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| STN | Nízkonapäťové spínacie a riadiace zariadenia Časť 4-1: Stýkače a spúšťáče motorov Elektromechanické stýkače a spúšťáče motorov | STN EN IEC 60947-4-1 35 4101 |
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Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters

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. 07/19

Obsahuje: EN IEC 60947-4-1:2019, IEC 60947-4-1:2018

Oznámením tejto normy sa od 22.03.2022 ruší
STN EN 60947-4-1 (35 4101) z decembra 2010

EUROPEAN STANDARD

EN IEC 60947-4-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2019

ICS 29.120.99; 29.130.20

Supersedes EN 60947-4-1:2010

English Version

**Low-voltage switchgear and controlgear - Part 4-1: Contactors
and motor-starters - Electromechanical contactors and motor-
starters
(IEC 60947-4-1:2018)**

Appareillage à basse tension - Partie 4-1: Contacteurs et
démarreurs de moteurs - Contacteurs et démarreurs
électromécaniques
(IEC 60947-4-1:2018)

Niederspannungsschaltgeräte - Teil 4-1: Schütze und
Motorstarter - Elektromechanische Schütze und
Motorstarter
(IEC 60947-4-1:2018)

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EN IEC 60947-4-1:2019 (E)**European foreword**

The text of document 121A/224/FDIS, future edition 4 of IEC 60947-4-1, prepared by SC 121A "Low-voltage switchgear and controlgear" of IEC/TC 121 "Switchgear and controlgear and their assemblies for low voltage" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60947-4-1:2019.

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) 2019-09-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-03-22

This document supersedes EN 60947-4-1:2010.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives 2014/30/EU and 2014/35/EU.

For the relationship with the EU Directive 2014/30/EU see informative Annex ZZA and for the relationship with the EU Directive 2014/35/EU see informative Annex ZZB, which are integral parts of this document.

Endorsement notice

The text of the International Standard IEC 60947-4-1:2018 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 60068-2-2:2007 | NOTE | Harmonized as EN 60068-2-2:2007 (not modified) |
| IEC 60079 (series) | NOTE | Harmonized as EN 60079 (series) |
| IEC 60079-7 | NOTE | Harmonized as EN 60079-7 |
| IEC 60079-29-3 | NOTE | Harmonized as EN 60079-29-3 |
| IEC 60269-1:2006 | NOTE | Harmonized as EN 60269-1:2007 (not modified) |
| IEC 60269-2:2013 | NOTE | Harmonized as HD 60269-2:2013 (modified) |
| IEC 60664-1:2007 | NOTE | Harmonized as EN 60664-1:2007 (not modified) |
| IEC 60812:2006 | NOTE | Harmonized as EN 60812:2006 (not modified) |
| IEC 60947-3 | NOTE | Harmonized as EN 60947-3 |
| IEC 60947-8 | NOTE | Harmonized as EN 60947-8 |
| IEC 60990:2016 | NOTE | Harmonized as EN 60990:2016 (not modified) |
| IEC 61000-6-5 | NOTE | Harmonized as EN 61000-6-5 |
| IEC 61032 | NOTE | Harmonized as EN 61032 |
| IEC 61095:2009 | NOTE | Harmonized as EN 61095:2009 (not modified) |
| IEC 61508-2 | NOTE | Harmonized as EN 61508-2 |

EN IEC 60947-4-1:2019 (E)

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| IEC 61508-3 | NOTE | Harmonized as EN 61508-3 |
| IEC 61508-4:2010 | NOTE | Harmonized as EN 61508-4:2010 (not modified) |
| IEC 61508-6:2010 | NOTE | Harmonized as EN 61508-6:2010 (not modified) |
| IEC 61649 | NOTE | Harmonized as EN 61649 |
| IEC 61915-2:2011 | NOTE | Harmonized as EN 61915-2:2012 (not modified) |
| IEC 62061 | NOTE | Harmonized as EN 62061 |
| IEC 62443 (series) | NOTE | Harmonized as EN 62443 (series) |
| IEC 62477-1:2012 | NOTE | Harmonized as EN 62477-1:2012 (not modified) |
| IEC 62683-1 | NOTE | Harmonized as EN 62683-1 |
| ISO/IEC 80079-34 | NOTE | Harmonized as EN ISO/IEC 80079-34 |

EN IEC 60947-4-1:2019 (E)**Annex ZA**
(normative)**Normative references to international publications
with their corresponding European publications**

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.

