SVENSK STANDARD SS-EN IEC 61439-1

Utgåva 3

2021-06-16

REDLINE VERSION

Kopplingsutrustningar för högst 1000 V växelspänning eller 1500 V likspänning – Del 1: Allmänt

Low-voltage switchgear and controlgear assemblies – Part 1: General rules

En så kallad ”Redline version” (RLV) innehåller både den fastställda IEC-standarden och en ändringsmarkerad standard. Alla tillägg och borttagningar sedan den tidigare utgåvan är markerade med färg. Med en RLV sparar du mycket tid när du ska identifiera och bedöma aktuella ändringar i standarden. SEK Svensk Elstandard kan bara ge ut en RLV i de fall den finns tillgänglig från IEC.

IEC 61439-1

Edition 3.0 2020-05

INTERNATIONAL STANDARD

colour inside

REDLINE VERSION

Low-voltage switchgear and controlgear assemblies – Part 1: General rules

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

Part 1: General rules

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

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This redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 61439-1 has been prepared by subcommittee 121B: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

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

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

a) clarification that power electric converter systems, switch mode power supplies, uninterruptable power supplies and adjustable speed power drive systems are tested to their particular products standard, but when they are incorporated in assemblies the incorporation is in accordance with the IEC 61439 series of standards;
b) introduction of a group rated current for circuits within a loaded assembly and the refocusing of temperature-rise verification on this new characteristic;
c) addition of requirements in respect of DC;
d) introduction of the concept of class I and class II assemblies regarding protection against electric shock.

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

FDIS	Report on voting
121B/99/FDIS	121B/103/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.

The reader’s attention is drawn to the fact that Annex N lists all the “in-some-countries” clauses on differing practices of a less permanent nature regarding this document.

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

A list of all parts of the IEC 61439 series, under the general title *Low-voltage switchgear and controlgear assemblies*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

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

The purpose of this document is to harmonize as far as practicable all rules and requirements of a general nature applicable to low-voltage switchgear and controlgear assemblies ~~(ASSEMBLIES)~~, in order to obtain uniformity of requirements and verification for assemblies and to avoid the need for verification in other standards. All those requirements for the various assembly standards which can be considered as general have therefore been gathered in this document together with specific subjects of wide interest and application, e.g. temperature-rise, dielectric properties, etc.

For each type of low-voltage switchgear and controlgear assembly, only two main standards are necessary to determine all requirements and the corresponding methods of verification:

– the basic standard, (this document) referred to as “IEC 61439-1” in the specific standards, covering the various types of low-voltage switchgear and controlgear assemblies;
– the specific assembly standard hereinafter also referred to as the relevant assembly standard.

For a general rule to apply to a specific assembly standard, it should be explicitly referred to by quoting this document followed by the relevant clause or subclause number e.g. “IEC 61439-1:2020, 9.1.3”.

A specific assembly standard may not require, and hence need not call up, a general rule where it is not applicable, or it ~~may~~ can add requirements if the general rule is deemed inadequate in the particular case, but it may not deviate from it unless there is substantial technical justification detailed in the specific assembly standard.

Where, in this document, a cross-reference is made to another clause, the reference is to be taken to apply to that clause as amended by the specific assembly standard, where applicable.

Requirements in this document that are subject to agreement between the assembly manufacturer and the user are summarized in Annex C (informative). This schedule also facilitates the supply of information on basic conditions and additional user specifications to enable proper design, application and utilization of the assembly.

For the ~~new re-structured~~ IEC 61439 series, the following parts are ~~envisaged~~ published:

a) IEC 61439-1: General rules
b) IEC 61439-2: Power switchgear and controlgear assemblies (PSC-assemblies)[1]
c) IEC 61439-3: Distribution boards ~~(to supersede IEC 60439-3)~~ intended to be operated by ordinary persons (DBO)
d) IEC 61439-4: ~~ASSEMBLIES for construction sites (to supersede IEC 60439-4)~~ Particular requirements for assemblies for construction sites (ACS)
e) IEC 61439-5: Assemblies for power distribution ~~(to supersede IEC 60439-5)~~ in public networks
f) IEC 61439-6: Busbar trunking systems ~~(to supersede IEC 60439-2)~~ (busways)
f) IEC 61439-7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations
g) IEC TR 61439-0: Guidance to specifying assemblies.

