ICS 19.080, 91.140.50 SLOVENSKÁ TECHNICKÁ NORMA Január 2017

STN	**Zariadenia na meranie elektrickej energie (striedavého prúdu). Všeobecné požiadavky, skúšky a skúšobné podmienky. Časť 31: Bezpečnostné požiadavky a skúšky.**	**STN EN 62052-31** 35 6134

Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 31: Product safety requirements and tests

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/16

Obsahuje: EN 62052-31:2016, IEC 62052-31:2015

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EUROPEAN STANDARD **EN 62052-31**

NORME EUROPÉENNE

EUROPÄISCHE NORM June 2016

ICS 19.080; 91.140.50

English Version

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

Equipement de comptage de l'électricité (CA) - Exigences générales, essais et conditions d'essai - Partie 31 : Exigences et essais sur la sécurité de produit (IEC 62052-31:2015)

Wechselstrom-Elektrizitätszähler - Allgemeine Anforderungen, Prüfungen und Prüfbedingungen - Teil 31: Sicherheitsanforderungen und Prüfungen (IEC 62052-31:2015)

This European Standard was approved by CENELEC on 2015-10-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 62052-31:2016 E

European foreword

The text of document 13/1639/FDIS, future edition 1 of IEC 62052-31, prepared by IEC/TC 13 "Electrical energy measurement and control" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62052-31:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-12-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-06-17

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62052-31:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60038	NOTE	Harmonized as EN 60038.
IEC 60060-1:2010	NOTE	Harmonized as EN 60060-1:2010 (not modified).
IEC 60065	NOTE	Harmonized as EN 60065.
IEC 60068-1:2013	NOTE	Harmonized as EN 60068-1:2014 (not modified).
IEC 60071-1	NOTE	Harmonized as EN 60071-1.
IEC 60079-0	NOTE	Harmonized as EN 60079-0.
IEC 60228	NOTE	Harmonized as EN 60228.
IEC 60255-27:2013	NOTE	Harmonized as EN 60255-27:2014 (not modified).
IEC 60269-1	NOTE	Harmonized as EN 60269-1.
IEC 60335-1	NOTE	Harmonized as EN 60335-1.
IEC 60364-1:2005	NOTE	Harmonized as HD 60364-1:2008 (modified).
IEC 60364-4-41	NOTE	Harmonized as HD 60364-4-41.

IEC 60364-5-52	NOTE	Harmonized as HD 60364-5-52.
IEC 60664-3:2003 Amd 1:2010	NOTE	Harmonized as EN 60664-3:2003 (not modified) and as EN 60664-3:2003/A1:2010 (not modified).
IEC 60688:2012	NOTE	Harmonized as EN 60688:2013 (not modified).
IEC 60721-3-0:1984 Amd 1:1987	NOTE	Harmonized as EN 60721-3-0:1993 (not modified).
IEC 60721-3-3:1994 Amd 2:1997	NOTE	Harmonized as EN 60721-3-3:1995 (not modified) and as EN 60721-3-3:1995/A2:1997 (not modified)
IEC 60947-1:2007, Amd 1:2010 Amd 2:2014	NOTE	Harmonized as EN 60947-1:2007 (not modified), as EN 60947-1:2007/A1:2011 (not modified) and as EN 60947-1:2007/A2:2014 (not modified).
IEC 60990	NOTE	Harmonized as EN 60990.
IEC 61008-1	NOTE	Harmonized as EN 61008-1.
IEC 61000-4-5:2014	NOTE	Harmonized as EN 61000-4-5:2014 (not modified).
IEC 61010-1:2010	NOTE	Harmonized as EN 61010-1:2010 (not modified).
IEC 61030-2-030	NOTE	Harmonized as EN 61030-2-030.
IEC 61140	NOTE	Harmonized as EN 61140.
IEC 61180-1:1992	NOTE	Harmonized as EN 61180-1:1994 (not modified).
IEC 61558-1	NOTE	Harmonized as EN 61558-1.
IEC 61558-2-16	NOTE	Harmonized as EN 61558-2-16.
IEC 61643-12	NOTE	Harmonized as CLC/TS 61643-12.
IEC 61869-3	NOTE	Harmonized as EN 61869-3.
IEC 62052-11:2003	NOTE	Harmonized as EN 62052-11:2003 (not modified).
IEC 62052-21:2004	NOTE	Harmonized as EN 62052-21:2004 (not modified).
IEC 62053-11:2003	NOTE	Harmonized as EN 62053-11:2003 (not modified).
IEC 62053-21:2003	NOTE	Harmonized as EN 62053-21:2003 (not modified).
IEC 62053-22:2003	NOTE	Harmonized as EN 62053-22:2003 (not modified).
IEC 62053-23:2003	NOTE	Harmonized as EN 62053-23:2003 (not modified).
IEC 62053-24:2014	NOTE	Harmonized as EN 62053-24:2015 (not modified).
IEC 62053-31:1998	NOTE	Harmonized as EN 62053-31:1998 (not modified).
IEC 62054-11:2004	NOTE	Harmonized as EN 62054-11:2004 (not modified).
IEC 62054-21:2004	NOTE	Harmonized as EN 62054-21:2004 (not modified).
IEC 62055-31:2005	NOTE	Harmonized as EN 62055-31:2005 (not modified).

