA AC and/or DC or higher.

The current values shall be indicated as RMS values. Additional indication of DC or peak values are allowed.

The frequency range of the current sensors shall include a range from a minimum of 40 Hz up to the third harmonic of the rated mains frequency.

NOTE 1 For railway applications a frequency range starting at 15 Hz is recommended.

NOTE 2 For industrial applications a frequency range up to 1 kHz is recommended.

NOTE 3 For testing the leakage current of appliances a measuring range starting at 0,1 mA with a resolution of 0,01 mA is recommended.

4.2 Operating classes

4.2.1 General

Current sensors are classified into three operating classes according to their sensitivity for low-frequency magnetic fields in accordance with IEC 61000-4-8 at 50 Hz and 60 Hz.

For optional frequency ranges between 16,7 Hz and 400 Hz, the test configuration in accordance with IEC 61000-4-8 shall be used.

4.2.2 Operating class 1

Current sensors of operating class 1 shall be applicable to operate within external low-frequency magnetic fields according to 4.2.1 up to a field strength of 100 A/m. The upper limit of field strength shall be marked on the pictogram according to 5.1.

4.2.3 Operating class 2

Current sensors of operating class 2 shall be applicable to operate within external low-frequency magnetic fields according to 4.2.1 up to a field strength of 30 A/m. The upper limit of field strength shall be marked on the pictogram according to 5.1.

4.2.4 Operating class 3

Current sensors of operating class 3 shall be applicable to operate within external low-frequency magnetic fields according to 4.2.1 up to a field strength of 10 A/m. The upper limit of field strength shall be marked on the pictogram according to 5.1.

4.3 Specified measuring range / operating uncertainty of reading

4.3.1 General

The operating uncertainty of the specified measuring range for current sensors of operating class 1, operating class 2 and operating class 3 shall be determined according to the equation of Table 3 within the operating conditions of 4.5. The relation between operating class and external magnetic field is shown in Figure 1, Figure 2 and Table 1.

The fiducial value is the measured value of the leakage current.

4.3.2 Specified measuring range of an operating class 1 current sensor

The specified measuring range of an operating class 1 current sensor is the range of indicated values between stated lower and upper measurements for which the operating uncertainty of reading is:

– less than 15 % for values less than or equal to 10 mA, and is less than 10 % for values greater than 10 mA for external low-frequency magnetic fields of up to 10 A/m;

and

– less than 20 % for values less than or equal to 10 mA and is less than 12,5 % for values greater than 10 mA for external low-frequency magnetic fields of up to 30 A/m;

and

– less than 30 % for values less than or equal to 10 mA, and is less than 15 % for values greater than 10 mA for external low-frequency magnetic fields of up to 100 A/m.

4.3.3 Specified measuring range of an operating class 2 current sensor

The specified measuring range of an operating class 2 current sensor is the range of indicated values between stated lower and upper measurements for that the operating uncertainty of reading is:

– less than 15 % for values less than or equal to 10 mA and is less than 10 % for values greater than 10 mA for external low-frequency magnetic fields of up to 10 A/m;

and

– less than 20 % for values less than or equal to 10 mA and is less than 12.5 % for values greater than 10 mA for external low-frequency magnetic fields of up to 30 A/m.

4.3.4 Specified measuring range of an operating class 3 current sensor

The specified measuring range of an operating class 3 instrument is the range of indicated values between stated lower and upper measurements for which the operating uncertainty of reading is:

– less than 15 % for values less than or equal to 10 mA and is less than 10 % for values greater than 10 mA for external low-frequency magnetic fields of up to 10 A/m.