This list is not exhaustive; additional parts ~~may~~ can be developed as the need arises.

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[1] IEC 61439-2 includes requirements for assemblies for use in photovoltaic installations.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

Part 1: General rules

1 Scope

~~NOTE 1 Throughout this standard, the term ASSEMBLY (see 3.1.1) is used for a low-voltage switchgear and controlgear assembly.~~

This part of IEC 61439 lays down the general definitions and ~~states the~~ service conditions, construction requirements, technical characteristics and verification requirements for low-voltage switchgear and controlgear assemblies.

~~This standard cannot be used alone to specify an ASSEMBLY or used for a purpose of determining conformity. ASSEMBLIES shall comply with the relevant part of the IEC 61439 series, Parts 2 onwards.~~

NOTE Throughout this document, the term assembly(s) (see 3.1.1) is used for a low-voltage switchgear and controlgear assembly(s).

For the purpose of determining assembly conformity, the requirements of the relevant part of the IEC 61439 series, Part 2 onwards, apply together with the cited requirements of this document. For assemblies not covered by Part 3 onward, Part 2 applies.

This document applies to ~~low-voltage switchgear and controlgear~~ assemblies ~~(ASSEMBLIES)~~ only when required by the relevant assembly standard as follows:

– assemblies for which the rated voltage does not exceed 1 000 V ~~in case of~~ AC or 1 500 V ~~in case of~~ DC;

– assemblies designed for a nominal frequency of the incoming supply or supplies not exceeding 1 000 Hz;

– assemblies intended for indoor and outdoor applications;

– stationary or movable assemblies with or without an enclosure;

– assemblies intended for use in connection with the generation, transmission, distribution and conversion of electric energy, and for the control of electrical energy consuming equipment.

~~– ASSEMBLIES designed for use under special service conditions, for example in ships and in rail vehicles provided that the other relevant specific requirements are complied with;~~

~~NOTE 2 Supplementary requirements for ASSEMBLIES in ships are covered by IEC 60092-302.~~

~~– ASSEMBLIES designed for electrical equipment of machines provided that the other relevant specific requirements are complied with.~~

~~NOTE 3 Supplementary requirements for ASSEMBLIES forming part of a machine are covered by the IEC 60204 series.~~

~~This standard applies to all ASSEMBLIES whether they are designed, manufactured and verified on a one-off basis or fully standardised and manufactured in quantity.~~

~~The manufacture and/or assembly may be carried out other than by the original manufacturer (see 3.10.1).~~

This document does not apply to individual devices and self-contained components such as motor starters, fuse switches, power electronic converter systems and equipment (PECS), switch mode power supplies (SMPS), uninterruptable power supplies (UPS), basic drive

modules (BDM), complete drive modules (CDM), adjustable speed power drives systems (PDS), and other electronic equipment~~, etc.~~ which ~~will~~ comply with their relevant product standards. This document describes the integration of devices and self-contained components into an assembly or into an empty enclosure forming an assembly.

For some applications involving, for example, explosive atmospheres, functional safety, there can be a need to comply with the requirements of other standards or legislation in addition to those specified in the IEC 61439 series.

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 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-11:1981, *Basic environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60073:2002, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators*

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

~~IEC 60216 (all parts), *Electrical insulating materials – Properties of thermal endurance*~~

~~IEC 60227-3:1993, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 3: Non-sheathed cables for fixed wiring*~~

~~IEC 60245-3:1994, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 3: Heat resistant silicone insulated cables*~~

~~IEC 60245-4:1994, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4: Cords and flexible cables*~~

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-4-41:2005, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*
IEC 60364-4-41:2005/AMD1:2017

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

IEC 60364-5-51:2005, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60364-5-52:2009, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

~~IEC 60364-5-53:2001, *Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control*~~

~~IEC 60364-5-54:2011, *Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors*~~

IEC 60439 (all parts), *Low-voltage switchgear and controlgear assemblies*[2]

IEC 60445:~~2010~~2017, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors*

IEC 60447:2004, *Basic and safety principles for man-machine interface, marking and identification – Actuating principles*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*[~~3~~4]
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

