IEC 62052-31

Edition 2.0 2024-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Electricity metering equipment – General requirements, tests and test conditions – Part 31: Product safety requirements and tests

Équipement de comptage de l'électricité – Exigences générales, essais et conditions d'essai – Partie 31: Exigences et essais sur la sécurité de produit

IEC 62052-31:2024-10(en-fr)

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ELECTRICITY METERING EQUIPMENT – GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –

Part 31: Product safety requirements and tests

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 62052-31 has been prepared by IEC technical committee 13: Electrical energy measurement and control. It is an International Standard.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

a) Title modified (removed "AC");

b) Scope modified: Extended scope to 1 000 V AC and 1 500 V DC including DC meters. This has led to many changes in various clauses, in particular in Clause 6; Included transducer-operated meters or meters designed for operation with Low Power Instrument Transformers (LPIT) or sensors; Aligned environmental conditions with those of IEC 62052-11:2020, 1.5.2;

c) Tests: Several clarifications added;

d) Information and marking requirements: Table 2 aligned widely with IEC 62052-11:2020; Requirements for batteries added;

e) Protection against electrical shock: Multiple modifications done in different; Clause 6 re-numbered and re-organized; Requirements for touch currents clarified (6.3.1); Specified, in which cases OVC II (resp. CAT II) and OVC IV (resp. CAT IV) requirements shall be applied (6.7.1.3); Added requirements for working voltages (6.7.1.5) and cemented joins (6.7.2.4.2); Table 7 updated and extended; Flowcharts for electrical tests (Figure 10 and Figure 11) and related test procedures updated;

f) Protection against spread of fire: Requirements for limited energy circuits updated (9.4);

g) Equipment temperature limits and resistance to heat: Table 40 modified to include additional insulation classes;

h) Protection against liberated gases and substances explosion and implosion: Requirements for batteries updated;

i) Components and sub-assemblies Requirements for surge protective devices (13.5);

j) Annex B revised;

k) Annex F revised and new examples added;

l) Annex K revised (see related changes in 6.7.1.3);

m) Annex L: Removed Annex L "Overview of Safety Aspects Covered", added new Annex L "Electricity Meters in LVDC Systems";

n) Annex M: Removed Annex M "Index of Defined Terms" and added new Annex M "Component Standards";

o) General alignment with IEC 61010-1 AMD2 Ed.3 (CDV in preparation) done where possible, however this standard is still in development;

p) Temperature and humidity ranges (1.5.1 and 1.5.2) revised.

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

Draft	Report on voting
13/1923/FDIS	13/1926/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.

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.

A list of all parts of IEC 62052 series, under the general title *Electricity metering equipment – General requirements, tests and test conditions*, can be found on the IEC website.

Future documents in this series will carry the new general title as cited above. Titles of existing documents in this series will be updated at the time of the next edition.

In this document, the following print types are used:

- requirements and definitions: in roman type;
- NOTES: in smaller roman type;
- *conformity and tests: in italic type.*

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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INTRODUCTION

The IEC addresses safety aspects by establishing *basic*, *group* and *product* safety publications.

A *basic safety publication* covers a specific safety-related matter, applicable to many electrotechnical products. It is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51. It is not intended for use by manufacturers or certification bodies. One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications. The requirements, test methods or test conditions of basic safety publications will not apply unless specifically referred to or included in the relevant publications.

A *group safety publication* covers all safety aspects of a specific group of products within the scope of two or more product technical committees (TCs). Group safety publications are primarily intended to be stand-alone product safety publications but may also be used by TCs as source material in the preparation of their publications.

A *product safety publication* covers all safety aspects of one or more products within the scope of a single product TC.

The objectives of the development of this document are the following:

- to specifically reference and include relevant requirements, test methods or test conditions of relevant basic safety publications so that they become applicable;
- to specifically reference and include – where appropriate, in a modified form – relevant requirements, test methods or test conditions of relevant group safety publications;
- to consider the latest developments in the technology used for the design and manufacture of equipment for electrical energy measurement and control;
- to achieve a uniform approach to product safety throughout the international metering industry.

