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## 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 61439-1:2009. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61439-1:2009.

### Nationellt förord

Europastandarden EN 61439-1:2009

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61439-1, First edition, 2009 - Low-voltage switchgear and controlgear assemblies - Part 1: General rules**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60439-1, utgåva 4, 2004, gäller ej fr o m 2014-11-01.

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English version

**Low-voltage switchgear and controlgear assemblies -  
Part 1: General rules**  
(IEC 61439-1:2009, modified)

Ensembles d'appareillage  
à basse tension -  
Partie 1: Règles générales  
(CEI 61439-1:2009, modifiée)

Niederspannungs-  
Schaltgerätekombinationen -  
Teil 1: Allgemeine Festlegungen  
(IEC 61439-1:2009, modifiziert)

This European Standard was approved by CENELEC on 2009-11-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

**CENELEC**

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

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of the International Standard IEC 61439-1:2009, prepared by SC 17D, Low-voltage switchgear and controlgear assemblies, of IEC TC 17, Switchgear and controlgear, together with the common modifications prepared by the Technical Committee CENELEC TC 17D, Low-voltage switchgear and controlgear assemblies, was submitted to the formal vote and was approved by CENELEC as EN 61439-1 on 2009-11-01.

This European Standard supersedes EN 60439-1:1999 + A1:2004.

This European Standard includes the following significant technical changes with respect to EN 60439-1:1999:

- the dual role of EN 60439-1 as a product standard in its own right, as well as a general rules standard for assemblies covered by a subsidiary product part of the EN 60439 series, has been abandoned;
- consequently, EN 61439-1 is a pure “general rules” standard to be referred to by subsidiary product parts of the EN 61439 series;
- the product standard replacing EN 60439-1 is EN 61439-2;
- the discrimination between type-tested assemblies (TTA) and partially type-tested assemblies (PTTA) is eliminated by the verification approach;
- three different but equivalent types of verification of requirements are introduced:
  - verification by testing,
  - verification by calculation/measurement, or
  - verification by satisfying design rules;
- the requirements regarding temperature rise have been clarified;
- the rated diversity factor (RDF) is covered in more detail;
- requirements from the standard for empty enclosures for assemblies (EN 62208) have been incorporated;
- the whole structure of the standard is aligned with its new function as “general rules” standard.

The following dates were fixed:

- |                                                                                                                                                                                            |       |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|
| <ul style="list-style-type: none"> <li>– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement</li> </ul> | (dop) | 2010-11-01 |
| <ul style="list-style-type: none"> <li>– latest date by which the national standards conflicting with the EN have to be withdrawn</li> </ul>                                               | (dow) | 2014-11-01 |

However, when a dated reference to EN 60439-1 is made in another part of the EN 60439 series of assembly standards not yet transferred into the new EN 61439 series, the superseded EN 60439-1 still applies (see also the Introduction).

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive EMC (2004/108/EC). See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

### **Endorsement notice**

The text of the International Standard IEC 61439-1:2009 was approved by CENELEC as a European Standard with agreed common modifications as given below.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60038 (mod)	1983	IEC standard voltages <sup>1)</sup>	HD 472 S1 + corr. February + A1	1989 2002 1995
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	Environmental testing - 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 60099-1 (mod)	1991	Surge arresters - Part 1: Non-linear resistor type gapped surge arresters for a.c. systems	EN 60099-1	1994
IEC 60204 (mod)	Series	Safety of machinery - Electrical equipment of machines	EN 60204	Series
IEC 60216	Series	Electrical insulating materials - Properties of thermal endurance	EN 60216	Series
IEC 60228	2004	Conductors of insulated cables	EN 60228 + corr. May	2005 2005
IEC 60364 (mod)	Series	Low-voltage electrical installations	HD 384/ HD 60364	Series
IEC 60364-4-41 (mod)	2005	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41 + corr. July	2007 2007
IEC 60364-4-44	2007	Low voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	-	-
IEC 60364-5-52	2001	Electrical installations of buildings - 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	-	-