IEC 62058-11:2008	NOTE	Harmonized as EN 62058-11:2010 (modified).
IEC 62058-21:2008	NOTE	Harmonized as EN 62058-21:2010 (modified).
IEC 62058-31:2008	NOTE	Harmonized as EN 62058-31:2010 (modified).
IEC 62477-1:2012	NOTE	Harmonized as EN 62477-1:2012 (not modified).
ISO 780	NOTE	Harmonized as EN ISO 780.
ISO 7010	NOTE	Harmonized as EN ISO 7010.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60027-1	-	Letter symbols to be used in electrical technology - Part 1: General	EN 60027-1	-
IEC 60068-2-75	2014	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	2014
IEC 60068-2-78	-	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	-
IEC 60085	-	Electrical insulation - Thermal evaluation and designation	EN 60085	-
IEC 60112	-	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	-
IEC 60269-3	-	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	HD 60269-3	-
IEC 60332-1-2	2004	Tests on electric and optical fibre 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	EN 60332-1-2	2004
-	-		+ A11	2016 [1)]

1) To be published.

Publication	Year	Title	EN/HD	Year
IEC 60332-2-2	2004	Tests on electric and optical fibre cables under fire conditions - Part 2-2: Test for vertical flame propagation for a single small insulated wire or cable - Procedure for diffusion flame	EN 60332-2-2	2004
IEC 60364-4-44 (mod)	2007	Low-voltage electrical installations - Part 4-442: Protection for safety - Protection of low-voltage installations against temporary overvoltages due to earth faults in the high-voltage system and due to faults in the low voltage system	HD 60364-4-442	2012
IEC 60364-4-44 (mod)	2007	Low-voltage electrical installations - Part 4-444: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	HD 60364-4-444	2010
IEC 60417-DB	-	Graphical symbols for use on equipment	-	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
-	-		+ corrigendum May	1993
+ A1	1999		+ A1	2000
+ A2	2013		+ A2	2013
IEC 60617-DB	-	Graphical symbols for diagrams	-	-
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60695-2-11	-	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products (GWEPT)	EN 60695-2-11	-
IEC 60695-10-2	-	Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test method	EN 60695-10-2	-
IEC 60695-11-10	-	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods	EN 60695-11-10	-
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
-	-		+ A11	2009
+ A1 (mod)	2009		+ A1	2010
-	-		+ A12	2011
-	-		+ AC	2011
+ A2 (mod)	2013		+ A2	2013

Publication	Year	Title	EN/HD	Year
IEC 61032	1997	Protection of persons and equipment by enclosures - Probes for verification	EN 61032	1998
IEC 61180-2	-	High-voltage test techniques for low-voltage equipment - Part 2: Test equipment	EN 61180-2	-
IEC 62053-52	-	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols	EN 62053-52	-
ISO 75-2	-	Plastics - Determination of temperature of deflection under load - Part 2: Plastics and ebonite	EN ISO 75-2	-
ISO 306	-	Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST)	EN ISO 306	-
ISO 3864-1	-	Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings	-	-
ISO 7000	2004	Graphical symbols for use on equipment - Index and synopsis	-	-

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INTERNATIONAL STANDARD

colour inside

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

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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICITY METERING EQUIPMENT (AC) – 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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International Standard IEC 62052-31 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

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

FDIS	Report on voting
13/1639/FDIS	13/1645/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.

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

In this standard, 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 publication will remain unchanged until the stability date 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.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

NOTE 1 The following text is based on IEC Guide 104, ISO/IEC Guide 51 and IEC 60255-27:2013.

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 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.

Existing product standards established by TC 13 include a range of safety requirements, test methods and test conditions. However, an important requirement of IEC Guide 104:2010, 5.2.3 has not been met so far:

> *"Safety aspects and performance aspects should not be covered in the same publication, as this makes it difficult to assess conformity with safety requirements alone. If, exceptionally, there are reasons to cover them in the same publication, safety aspects and performance aspects shall be clearly distinguished from each other. If there are performance criteria which have safety implications, these are considered to be safety aspects and this shall be made clear in the publication."*

In addition, some important aspects of product safety, such as safety under single fault conditions, have not been covered so far.