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

IEC 60695-2-10:~~2000~~2013, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:~~2000~~2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

~~IEC 60695-11-5:2004, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*~~

IEC 60695-2-12, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60865-1:~~1993~~2011, *Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods*

IEC TR 60890:~~1987~~2014, *A method of temperature-rise~~ assessment by extrapolation for partially type-tested assemblies (PTTA)~~ verification of low-voltage switchgear and controlgear assemblies by calculation*

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

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

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio frequency, electromagnetic field immunity test* ~~5~~6

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2 Withdrawn. The IEC 60439 series has been cancelled and replaced by the IEC 61439 series.

~~3 There is a consolidated edition 1.1 (2001) that includes IEC 60529 (1989) and its amendment 1 (1999).~~

4 There is a consolidated document edition 2.2 (2013) that includes IEC 60529 (1989) and its Amendment 1 (1999) and Amendment 2 (2013).

IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:~~2004~~2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:~~2005~~2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*[7]
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:~~2008~~2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*
IEC 61000-4-11:2004/AMD1:2017

~~IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low-frequency immunity tests*[8]~~

IEC 61000-6-3:2006, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*
IEC 61000-6-3:2006/AMD1:2010

IEC 61000-6-4:~~2006~~2018, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards –Emission standard for industrial environments*[9]

IEC 61082-1:2014, *Preparation of documents used in electrotechnology – Part 1: Rules*

IEC 61180~~ (all parts)~~:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

~~IEC/TS 61201:2007, *Use of conventional touch voltage limits – Application guide*~~

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

IEC 61921:2017, *Power capacitors – Low-voltage power factor correction banks*

IEC 62208:2011, *Empty enclosures for low-voltage switchgear and controlgear assemblies – General requirements*

~~5 There is a consolidated edition 3.2 (2010) that includes IEC 61000-4-3 (2006) and amendment 1 (2007) and amendment 2 (2010).~~

6 There is a consolidated edition 3.2 (2010) that includes IEC 61000-4-3 (2006) and Amendment 1 (2007) and Amendment 2 (2010).

7 There is consolidated edition 3.1 (2017) that includes IEC 61000-4-5 (2014) and its Amendment 1 (2017).

~~8 There is a consolidated edition 1.1 (2009) that includes IEC 61000-4-13 (2002) and its amendment 1 (2009).~~

~~9 There is a consolidated edition 2.1 (2011) that includes IEC 61000-6-4 (2006) and its amendment 1 (2010).~~

~~IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*~~

IEC 81346-1:2009, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules*

IEC 81346-2:2019, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 2: Classification of objects and codes for classes*

CISPR 11:~~2009~~2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*~~10~~
CISPR 11:2015/AMD1:2016
CISPR 11:2015/AMD2:2019

~~CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*~~

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*
CISPR 32:2015/AMD1:2019

ISO 178:~~2001~~2010, *Plastics – Determination of flexural properties*
ISO 178:2010/AMD1:2013

~~ISO 179 (all parts) *Plastics – Determination of Charpy impact strength*~~

ISO 179-1:2010, *Plastics – Determination of Charpy impact properties – Part 1: Non-instrumented impact test*

ISO 179-2:1997, *Plastics – Determination of Charpy impact properties – Part 2: Instrumented impact test*
ISO 179-2:1997/AMD1:2011

ISO 2409:~~2007~~2013, *Paints and varnishes – Cross-cut test*

ISO 4628-3:~~2003~~2016, *Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3: Assessment of degree of rusting*

ISO 4892-2:~~2006~~2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

~~10 There is a consolidated edition 5.1 (2010) that includes CISPR 11 (2009) and its amendment 1 (2010).~~

SVENSK STANDARD SS-EN IEC 61439-1

Fastställd	Utgåva	Sida	Ansvarig kommitté
2021-06-16	3	1 (1+164)	SEK TK 121B

Kopplingsutrustningar för högst 1000 V växelspänning eller 1500 V likspänning – Del 1: Allmänt

Low-voltage switchgear and controlgear assemblies – Part 1: General rules

Som svensk standard gäller europastandarden EN IEC 61439-1:2021. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61439-1:2021.