NOTE 1 Where 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.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|---|----------------|-------------|
| IEC 60034-1 | 2017 | Rotating electrical machines - Part 1: Rating and performance | - | - |
| IEC 60034-12 | 2016 | Rotating electrical machines - Part 12: Starting performance of single-speed three-phase cage induction motors | EN 60034-12 | 2017 |
| IEC 60034-30-1 | - | Rotating electrical machines - Part 30-1: Efficiency classes of line operated AC motors (IE code) | EN 60034-30-1 | 2014 |
| IEC 60038 (mod) | - | IEC standard voltages | EN 60038 | 2011 |
| IEC 60068-2-14 | 2009 | Environmental testing - Part 2-14: Tests - Test N: Change of temperature | EN 60068-2-14 | 2009 |
| IEC 60079-14 | - | Explosive atmospheres - Part 14: Electrical installations design, selection and erection | EN 60079-14 | 2014 |
| IEC 60085 | 2007 | Electrical insulation - Thermal evaluation and designation | EN 60085 | 2008 |
| IEC 60364-1 (mod) | 2005 | Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions | HD 60364-1 | 2008 |
| - | - | | + A11 | 2017 |
| IEC 60364-7-712 | - | Electrical installations of buildings -- Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems | HD 60364-7-712 | 2005 |
| - | - | | + corrigendum | 2006 |
| IEC 60715 | 2017 | Dimensions of low-voltage switchgear and controlgear - Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories | EN 60715 | 2017 |
| IEC 60730-1 (mod) | - | Automatic electrical controls - Part 1: General requirements | EN 60730-1 | 2016 |

EN IEC 60947-4-1:2019 (E)

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------------|--|--------------|-------------|
| IEC 60947-1 | 2007 | Low-voltage switchgear and controlgear - Part 1: General rules | EN 60947-1 | 2007 |
| + A1 | 2010 | | + A1 | 2011 |
| + A2 | 2014 | | + A2 | 2014 |
| IEC 60947-2 | 2016 | Low-voltage switchgear and controlgear - Part 2: Circuit-breakers | EN 60947-2 | 2017 |
| +COR 1 | 2016 | | | |
| IEC 60947-5-1 | 2016 | Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices | EN 60947-5-1 | 2017 |
| +COR 1 | 2016 | | - | - |
| IEC 61000-6-2 | - | Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments | EN 61000-6-2 | 2019 |
| IEC 61051-2 | 1991 ¹ | Varistors for use in electronic equipment - Part 2: Sectional specification for surge suppression varistors | - | - |
| IEC 61140 | 2016 | Protection against electric shock - Common aspects for installation and equipment | EN 61140 | 2016 |
| IEC 61439 | series | Low-voltage switchgear and controlgear assemblies | EN 61439 | series |
| IEC 61810-1 | - | Electromechanical elementary relays - Part 1: General and safety requirements | EN 61810-1 | 2015 |
| CISPR 11 (mod) | 2015 | Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement | EN 55011 | 2016 |
| + A1 | 2016 | | + A1 | 2017 |
| ISO 2859-1 | 1999 | Sampling procedures for inspection by attributes -- Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection | - | - |
| ISO 3864-2 | 2016 ¹ | Graphical symbols - Safety colours and safety signs – Part 2: Design principles for product safety labels | - | - |

¹ Dated as no equivalent European Standard exists.