This *product safety standard* is based on, among others, the following:

- the *basic safety standard* IEC 60664-1:2020, established by TC 109;
- standards from the IEC 60364 series related to electrical installations of buildings, established by TC 64;
- the *group safety standard* IEC 61010-1:2016 established by TC 66;
- the *group safety standard* IEC 62477-1:2022 established by TC 22;
- IEC 60255-27:2023, a *product safety standard* for measuring relays and protection equipment, established by TC 95. These products are similar in their design and to some extent in their use in equipment for electrical energy measurement and control.

To facilitate the use of this document, an integral text has been prepared, with appropriate references to source documents.

Being a product safety standard, this document takes precedence over the group safety standards IEC 61010-1:2016 and IEC 62477-1:2022.

ELECTRICITY METERING EQUIPMENT – GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –

Part 31: Product safety requirements and tests

1 Scope

1.1 General

This part of IEC 62052 specifies general safety requirements and associated tests, with their appropriate conditions for type testing of directly connected, transformer-operated or transducer-operated AC and DC electricity meters and load control equipment.

NOTE 1 For other general requirements, such as EMC, dependability, etc., see the relevant IEC 62052 or IEC 62059 standards. For accuracy requirements and other requirements specific to class indices, see the relevant IEC 62053 standards.

This document applies to electricity metering equipment designed to:

- measure and control electrical energy on electrical networks (mains) with voltage up to 1 000 V AC or 1 500 V DC;

  NOTE 2 The voltage mentioned above is the line-to-neutral voltage AC RMS or DC derived from nominal voltages. See Table 7.

- have all functional elements, including add-on communication modules, enclosed in, or forming a single meter case with exception of indicating displays;
- operate with integrated displays (electromechanical or static meters);
- operate with detached indicating displays or without an indicating display (static meters only);
- wall-mounted or to be installed in specified matching sockets or racks;
- optionally provide additional functions other than those for measurement of electrical energy.

NOTE 3 Modern electricity meters typically contain additional functions such as measurement of voltage magnitude, current magnitude, power, frequency, power factor, etc.; measurement of power quality parameters; load control functions; delivery, time, test, accounting, and recording functions; data communication interfaces and associated data security functions. The relevant standards for these functions may apply in addition to the requirements of this document. However, the requirements for such functions are outside the scope of this document.

NOTE 4 Product requirements for Power Metering and Monitoring Devices (PMDs) and measurement functions such as voltage magnitude, current magnitude, power, frequency, etc., are covered in IEC 61557-12. However, devices compliant with IEC 61557-12 are not intended to be used as billing meters unless they are also compliant with the IEC 62052-11:2020 and one or more relevant IEC 62053-xx particular requirements (accuracy class) standard.

NOTE 5 Product requirements for Power Quality Instruments (PQIs) are covered in IEC 62586-1. Requirements for power quality measurement techniques (functions) are covered in IEC 61000-4-30. Requirements for testing of the power quality measurement functions are covered in IEC 62586-2.

This document also applies to transducer-operated meters or meters designed for operation with Low Power Instrument Transformers (LPIT) or sensors (as defined in the IEC 61869 series).

NOTE 6 For meters designed for operation with LPITs, only the metering unit is considered a low voltage device. If the LPITs are rated for voltages exceeding 1 000 V AC, or 1 500 V DC, the combination of the metering unit and LPITs is not a low voltage device.

When equipment in scope of this document is designed to be installed in a specified matching socket, then the requirements apply to, and the tests are performed on, equipment installed in its specified matching socket. However, requirements for sockets and inserting / removing the meters from the socket are outside the scope of this document.

This document is also applicable to auxiliary input and output circuits, operation indicators, and test outputs of equipment for electrical energy measurement.

NOTE 7 Some examples include impulse inputs and outputs, control inputs and outputs, energy test outputs, and circuits for meter data exchange.

Equipment used in conjunction with equipment for electrical energy measurement and control may need to comply with additional safety requirements. See also Clause 13.

NOTE 8 Examples are telecommunication modems and customer information units.