The objectives of the development of this International Standard 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 remove any ambiguity resulting from the lack of a comprehensive product safety standard for products in the Scope of TC 13;
- 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 60664-1:2007, 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 61010-1:2010 established by TC 66;

- the *group safety standard* IEC 62477-1:2012 established by TC 22;
- IEC 60255-27:2013, 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 standard, an integral text has been prepared, with appropriate 539 references to source documents.

This standard cancels and replaces the safety requirements specified in earlier standards established by IEC TC 13. See also Annex L (Informative).

NOTE 2 When this standard is published, an amendment to the relevant standards affected by this standard in IEC 62052, IEC 62053 and IEC 62054 will be published, to indicate which parts of those standards are replaced / cancelled by this standard.

Being a product safety standard, this standard takes precedence over the group safety standards IEC 61010-1:2010 and IEC 62477-1:2012.

ELECTRICITY METERING EQUIPMENT (AC) – GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –

Part 31: Product safety requirements and tests

1 Scope and object

1.1 Scope

This part of IEC 62052 specifies product safety requirements for equipment for electrical energy measurement and control.

NOTE 1 For other requirements, see the relevant standards.

This International Standard applies to newly manufactured metering equipment designed to measure and control electrical energy on 50 Hz or 60 Hz networks with a voltage up to 600 V, where all functional elements, including add-on modules are enclosed in or form a single case.

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

This International Standard also applies to metering equipment containing supply and load control switches, but only those which are electromechanical in operation.

NOTE 3 For components and sub-assemblies, see Clause 13.

When such equipment is designed to be installed in a specified matching socket, then the requirements apply to, and the tests shall be 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 standard.

This International Standard is also applicable to auxiliary input and output circuits.

NOTE 4 Examples are impulse inputs and outputs, control inputs and outputs, circuits for meter data exchange.

In this standard distinction is made between:

- electromechanical meters, static meters and equipment for tariff and load control;
- direct connected, current transformer operated, voltage and current transformer operated meters;
- protective class I and protective class II equipment;
- wall or cabinet mounted, rack mounted and panel mounted equipment;
- equipment intended for indoor use and outdoor use.

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 5 Examples are telecommunication modems and customer information units.

This International Standard does not apply to:

- equipment where the voltage line-to-neutral derived from nominal voltages exceeds 600 V;
- portable meters;

NOTE 6 Portable meters are meters that are not permanently connected.

- laboratory and mobile meter test equipment;
- reference standard meters.

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

- metering equipment has been installed correctly;
- metering equipment is used generally by unskilled 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 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 personnel, 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 standard.

1.2 Object

1.2.1 Aspects included in scope

NOTE 1 Subclause 1.2 is based on IEC 61010-1:2010, 1.2.

The purpose of the requirements of this standard 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 hazard 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.

1.2.2 Aspects excluded from scope

This standard 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 62052-11:2003, IEC 62052-21:2004 and IEC 62055-31:2005

c) protective measures for explosive atmospheres (see IEC 60079-0);

d) functional safety requirements;

e) effectiveness of transport packaging;

f) safety requirements of installations.

NOTE 2 The latter is generally subject to national regulation.

1.3 Verification

NOTE This subclause reproduces IEC 61010-1:2010, 1.3.

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

1.4 Environmental conditions

1.4.1 Normal environmental conditions

NOTE 1 Subclause 1.4 is based on IEC 61010-1:2010, 1.4.

This standard 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 3K5, but with low air temperature -10 °C; see IEC 60721-3-3:1994;

NOTE 2 3K5 specifies low air temperature -5 °C, high air temperature +45 °C, low relative humidity 5 %, high relative humidity 95 %. See the climatogram in IEC 60721-3-3:1994, Figure B.5.

d) voltage fluctuations up to -20…15 % 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.

1.4.2 Extended environmental conditions

This standard applies to metering equipment designed to be safe not only under the environmental conditions specified in 1.4.1, 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 3K6; see IEC 60721-3-3:1994;

NOTE 1 3K6 specifies low air temperature -25 °C, high air temperature +55 °C, low relative humidity 10 %, high relative humidity 100 %. See the climatogram in IEC 60721-3-3:1994, Figure B.6.

d) transient overvoltages higher than what is required for overvoltage category III.

NOTE 2 Under such circumstances, additional protection can be provided by external overvoltage protection elements. However, this is beyond the Scope of this standard. Information on the effects of installing varistors in large quantities on the network can be found in IEC TR 61000-2-3:1992, 6.6.1.

1.4.3 Extreme environmental conditions

NOTE 1 The following text is based on IEC 60721-3-0:1984, 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 60721-3-3:1994.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *Letter symbols to be used in electrical technology – Part 1: General*

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

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

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

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

IEC 60269-3, *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 fibre 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 fibre 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 60417-DB-12M, *Graphical symbols for use on equipment*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
Amd1:1999
Amd2: 2013

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IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

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