EN IEC 60947-4-1:2019 (E)**Annex ZZA**
(informative)**Relationship between this European standard and the essential requirements of Directive 2014/30/EU [2014 OJ L96] aimed to be covered and the standardisation request M/552**

This European standard has been prepared under the European Commission standardisation request C(2016) 7641 final of 30.11.2016², ('M/552'), as regards harmonised standards in support of Directive 2014/30/EU relating to electromagnetic compatibility, to provide one voluntary means of conforming to essential requirements of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZZA.1 – Correspondence between this European standard and the Essential Requirements set out in Directive 2014/30/EU [2014 OJ L96]

| Essential requirements of Directive 2014/30/EU | Clause(s) / sub-clause(s) of this EN | Remarks / Notes |
|--|--------------------------------------|-----------------|
| Annex I. 1(a) (electromagnetic disturbances) | 2, 8.3.3, 9.4.1, 9.4.3 | |
| Annex I. 1(b) (electromagnetic immunity) | 2, 8.3.1, 8.3.2, 9.4.1, 9.4.2 | |

WARNING 1: Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

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² COMMISSION IMPLEMENTING DECISION C(2016) 7641 final of 30.11.2016 on a standardisation request to the European Committee for Standardisation, to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards harmonised standards in support of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

Annex ZZB (informative)

Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered

This European standard has been prepared under a Commission's standardization request relating to harmonized standards in the field of the Low Voltage Directive, M/511, to provide one voluntary means of conforming to safety objectives of Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZB.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding safety objectives of that Directive, and associated EFTA regulations.

**Table ZZB.1 – Correspondence between this European standard and Annex I of
Directive 2014/35/EU [2014 OJ L96]**

| Safety objectives of Directive 2014/35/EU | Clause(s) / sub-clause(s) of this EN | Remarks/note |
|---|--|--------------|
| 1 a) | 2, 3, 5, 6, 8, Annex A, Annex B, Annex F, Annex K, Annex M, Annex P, Annex Q | |
| 1 b) | 2, 3, 5, 6, 7, 8, 9, Annex A, Annex F, Annex G, Annex L, Annex M, Annex N, Annex Q | |
| 1 c) | 1, 2, 3, 5, 6, 7, 8,9, Annex A, Annex B, Annex D, Annex F, Annex G, Annex H, Annex I, Annex K, Annex L, Annex M, Annex O, Annex P, Annex Q | |
| 2 a) | 2, 3, 5, 6, 8, 9, Annex N | |
| 2 b) | 2, 3, 5, 6, 8.1, 9, Annex L | |
| 2 c) | 1, 2, 3, 5, 6, 7, 8, Annex F, Annex K, Annex L | |
| 2 d) | 2, 3, 5, 6, 8, 9, Annex B, Annex F, Annex K, Annex L, Annex M, Annex N, Annex P | |
| 3 a) | 2, 3, 5, 6, 7, 8, 9, Annex L, Annex M | |
| 3 b) | 2, 3, 5, 6, 7, 8, 9, Annex B, Annex D, Annex G, Annex I, Annex K, Annex L, Annex M, Annex P, Annex Q | |
| 3 c) | 2, 3, 5, 6, 8, 9, Annex B, Annex D, Annex H, Annex L, Annex P, Annex Q | |