Nationellt förord

Europastandarden EN IEC 61439-1:2021

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61439-1, Third edition, 2020 - Low-voltage switchgear and controlgear assemblies - Part 1: General rules**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61439-1, utgåva 2, 2012, gäller ej fr o m 2024-05-21.

ICS 29.130.20

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61439-1

May 2021

ICS 29.130.20

Supersedes EN 61439-1:2011 and all of its amendments and corrigenda (if any)

English Version

Low-voltage switchgear and controlgear assemblies - Part 1: General rules (IEC 61439-1:2020)

Ensembles d'appareillage à basse tension - Partie 1: Règles générales (IEC 61439-1:2020)

Niederspannungs-Schaltgerätekombinationen - Teil 1: Allgemeine Festlegungen (IEC 61439-1:2020)

This European Standard was approved by CENELEC on 2020-06-24. 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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 61439-1:2021 E

European foreword

The text of document 121B/99/FDIS, future edition 3 of IEC 61439-1, prepared by SC 121B "Low-voltage switchgear and controlgear assemblies" 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 61439-1:2021.

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) 2021-11-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-05-21

This document supersedes EN 61439-1:2011 and all of its amendments and corrigenda (if any).

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 Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 61439-1:2020 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 60038:2009	NOTE	Harmonized as EN 60038:2011
IEC 60092 (series)	NOTE	Harmonized as EN 60092 (series)
IEC 60112:2003	NOTE	Harmonized as EN 60112:2003 (not modified)
IEC 60112:2003/A1:2009	NOTE	Harmonized as EN 60112:2003/A1:2009 (not modified)
IEC 60204 (series)	NOTE	Harmonized as EN 60204 (series)
IEC 60204-1:2016	NOTE	Harmonized as EN 60204-1:2018
IEC 60216 (series)	NOTE	Harmonized as EN 60216 (series)
IEC 60228:2004	NOTE	Harmonized as EN 60228:2005 (not modified)
IEC 60269-2	NOTE	Harmonized as HD 60269-2
IEC 60364-4-44:2007	NOTE	Harmonized as HD 60364-4-442:2012
IEC 60364-4-44:2007/A1:2015	NOTE	Harmonized as HD 60364-4-443:2016
IEC 60364-5-54:2011	NOTE	Harmonized as HD 60364-5-54:2011 (not modified)

IEC 60364-5-55:2011	NOTE	Harmonized as HD 60364-5-559:2012
IEC 60664-1:2007	NOTE	Harmonized as EN 60664-1:2007 (not modified)
IEC 60695-11-5:2016	NOTE	Harmonized as EN 60695-11-5:2017 (not modified)
IEC 60721-3-3:2019	NOTE	Harmonized as EN IEC 60721-3-3:2019 (not modified)
IEC 60947 (series)	NOTE	Harmonized as EN IEC 60947 (series)
IEC 60947-1:2020	NOTE	Harmonized as EN IEC 60947-1:2021 (not modified)
IEC 60947-2	NOTE	Harmonized as EN 60947-2
IEC 60947-7-2:2009	NOTE	Harmonized as EN 60947-7-2:2009 (not modified)
IEC 61000-2-2:2002	NOTE	Harmonized as EN 61000-2-2:2002 (not modified)
IEC 61000-2-2:2002/A1:2017	NOTE	Harmonized as EN 61000-2-2:2002/A1:2017 (not modified)
IEC 61000-2-2:2002/A2:2018	NOTE	Harmonized as EN 61000-2-2:2002/A2:2019 (not modified)
IEC 61000-4-13:2002	NOTE	Harmonized as EN 61000-4-13:2002 (not modified)
IEC 61000-4-13:2002/A2:2015	NOTE	Harmonized as EN 61000-4-13:2002/A2:2016 (not modified)
IEC 61000-6-1:2016	NOTE	Harmonized as EN IEC 61000-6-1:2019 (not modified)
IEC 61000-6-2:2016	NOTE	Harmonized as EN IEC 61000-6-2:2019 (not modified)
IEC 61000-6-3:2006	NOTE	Harmonized as EN 61000-6-3:2007 (not modified)
IEC 61082 (series)	NOTE	Harmonized as EN 61082 (series)
IEC 61140:2016	NOTE	Harmonized as EN 61140:2016 (not modified)