This document does not apply to:

- meters rated to operate with voltage exceeding 1 000 V AC, or 1 500 V DC;
- metering systems comprising multiple devices physically remote from one another;
- portable meters;

NOTE 9 Portable meters are meters that are not permanently connected.

- meters used in rolling stock, vehicles, ships and airplanes;
- laboratory and mobile meter test equipment;
- reference standard meters;

NOTE 10 Nominal values, accuracy classes, requirements and test methods for reference standard meters are specified in IEC 62057-1: 2023.

- conventional or low power instrument transformers;

NOTE 11 Safety of conventional power transformers and low power instrument transformers is covered in the IEC 61869 series of standards.

- equipment with solid-state or other non-electromechanical supply and load control switches.

NOTE 12 For components and sub-assemblies, see Clause 13.

The safety requirements of this document are based on the following assumptions:

- metering equipment has been installed correctly;
- metering equipment is used generally by ordinary persons, including meter readers and consumers of electrical energy. In many cases, it is installed in a way that it is freely accessible. Its terminal covers cannot be removed, and its case cannot be opened without removing seals (if present) and using a tool;
- during normal use all terminal covers, covers and barriers providing protection against accessing hazardous live parts are in place;
- for installation, configuration, maintenance and repair it may be necessary to remove terminal cover(s), (a part of) the case or barriers so that hazardous live parts may become accessible. Such activities are performed by skilled persons, who have been suitably trained to be aware of working procedures necessary to ensure safety. Therefore, safety requirements covering these conditions are out of the scope of this document.

1.2 Aspects included in scope

NOTE 1 Subclause 1.2 is based on IEC 61010-1:2016, 1.2.

The purpose of the requirements of this document is to ensure that hazards to the user and the surrounding area are reduced to a tolerable level.

Requirements for protection against particular types of hazards are given in Clauses 6 to 12 as follows:

a) electrical shock or burn (see Clause 6);
b) mechanical hazards and stresses (see Clauses 7 and 8);
c) spread of fire from the equipment (see Clause 9);
d) excessive temperature (see Clause 10);
e) penetration of dust and water (see Clause 11);
f) liberated gases, explosion and implosion (see Clause 12).

Requirements for components and sub-assemblies are specified in Clause 13.

Requirements for protection against hazards arising from reasonably foreseeable misuse are specified in Clause 14.

Risk assessment for hazards or environments not fully covered above is specified in Clause 15.

NOTE 2 Attention is drawn to the existence of additional requirements specified by national authorities responsible for health and safety.

1.3 Aspects excluded from scope

This document does not cover:

a) performance, reliability or other properties of the equipment not related to safety;
b) EMC requirements, which are covered by the relevant type testing standards;

NOTE 1 For EMC requirements and test methods, see, IEC 62052-11:2020, IEC 62052-21:2004 and IEC 62055-31:2021.

c) protective measures for explosive atmospheres (see IEC 60079-0:2017);
d) functional safety requirements;
e) effectiveness of transport packaging;
f) safety requirements of installations.

NOTE 2 The latter is generally subject to national regulation.

1.4 Verification

NOTE This subclause reproduces IEC 61010-1:2016, 1.3.

This document also specifies methods of verifying that the equipment meets the requirements of this document, through inspection, type tests, risk assessment and routine tests. See Clauses 4, 15 and Annex I respectively.

1.5 Environmental conditions

1.5.1 Normal environmental conditions

NOTE 1 This subclause is based on IEC 61010-1:2016, 1.4.

This document applies to metering equipment designed to be safe at least under the following conditions:

a) indoor use;
b) altitude up to 2 000 m;

c) climatic conditions according to IEC 62052-11:2020,8.2, limit range of operation for indoor use.