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IEC 60947-4-1

Edition 4.0 2018-10

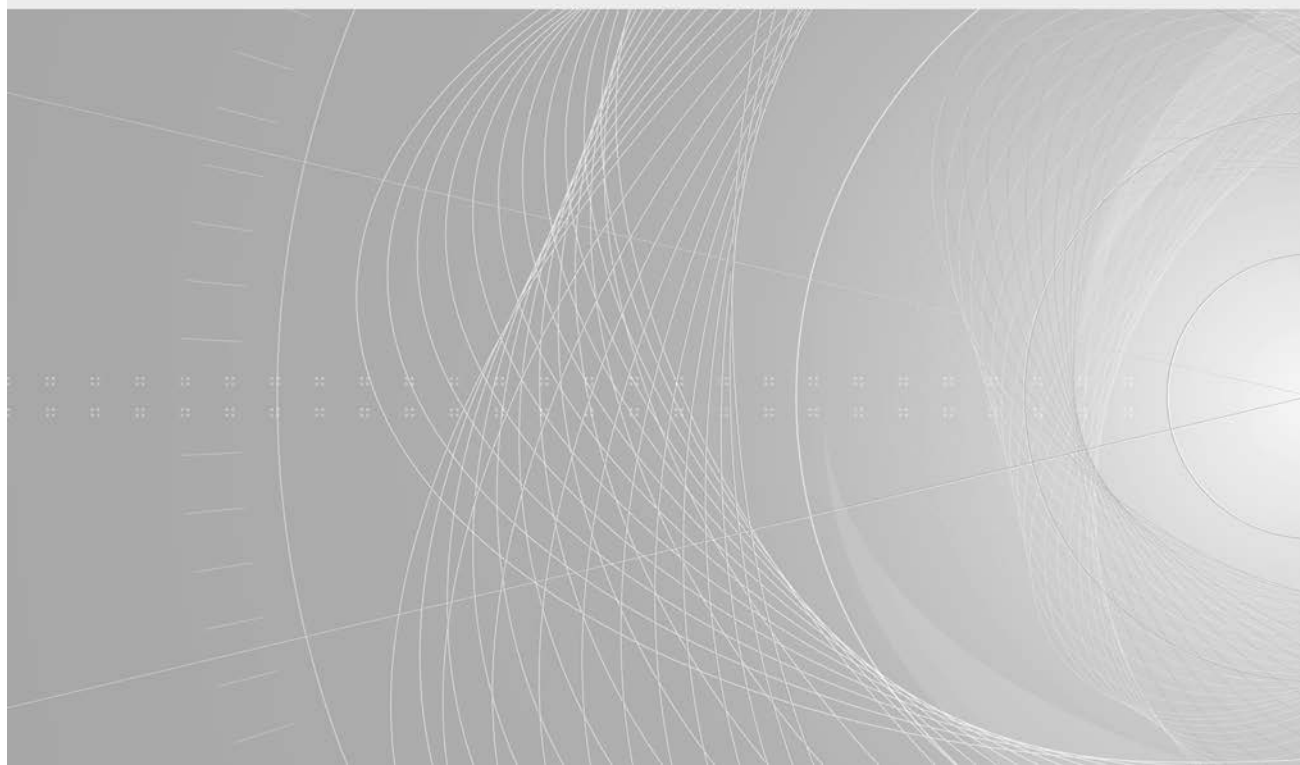
INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Low-voltage switchgear and controlgear –
Part 4-1: Contactors and motor-starters – Electromechanical contactors and
motor-starters**

**Appareillage à basse tension –
Partie 4-1: Contacteurs et démarreurs de moteurs – Contacteurs et démarreurs
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IEC 60947-4-1

Edition 4.0 2018-10

INTERNATIONAL STANDARD

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INTERNATIONALE

ICS 29.120.99, 29.130.20

ISBN 978-2-8322-5922-1

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 4-1: Contactors and motor-starters –
Electromechanical contactors and motor-starters**

FOREWORD

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International Standard IEC 60947-4-1 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

This fourth edition cancels and replaces the third edition published in 2009 and its Amendment 1:2012. This edition constitutes a technical revision.

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

- Scope structure and exclusions
- Editorial correction of notes and hanging paragraphs
- Reference to IEC 62683-1
- Motor protective switching device (MPSD) with its requirements

- Safety aspects related to:
 - General aspects;
 - Limited energy circuits;
 - Electronic circuits;
 - Assessment procedure for electromechanical overload protection used in safety - applications (new Annex L)
- Introduction of provisions covering the impact of higher locked rotor current to achieve high efficiency class
- Mention of dedicated wiring accessories
- Pickup power measurement
- Alignment to IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010, and IEC 60947-1:2007/AMD2:2014
- Direct current requirements for covering photovoltaic application (new Annex M)
- Load monitoring indicators (new Annex O)
- Short-circuit breaking tests of MPSD (new Annex P)
- Co-ordination under short-circuit conditions between a MPSD and another short-circuit protective device associated in the same circuit (new Annex Q)

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

| FDIS | Report on voting |
|---------------|------------------|
| 121A/224/FDIS | 121A/233/RVD |

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.

A list of all parts of the IEC 60947 series can be found, under the general title *Low-voltage switchgear and controlgear*, on the IEC website.

This document shall be read in conjunction with IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010, IEC 60947-1:2007/AMD2:2014, *Low voltage switchgear and controlgear – Part 1: General rules*. The provisions of the general rules are applicable to this document, where specifically called for.