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.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-2	2007	Environmental testing – Part 2-2: Tests – Test B: Dry heat	EN 60068-2-2	2007
IEC 60068-2-11	1981	Basic environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist	EN 60068-2-11	1999
IEC 60068-2-30	2005	Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005
IEC 60073	2002	Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators	EN 60073	2002
IEC 60085	2007	Electrical insulation – Thermal evaluation and designation	EN 60085	2008
IEC 60364	(all parts)	Low-voltage electrical installations	HD 364	(all parts)
IEC 60364-4-41	2005	Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock	HD 364-4-41 (modified)	2017
+A1	2017		+A11	2017
			+A12	2019
IEC 60364-4-44	2007	Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	HD 60364-4-442 (modified)	2012
+A1	2015		+HD 60364-4-444 (modified)	2010
+A2	2018		+HD 60364-4-443 (modified)	2016
IEC 60364-5-51	2005	Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules	HD 60364-5-51 (modified)	2009
			+A11	2010
			+A12	2017

Publication	Year	Title	EN/HD	Year
IEC 60364-5-52	2009	Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems	HD 60364-5-52 (modified)	2011
			+A11	2017
IEC 60364-5-53	2001	Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control	-	-
+A1	2002			
+A2	2015			
IEC 60439	(all parts)	Low-voltage switchgear and controlgear assemblies	EN 60439	(all parts)
IEC 60445	2017	Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors	EN 60445	2017
IEC 60447	2004	Basic and safety principles for man-machine interface, marking and identification – Actuating principles	EN 60447	2004
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
+A1	1999		+A1	2000
+A2	2013		+A2	2013
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60695-2-10	2013	Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure	EN 60695-2-10	2013
IEC 60695-2-11	2014	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	2014
IEC 60865-1	2011	Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods	EN 60865-1	2012
IEC TR 60890	2014	A method of temperature-rise verification of low-voltage switchgear and controlgear assemblies by calculation	-	-
IEC 60947-1	2020	Low-voltage switchgear and controlgear - Part 1: General rules	EN IEC 60947-1	2021
IEC 60947-4-1	2018	Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters	EN 60947-4-1	2019
IEC 60947-7-2	2009	Low-voltage switchgear and controlgear – Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors	EN 60947-7-2	2009

Publication	Year	Title	EN/HD	Year
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3	2006	, Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2006
+A1	2007		+A1	2008
+A2	2010		+A2	2010
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-5	2014	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test	EN 61000-4-5	2014
+A1	2017		+A1	2017
IEC 61000-4-6	2013	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2014
			+AC1	2015
IEC 61000-4-8	2009	Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test	EN 61000-4-8	2010
IEC 61000-4-11	2004	Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	2004
+A1	2017		+A1	2017
IEC 61000-6-2	2016	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards – Immunity standard for industrial environments	EN 61000-6-2	2019
IEC 61000-6-3	2006	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments	EN 61000-6-3	2007
+A1	2010		+A1	2011
IEC 61000-6-4	2018	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards –Emission standard for industrial environments	EN 61000-6-4	2019
IEC 61082-1	2014	Preparation of documents used in electrotechnology – Part 1: Rules	EN 61082	2015
IEC 61180	2016	High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment	EN 61180	2016
IEC 61439	(all parts)	Low-voltage switchgear and controlgear assemblies	EN 61439	(all parts)