NOTE 2 In IEC 62052-11:2020, the limit range of operation for indoor use is specified according to IEC 60721-1:1990, climatic class 3K6. The closest climatic class in IEC 60721-3-3:2019, is class 3K24 defined in Table 1, with low air temperature -25 °C, high air temperature +55 °C, low relative humidity 5 %, and high relative humidity 100 %. However, for special applications other temperature limit ranges of operation are allowed according to purchase contract.

d) variation in voltage magnitude up to ±10 % of the nominal voltage. The equipment may have several nominal voltages;

e) transient overvoltages up to the levels of overvoltage category III;

f) transient overvoltages occurring on the mains supply (see 6.7.1.1);

g) applicable pollution degree of the intended environment (pollution degree 2 in most cases).

Manufacturers may specify more restricted environmental conditions for operation; nevertheless, the equipment shall be safe within these normal environmental conditions.

1.5.2 Extended environmental conditions

This document applies to metering equipment designed to be safe not only under the environmental conditions specified in 1.5.1, but also under any of the following conditions for which the equipment is rated by the manufacturer:

a) outdoor use;

b) altitude above 2 000 m;

c) climatic conditions according to IEC 62052-11:2020, 8.2, limit range of operation for outdoor use.

NOTE 1 In IEC 62052-11:2020, the limit range of operation for outdoor use is specified according to IEC 60721-1:1990, climatic class 3K7. The closest climatic class in IEC 60721-3-4:2019, is class 4K23 defined in Table 1, but with low air temperature -40°C (instead of -45 °C), high air temperature +70 °C, low relative humidity 4 %, and high relative humidity 100 %. However, for special applications other temperature limit ranges of operation are allowed according to purchase contract.

d) variation in voltage magnitude up to -20…15 % of the nominal voltage;

NOTE 2 See IEC 62368:2018 , B 2.3.

e) rated impulse voltage U_{imp} higher than what is required for overvoltage category III (see 3.3.8).

1.5.3 Extreme environmental conditions

NOTE 1 The following text is based on IEC 60721-3-0:2020, 5.2.

It is recognized that extreme environmental conditions may exist.

Elements determining the environmental conditions may occur with any of their severities in combination with other elements and their respective severities. An assumption that each element may occur with its highest severity would lead to unnecessary overdesign and cost. Therefore, specifications for products to operate under such extreme environmental conditions are a matter for negotiation between the manufacturer and the purchaser.

NOTE 2 For specific climatic conditions, see IEC 60721-3-3:2019.

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 60027-1:1992, *Letters symbols to be used in electrical technology – Part 1: General*
IEC 60027-1:1992/AMD1:1997
IEC 60027-1:1992/AMD2:2005

IEC 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

IEC 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60269-3:2010, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications) – Examples of standardized systems of fuses A to F*

IEC 60332-1-2:2004, *Tests on electric and optical fiber cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

IEC 60332-2-2:2004, *Tests on electric and optical fiber cables under fire conditions – Part 2-2: Test for vertical flame propagation for a single small insulated wire or cable – Procedure for diffusion flame*

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60384-14:2023, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60417-DB-12M, *Graphical symbols for use on equipment*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60617-DB-12M, *Graphical symbols for diagrams*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60721-3-0:2020, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Introduction*

IEC 60721-3-3:2019, *Classification of environmental conditions – Part 3-3: Classification of groups of environmental parameters and their severities – Stationary use at weather protected locations*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*
IEC 60950-1:2005/AMD1:2009
IEC 60950-1:2005/AMD2:2013

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity* test
IEC 61000-4-5:2014/AMD1:2017

IEC 61010-1:2016*, Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*
IEC 61010-1:2016/AMD1:2016
IEC 61010-1 AMD2 ED. 3 CDV in preparation

IEC 61010-2-030:2017*, Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-030: Particular requirements for testing and measuring circuit*s

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61180:2016, *High-voltage test techniques for low voltage equipment – Definitions, test and procedure requirements, test equipment*

IEC 61851-23:2014, *Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station*

IEC 62052-11:2020, *Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment*

IEC 62052-31:2015, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 31: Product safety requirements and tests*

IEC 62368-1:2018, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

ISO 75-2:2013, *Plastics – Determination of temperature of deflection under load – Part 2: Plastics and ebonite*

ISO 3864-1:2011, *Graphical symbols, Safety colors and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 7000:2019, *Graphical symbols for use on equipment – Registered symbols*