<sup>1)</sup> The title of HD 472 S1 is: Nominal voltages for low-voltage public electricity supply systems.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60364-5-54 (mod)	2002	Electrical installations of buildings - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements, protective conductors and protective bonding conductors	HD 60364-5-54	2007
IEC 60445 (mod)	2006	Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and conductor terminations	EN 60445	2007
IEC 60446	2007	Basic and safety principles for man-machine interface, marking and identification - Identification of conductors by colours or alphanumerics	EN 60446	2007
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		+ corr. May A1	1993 2000
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	2000	Fire hazard testing - Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure	EN 60695-2-10	2001
IEC 60695-2-11	2000	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	2001
IEC 60695-11-5	2004	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2005
IEC/TR3 60890	1987	A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	CLC/TR 60890 <sup>2)</sup>	2002
IEC 60947-1	2004	Low-voltage switchgear and controlgear - Part 1: General rules	EN 60947-1 + corr. November	2004 <sup>3)</sup> 2004
IEC 61000-3-2	2005	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)	EN 61000-3-2	2006
IEC 61000-4-2	1995	Electromagnetic compatibility (EMC) -	EN 61000-4-2	1995 <sup>4)</sup>
A1	1998	Part 4-2: Testing and measurement	A1	1998
A2	2000	techniques - Electrostatic discharge immunity test	A2	2001

<sup>2)</sup> CLC/TR 60890 includes corrigendum March 1988 + A1:1995 to IEC/TR3 60890.

<sup>3)</sup> EN 60947-1:2004 is superseded by EN 60947-1:2007, which is based on IEC 60947-1:2007.

<sup>4)</sup> EN 61000-4-2:1995 is superseded by EN 61000-4-2:2009, which is based on IEC 61000-4-2:2008.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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
IEC 61000-4-4	2004	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2004
IEC 61000-4-5	2005	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2006
IEC 61000-4-6 + A1 + A2	2003 2004 2006	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6 + corr. August	2007 <sup>5)</sup> 2007
IEC 61000-4-8 A1	1993 2000	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8 A1	1993 2001
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
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	EN 61000-4-13	2002
IEC 61000-6-4	2006	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN 61000-6-4	2007
IEC 61082	Series	Preparation of documents used in electrotechnology	EN 61082	Series
IEC/TR 61117	1992	A method for assessing the short-circuit withstand strength of Partially Type-Tested Assemblies (PTTA)	-	-
IEC 61180	Series	High-voltage test techniques for low-voltage equipment	EN 61180	Series
IEC/TS 61201	2007	Use of conventional touch voltage limits - Application guide	-	-
IEC 61346-1	1996	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 1: Basic rules	EN 61346-1	1996

<sup>5)</sup> EN 61000-4-6:2007 is superseded by EN 61000-4-6:2009, which is based on IEC 61000-4-6:2008.



<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u> <sup>7)</sup>
IEC 61346-2	- <sup>6)</sup>	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 2: Classification of objects and codes for classes	EN 61346-2	2000 <sup>7)</sup>
IEC 62208	2002	Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements	EN 62208	2003
IEC 62262	2002	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	EN 62262	2002
CISPR 11 (mod) + A1 (mod)	2003 2004	Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement	EN 55011	2007
CISPR 22 (mod) A1 A2	2005 2005 2006	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022 A1 -	2006 2007 -
ISO 178	2001	Plastics - Determination of flexural properties	EN ISO 178	2003
ISO 179	Series	Plastics - Determination of Charpy impact properties	EN ISO 179	Series
ISO 2409	1992	Paints and varnishes - Cross-cut test	EN ISO 2409	1994
ISO 4628-3	2003	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	2003
ISO 4892-2	1994	Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources	EN ISO 4892-2	1999 <sup>8)</sup>

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<sup>6)</sup> Undated reference.

<sup>7)</sup> Valid edition at date of issue.

<sup>8)</sup> EN ISO 4892-2:1999 is superseded by EN ISO 4892-2:2006, which is based on ISO 4892-2:2006.

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## INTRODUCTION

The purpose of this standard 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 to other standards. All those requirements for the various ASSEMBLIES standards which can be considered as general have therefore been gathered in this basic standard 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:

- this basic standard referred to as “Part 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 the relevant clause or sub-clause number of this standard followed by “Part 1” e.g. “9.1.3 of Part 1”.

A specific ASSEMBLY standard may not require and hence need not call up a general rule where it is not applicable, or it may 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.

Requirements in this standard that are subject to agreement between the ASSEMBLY manufacturer and the user are summarised 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:

- IEC 61439-1: General rules
- IEC 61439-2: Power switchgear and controlgear ASSEMBLIES (PSC-ASSEMBLIES)
- IEC 61439-3: Distribution boards (to supersede IEC 60439-3)
- IEC 61439-4: ASSEMBLIES for construction sites (to supersede IEC 60439-4)
- IEC 61439-5: ASSEMBLIES for power distribution (to supersede IEC 60439-5)
- IEC 61439-6: Busbar trunking systems (to supersede IEC 60439-2).

This list is not exhaustive; additional Parts may be developed as the need arises.



# 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 definitions and states the service conditions, construction requirements, technical characteristics and verification requirements for low-voltage switchgear and controlgear assemblies.

This standard 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 a.c. or 1 500 V in case of d.c.;
- stationary or movable ASSEMBLIES with or without enclosure;
- ASSEMBLIES intended for use in connection with the generation, transmission, distribution and conversion of electric energy, and for the control of electric energy consuming equipment;
- ASSEMBLIES designed for use under special service conditions, for example in ships, in rail vehicles, for equipment in explosive atmospheres, and for domestic applications (operated by unskilled persons), provided that the relevant specific requirements are complied with;

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

NOTE 3 Supplementary requirements for ASSEMBLIES in explosive atmospheres are covered by the IEC 60079 series and the IEC 61241 series.

- ASSEMBLIES designed for electrical equipment of machines. 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 standard cannot be used alone to specify an ASSEMBLY or used for a purpose of determining conformity.

This standard does not apply to individual devices and self-contained components, such as motor starters, fuse switches, electronic equipment, etc. which will comply with the relevant product standards.

### 2 Normative references

The following referenced documents are indispensable for the application 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 60038:1983, *IEC standard voltages*

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

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

IEC 60068-2-11:1981, *Environmental testing – 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 + 12-hour cycle)*

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

IEC 60099-1:1991, *Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems*

IEC 60204 (all parts), *Safety of machinery – Electrical equipment of machines*

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

IEC 60228:2004, *Conductors of insulated 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 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-52:2001, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

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

IEC 60364-5-54:2002, *Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors*

IEC 60445:2006, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and of conductor terminations*

IEC 60446:2007, *Basic and safety principles for man-machine interface, marking and identification – Identification of conductors by colours or alphanumerics*

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

IEC 60529:2001, *Degrees of protection provided by enclosures (IP Code)*

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

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

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

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

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

IEC 60947-1:2004, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 61000-3-2:2005, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*

IEC 61000-4-2:2001, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test – Basic EMC publication*

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

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

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test – Basic EMC publication*

IEC 61000-4-6:2005, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields – Basic EMC publication*

IEC 61000-4-8:2001, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test – Basic EMC publication*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variation immunity tests – Basic EMC publication*

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 – Basic EMC publication*

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

IEC 61082 (all parts), *Preparation of documents used in electrotechnology*

IEC/TR 61117:1992, *A method for assessing the short-circuit withstand strength of partially type-tested assemblies (PTTA)*

IEC 61180 (all parts), *High-voltage test techniques for low voltage equipment*

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

IEC 61346-1:1996, *Industrial systems, installation and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules*

IEC 61346-2, *Industrial systems, installation and equipment and industrial products – Structuring principles and reference designations – Part 2: Classification of objects and codes for classes*

IEC 62208:2002, *Empty enclosures for low-voltage switchgear and controlgear assemblies – General requirements*

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

ISO 178:2001, *Plastics – Determination of flexural properties*

ISO 179 (all parts), *Plastics – Determination of Charpy impact properties*

ISO 2409:1992, *Paints and varnishes – Cross-cut test*

ISO 4628-3:2003, *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 4892-2:1994, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources*

CISPR 11:2004, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*

CISPR 22:2006, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*