Publication	Year	Title	EN/HD	Year
IEC 61545	1996	Connecting devices - Devices for the connection of aluminium conductors in clamping units of any material and copper conductors in aluminium bodied clamping units	-	-
IEC 61921	2017	Power capacitors - Low-voltage power factor correction banks	EN 61921	—[1]
IEC 62208	2011	Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements	EN 62208	2011
IEC 81346-1	2009	Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules	EN 81346-1	2009
IEC 81346-2	2019	Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 2: Classification of objects and codes for classes	EN IEC 81346-2	2019
CISPR 11	2015	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	EN 55011 (modified)	2016
+A1	2016		+A11	2020
+A2	2019			
CISPR 32	2015	Electromagnetic compatibility of multimedia equipment – Emission requirements	EN 55032 (modified)	2015
+A1	2019		+A11	2020
ISO 178	2010	Plastics – Determination of flexural properties	EN ISO 178	2010
+A1	2013		+A1	2013
ISO 179-1	2010	Plastics – Determination of Charpy impact properties -- Part 1: Non-instrumented impact test	EN ISO 179-1	2010
ISO 179-2	1997	Plastics – Determination of Charpy impact properties -- Part 2: Instrumented impact test	EN ISO 179-2	1999
+A1	2011		+A1	2012
ISO 2409	2013	Paints and varnishes – Cross-cut test	EN ISO 22409	2013
ISO 4628-3	2016	Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3: Assessment of degree of rusting	EN ISO 4628-3	2016
ISO 4892-2	2013	Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps	EN ISO 4892-2	2013

[1] Under preparation. Stage at time of preparation FprEN 61921:2017.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

Part 1: General rules

FOREWORD

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61439-1 has been prepared by subcommittee 121B: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

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

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

a) clarification that power electric converter systems, switch mode power supplies, uninterruptable power supplies and adjustable speed power drive systems are tested to their particular products standard, but when they are incorporated in assemblies the incorporation is in accordance with the IEC 61439 series of standards;
b) introduction of a group rated current for circuits within a loaded assembly and the refocusing of temperature-rise verification on this new characteristic;

c) addition of requirements in respect of DC;

d) introduction of the concept of class I and class II assemblies regarding protection against electric shock.

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

FDIS	Report on voting
121B/99/FDIS	121B/103/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.

The reader's attention is drawn to the fact that Annex N lists all the "in-some-countries" clauses on differing practices of a less permanent nature regarding this document.

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

A list of all parts of the IEC 61439 series, under the general title *Low-voltage switchgear and controlgear assemblies*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

The purpose of this document is to harmonize as far as practicable all rules and requirements of a general nature applicable to low-voltage switchgear and controlgear assemblies, in order to obtain uniformity of requirements and verification for assemblies and to avoid the need for verification in other standards. All those requirements for the various assembly standards which can be considered as general have therefore been gathered in this document together with specific subjects of wide interest and application, e.g. temperature-rise, dielectric properties, etc.

For each type of low-voltage switchgear and controlgear assembly, only two main standards are necessary to determine all requirements and the corresponding methods of verification:

– the basic standard, (this document) referred to as “IEC 61439-1” in the specific standards, covering the various types of low-voltage switchgear and controlgear assemblies;
– the specific assembly standard hereinafter also referred to as the relevant assembly standard.

For a general rule to apply to a specific assembly standard, it should be explicitly referred to by quoting this document followed by the relevant clause or subclause number e.g. “IEC 61439-1:2020, 9.1.3”.

A specific assembly standard may not require, and hence need not call up, a general rule where it is not applicable, or it can add requirements if the general rule is deemed inadequate in the particular case, but it may not deviate from it unless there is substantial technical justification detailed in the specific assembly standard.

Where, in this document, a cross-reference is made to another clause, the reference is to be taken to apply to that clause as amended by the specific assembly standard, where applicable.

Requirements in this document that are subject to agreement between the assembly manufacturer and the user are summarized in Annex C (informative). This schedule also facilitates the supply of information on basic conditions and additional user specifications to enable proper design, application and utilization of the assembly.

For the IEC 61439 series, the following parts are published:

a) IEC 61439-1: General rules
b) IEC 61439-2: Power switchgear and controlgear assemblies (PSC-assemblies)[1]
c) IEC 61439-3: Distribution boards intended to be operated by ordinary persons (DBO)
d) IEC 61439-4: Particular requirements for assemblies for construction sites (ACS)
e) IEC 61439-5: Assemblies for power distribution in public networks
f) IEC 61439-6: Busbar trunking systems (busways)
g) IEC 61439-7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations
h) IEC TR 61439-0: Guidance to specifying assemblies.

This list is not exhaustive; additional parts can be developed as the need arises.

[1] IEC 61439-2 includes requirements for assemblies for use in photovoltaic installations.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

Part 1: General rules

1 Scope

This part of IEC 61439 lays down the general definitions and service conditions, construction requirements, technical characteristics and verification requirements for low-voltage switchgear and controlgear assemblies.

NOTE Throughout this document, the term assembly(s) (see 3.1.1) is used for a low-voltage switchgear and controlgear assembly(s).

For the purpose of determining assembly conformity, the requirements of the relevant part of the IEC 61439 series, Part 2 onwards, apply together with the cited requirements of this document. For assemblies not covered by Part 3 onward, Part 2 applies.

This document applies to assemblies only when required by the relevant assembly standard as follows:

– assemblies for which the rated voltage does not exceed 1 000 V AC or 1 500 V DC;
– assemblies designed for a nominal frequency of the incoming supply or supplies not exceeding 1 000 Hz;
– assemblies intended for indoor and outdoor applications;
– stationary or movable assemblies with or without an enclosure;
– assemblies intended for use in connection with the generation, transmission, distribution and conversion of electric energy, and for the control of electrical energy consuming equipment.

This document does not apply to individual devices and self-contained components such as motor starters, fuse switches, power electronic converter systems and equipment (PECS), switch mode power supplies (SMPS), uninterruptable power supplies (UPS), basic drive modules (BDM), complete drive modules (CDM), adjustable speed power drives systems (PDS), and other electronic equipment which comply with their relevant product standards. This document describes the integration of devices and self-contained components into an assembly or into an empty enclosure forming an assembly.

For some applications involving, for example, explosive atmospheres, functional safety, there can be a need to comply with the requirements of other standards or legislation in addition to those specified in the IEC 61439 series.

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 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-11:1981*, Basic environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60073:2002, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators*

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

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-4-41:2005*, Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*
IEC 60364-4-41:2005/AMD1:2017

IEC 60364-5-51:2005, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60364-5-52:2009, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60439 (all parts), *Low-voltage switchgear and controlgear assemblies*[2]

IEC 60445:2017, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors*

IEC 60447:2004, *Basic and safety principles for man-machine interface, marking and identification – Actuating principles*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*[3]
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60695-2-10:2013, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products* (GWEPT)

IEC 60695-2-12, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60865-1:2011, *Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods*

IEC TR 60890:2014, *A method of temperature-rise verification of low-voltage switchgear and controlgear assemblies by calculation*

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

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2 Withdrawn. The IEC 60439 series has been cancelled and replaced by the IEC 61439 series.

3 There is a consolidated document edition 2.2 (2013) that includes IEC 60529 (1989) and its Amendment 1 (1999) and Amendment 2 (2013).

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio frequency, electromagnetic field immunity test*[4]
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

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

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*
IEC 61000-4-11:2004/AMD1:2017

IEC 61000-6-3:2006, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*
IEC 61000-6-3:2006/AMD1:2010

IEC 61000-6-4:2018, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61082-1:2014, *Preparation of documents used in electrotechnology – Part 1: Rule*s

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

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

IEC 61921:2017, *Power capacitors – Low-voltage power factor correction banks*

IEC 62208:2011, *Empty enclosures for low-voltage switchgear and controlgear assemblies – General requirements*

IEC 81346-1:2009*, Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules*

IEC 81346-2:2019, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 2: Classification of objects and codes for classes*

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4 There is a consolidated edition 3.2 (2010) that includes IEC 61000-4-3 (2006) and Amendment 1 (2007) and Amendment 2 (2010).

5 There is consolidated edition 3.1 (2017) that includes IEC 61000-4-5 (2014) and its Amendment 1 (2017).

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
CISPR 11:2015/AMD1:2016
CISPR 11:2015/AMD2:2019

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*
CISPR 32:2015/AMD1:2019

ISO 178:2010, *Plastics – Determination of flexural properties*
ISO 178:2010/AMD1:2013

ISO 179-1:2010, *Plastics – Determination of Charpy impact properties – Part 1: Non-instrumented impact test*

ISO 179-2:1997, *Plastics – Determination of Charpy impact properties – Part 2: Instrumented impact test*
ISO 179-2:1997/AMD1:2011

ISO 2409:2013, *Paints and varnishes – Cross-cut test*

ISO 4628-3:2016, *Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3: Assessment of degree of rusting*

ISO 4892-2:2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*