The provisions of the general rules dealt with IEC 60947-1 are applicable to this part of IEC 60947 series where specifically called for. Clauses and subclauses, tables, figures and annexes of the general rules thus applicable are identified by reference to IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010, and IEC 60947-1:2007/AMD2:2014. For example, 4.3.4.1 of IEC 60947-1:2007, Table 4 of IEC 60947-1:2007, or Annex A of IEC 60947-1:2007.

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.

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

This document introduces the requirements for motor protection switching devices (MPSD).

MPSDs have been available on the market for many years. They are introduced in this document for covering the minimum safety and performance requirements of a manual motor starter with integral electromechanical or electronic short-circuit protection. This device fulfils all requirements of a starter and specific requirements of a circuit-breaker according to IEC 60947-2, mainly I_{CU} and I_{CS} , for protecting the motor and its circuit with control devices e.g. a contactor. An MPSD is not intended to support neutral pole, DC ratings, rated uninterrupted current I_U , backup protection, short-circuit tripping time-delay, selectivity category, withdrawable capability, RCD, recloser, EMC requirements of IEC 60947-2, etc.

Circuit-breakers according to Annex O of IEC 60947-2:2016 with motor overload protection characteristic according to this document but without starter ratings e.g. AC-3 are also available on the market. These devices are not covered by this document.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters

1 Scope

This part of IEC 60947 is applicable to the following equipment:

- electromechanical contactors and starters including motor protective switching device (MPSD);
- actuators of contactor relays;
- contacts dedicated exclusively to the coil circuit of this contactor or this contactor relay;
- dedicated accessories (e.g. dedicated wiring, dedicated latch accessory);

intended to be connected to distribution circuits, motors circuits and other load circuits, the rated voltage of which does not exceed 1 000 V AC or 1 500 V DC.

This document covers also the assessment procedure for electromechanical overload protection used in safety applications such as protecting a motor located in explosive atmosphere from the outside atmosphere: See Annex L.

This document does not apply to:

- starters for DC motors¹;
NOTE 1 The requirements for DC motor starters are under consideration for the next maintenance cycle.
- auxiliary contacts of contactors and contacts of contactor relays. These are covered by IEC 60947-5-1;
- starter used downstream to frequency drive¹;
NOTE 2 Additional requirements for starter used downstream to frequency drive are under consideration for the next maintenance cycle.
- short-circuit protective device integrated within starters other than MPSDs. This is covered by IEC 60947-2 and IEC 60947-3;
- the use of the product with additional measure within explosive atmospheres. These are given in IEC 60079 series;
- embedded software design rules¹;
- cyber security aspects. These are covered by IEC 62443 series.

The objective of this document is to state:

- a) the characteristics of the equipment;
- b) the conditions applicable to the equipment with reference to:
 - 1) its operation and behaviour,
 - 2) its dielectric properties,
 - 3) its degree of protection,

¹ For this subject the manufacturer is responsible for taking additional safety measures.

- 4) its construction including safety measures against electric shock, fire hazard and mechanical hazard;
- c) the tests intended for confirming that these conditions have been met, and the methods to be adopted for these tests;
- d) the information to be given with the equipment or in the manufacturer's literature.

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 60034-1:2017, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-12:2016, *Rotating electrical machines – Part 12: Starting performance of single-speed three-phase cage induction motors*

IEC 60034-30-1, *Rotating electrical machines – Part 30-1: Efficiency classes of line operated AC motors (IE code)*

IEC 60038, *IEC standard voltages*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60079-14, *Explosive atmospheres – Part 14: Electrical installations design, selection and erection*

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

IEC 60364-1:2005, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-7-712, *Low voltage electrical installations – Part 7-712: Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems*

IEC 60715:2017, *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories*

IEC 60730-1, *Automatic electrical controls – Part 1: General requirements*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-1:2007/AMD1:2010

IEC 60947-1:2007/AMD2:2014

IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61051-2, *Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

IEC 61140:2016, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61439 (all parts), *Low-voltage switchgear and controlgear assemblies*

IEC 61810-1, *Electromechanical elementary relays – Part 1: General and safety requirements*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 11:2015/AMD1:2016

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 3864-2, *Graphical symbols – Safety colours and safety signs – Part 2: Design principles for product safety labels*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN