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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Empty enclosures for low-voltage switchgear and controlgear assemblies – General requirements

Enveloppes vides destinées aux ensembles d'appareillage à basse tension – Exigences générales

IEC 62208:2011

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EMPTY ENCLOSURES FOR LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES – GENERAL REQUIREMENTS

FOREWORD

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International Standard IEC 62208 has been prepared by subcommittee 17D: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This second edition cancels and replaces the first edition published in 2002.

This edition constitutes a technical revision and includes the following significant technical changes with respect to the last edition:

– consideration of the restructured series of standards IEC 61439;
– alignment of test procedures with the newest relevant standards.

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

FDIS	Report on voting
17D/442/FDIS	17D/447/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

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

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- withdrawn,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

EMPTY ENCLOSURES FOR LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES – GENERAL REQUIREMENTS

1 Scope

This International Standard applies to empty enclosures, prior to the incorporation of switchgear and controlgear components by the user, as supplied by the enclosure manufacturer.

This standard specifies general definitions, classifications, characteristics and test requirements of enclosures to be used as part of switchgear and controlgear assemblies (e.g. in accordance with the IEC 61439 series), the rated voltage of which does not exceed 1 000 V a.c. or 1 500 V d.c., and suitable for general use for either indoor or outdoor applications.

NOTE 1 Additional requirements may apply for specific applications.

NOTE 2 The United States of America (USA) uses enclosure "Type" designations according to NEMA 250. The NEMA Enclosure Type designations specify additional environmental requirements for conditions such as corrosion, rust, icing, oil, and coolants. For this reason, the IEC Enclosure Classification Designations IP are used with an enclosure Type designation number appropriate for these markets.

This standard does not apply to enclosures, which are covered by other specific products standards (e.g. IEC 60670 series).

Compliance with the safety requirements of the applicable product standard is the responsibility of the assembly manufacturer.

NOTE 3 This standard may serve as a basis for other technical committees.

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

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*[1]

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

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1 There is a consolidated edition 2.1 (2001) that includes IEC 60529 (1989) and its Amendment 1 (1999).

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

IEC 61439-1:2011, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*[2]

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 2409:2007, *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 4892-2:2006, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources*
Amendment 1 (2009)

ISO 11469:2000, *Plastics – Generic identification and marking of plastic products*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
empty enclosure
enclosure intended for support and installation of electrical equipment, whose internal space provides suitable protection against external influences as well as a specified degree of protection against approach to or contact with live parts and against contact with moving parts

NOTE 1 Throughout this standard, the word enclosure is used for empty enclosure.

NOTE 2 The terms boxes, cubicles, desks or cabinets are alternative terms for enclosures.

3.2
protected space
internal space or portion of the internal space of the enclosure as specified by the manufacturer intended for the mounting of switchgear and controlgear for which the specified protection is provided by the enclosure

3.3
cover
external part of the enclosure

3.4
door
hinged or sliding cover

2 To be published.

3.5
mounting plate
separate internal accessory of the enclosure intended for the mounting of electrical components

3.6
cable gland plate
removable accessory of the enclosure, intended for securing and sealing of cables, conductors and conduits at their point of entry

3.7
removable cover
cover which is designed for closing an opening in the external enclosure and which can be removed for carrying out certain operations and maintenance work

NOTE A lid is considered as a removable cover.

3.8
enclosure manufacturer
manufacturer of an enclosure or the vendor who resells under his own responsibility

4 Classification

Enclosures are classified according to:

a) the type of material:
   - insulating;
   - metallic;
   - combination of insulating and metallic;

b) method of fixing:
   - floor standing;
   - wall mounting;
   - flush mounting;
   - pole mounting;

c) the intended location:
   - outdoor;
   - indoor;

d) the degree of protection:
   - IP code, according to IEC 60529;
   - IK code, according to IEC 62262;

e) the rated insulation voltage (for enclosures made of insulating materials).

5 EMC requirements

EMC requirements are not applicable for enclosures to this standard.

NOTE For degrees of protection provided by enclosures against electromagnetic disturbances (EM code), see IEC 61000-5-7.

6 Information to be given regarding the enclosure

6.1 General

The following information shall be given by the manufacturer.

6.2 Marking

The enclosure shall be identifiable, making it possible for the assembly manufacturer to obtain relevant information from the enclosure manufacturer. Such identification shall comprise:

- either the name, trade mark or identification mark of the enclosure manufacturer;
- type designation or identification number of the enclosure.

The marking shall be durable and easily legible and may be inside the enclosure.

Compliance is checked according to the test of 9.3 and by inspection.

Marking for the recycling of plastic parts shall be as stated in ISO 11469.

NOTE Marking of enclosures intended for total insulation (equivalent to class II) assemblies with the symbol IEC 60417-5172 is the responsibility of the assembly manufacturer.

6.3 Documentation

6.3.1 General

The manufacturer's documentation shall include all relevant constructional, mechanical characteristics, the enclosure classification (see Clause 4) and any instruction necessary for the correct handling, assembling, mounting and service conditions of the enclosure as well as reference to this standard:

- dimensions (see 6.3.2);
- mounting arrangements (see 6.3.3);
- permissible loads (see 6.3.4);
- lifting devices, if necessary (see 6.3.5);
- provisions for protection against electric shock (see 6.3.6);
- applicable service conditions (see Clause 7);
- location and size of protected space;
- data of thermal power dissipation capability;
- rated insulation voltage of enclosures constructed of an insulating material;
- degree of protection (IK and IP codes, see 8.7 and 8.8).

The data for the thermal power dissipation capability are a function of the admissible temperature inside the enclosure. They shall be provided for the different installation methods (e.g. flush mounting, surface mounting) of the enclosure and of the design of the enclosure, i.e. with or without ventilation openings and number of horizontal partitions. They shall include at least temperature rise inside the enclosure, at the top, and external surfaces temperature rise, for a given power loss inside the enclosure. This will provide the user with the correct data for the selection of the enclosure according to electrical equipment to be installed. For the purpose of the calculation, it is assumed that the heat generated by the selected equipment is distributed uniformly inside the protected space.

6.3.2 Dimensions

The dimensions shall be given in millimetres.

The external dimensions: height, width and depth are nominal values and shall be indicated in the catalogue of the enclosure manufacturer.

The projection of cable gland plates, removable covers and handles shall not be included in the external nominal dimensions, the dimensions of such shall be included in the manufacturer's documentation.

6.3.3 Mounting arrangements

The means and location of the enclosure mounting shall be defined in the enclosure manufacturer's documentation.

The location of the equipment mounting surfaces and their means of fixing shall be defined in the enclosure manufacturer's documentation.

6.3.4 Permissible loads

The permissible loads that the enclosure and its doors are able to carry shall be defined in the enclosure manufacturer's documentation (see also 8.2).

6.3.5 Lifting and transport support

Where required, the correct location and installation of lifting and transport support and the thread size of lifting devices, if applicable, shall be given in the enclosure manufacturer's documentation or in the instructions on how the enclosure has to be handled (see also 8.3).

6.3.6 Protective circuit

The enclosure manufacturer shall indicate in the technical documentation, if the enclosure ensures electrical continuity throughout by the conductive structural parts of the enclosure or if and how separate protective conductors to the protective circuits of the installation shall be carried out (see also 8.5).

7 Service conditions

7.1 General

Enclosures conforming to this standard are intended for use under the following service conditions.

The enclosure manufacturer shall specify the locations for which the enclosure is intended.

7.2 Normal service conditions

7.2.1 Ambient air temperature

7.2.1.1 Ambient air temperature for indoor locations

The ambient air temperature does not exceed +40 °C and its average over a period of 24 h does not exceed +35 °C.

The lower limit of the ambient air temperature is –5 °C.

7.2.1.2 Ambient air temperature for outdoor locations

The ambient air temperature does not exceed +40 °C and its average over a period of 24 h does not exceed +35 °C.

The lower limit of the ambient air temperature is –25 °C.

7.2.2 Humidity conditions

7.2.2.1 Humidity conditions for indoor locations

The relative humidity of the air does not exceed 50 % at a maximum temperature of +40 °C. Higher relative humidity may be permitted at lower temperatures, for example 90 % at +20 °C. Moderate condensation should be borne in mind which may occasionally occur due to variations in temperature.

7.2.2.2 Humidity conditions for outdoor locations

The relative humidity may be temporarily as high as 100 % at a maximum temperature of +25 °C.

7.3 Special service conditions

Where any of the following special service conditions exist, the applicable particular requirements shall be subject to agreement between user and manufacturer.

Examples of such conditions may include the following:

- abnormal ambient air temperature and humidity;
- presence of corrosive substances;
- presence of particular dusts (coal, cement, etc.);
- abnormal mechanical stresses (seismic, etc.);
- presence of fauna, flora, mould;
- ionizing influences;
- electromagnetic interferences;
- vibrations;
- UV radiation other than solar.

Agreements reached shall not contradict any safety regulations in force.

7.4 Conditions during transport and storage

A special agreement shall be made between the enclosure manufacturer and the user if the conditions during transport, storage and installation, for example temperature and humidity conditions, differ from those defined in 7.2.

8 Design and construction

8.1 General

The enclosure shall be constructed only of materials capable of withstanding the mechanical, electrical and thermal stresses, as specified in Clause 9, as well as the effects of humidity which are likely to be encountered in normal use.

Protection against corrosion shall be ensured by the use of suitable materials or by the application of protective coating to the exposed surface, taking into account the intended conditions of use.

Compliance to this requirement is checked by the test of 9.13.

In addition for enclosures or parts of enclosures made of insulating materials, thermal stability, resistance to heat, fire and weathering shall be verified according to the tests of 9.9 and 9.12.

8.2 Static loads

Compliance of the permissible load that the enclosure and its doors are able to carry is checked according to the test of 9.4.

8.3 Lifting and transport support

Where required, enclosures shall be provided with the appropriate lifting devices or transport means.

Compliance is checked according to the test of 9.5.

8.4 Access to the interior of the enclosure

Adequate access to the protected space shall be provided by means of a door(s) or removable cover(s). Access may be restricted by the use of a key or tool.

Cable gland plates and covers which are removable from the outside shall require the use of a tool.

8.5 Protective circuit

Metallic enclosures shall ensure electrical continuity throughout either by the conductive structural parts of the enclosure or provisions for a separate protective conductor to earth or both.

When a removable part of an enclosure is removed, the protective circuit for the remainder of the enclosure shall not be interrupted.

For lids, doors, removable covers and the like, the usual metal screwed connections and metal hinges may ensure continuity of the protective circuit provided no electrical equipment is attached to them. Where these are intended for mounting electrical equipment additional means shall be provided to ensure the continuity of the protective circuit.

Compliance is checked according to the test of 9.11.

The enclosure manufacturer shall provide means to facilitate the connection of the external protective conductor by the assembly manufacturer.

8.6 Dielectric strength

The enclosures constructed of an insulating material shall fulfil the dielectric test of 9.10.

8.7 Degree of protection (IK code)

The degree of protection against mechanical impact, as declared by the manufacturer, shall be in accordance with IEC 62262.

Compliance is checked according to the test of 9.7.

8.8 Degree of protection (IP code)

The degree of protection against access to hazardous parts, against ingress of solid foreign objects and/or against ingress of water, as declared by the manufacturer, shall be in accordance with IEC 60529.

Compliance is checked according to the test of 9.8.

NOTE An enclosure may be assigned differing IP codes dependent upon the declared IK code.

9 Type tests

9.1 General

Tests according to this standard are type tests.

9.2 General conditions of tests

The enclosures under test shall be mounted and installed as in normal use according to the enclosure manufacturer's instructions.

Unless otherwise specified, the tests shall be carried out at an ambient temperature of between +10 °C and +40 °C.

Table 1 shows the number of samples to be tested and the order of test per sample.

Table 1 – Number of samples to be tested and order of test per sample

Subclause	Test	Sample 1	Sample 2	Sample 3	Representative sample (see 9.12)
9.3	Marking	8			
9.4	Static loads	1			
9.5	Lifting	2			
9.6	Axial loads of metal inserts	3			
9.7	Degree of protection against external mechanical impacts (IK code)	4			
9.8	Degree of protection against access to hazardous parts and against ingress of solid objects and/or water (IP code)	5			
9.9.1	Thermal stability		1		
9.9.2	Resistance to heat		2		
9.9.3	Resistance to abnormal heat and fire		3		
9.10	Dielectric strength	6			
9.11	Continuity of the protective circuit	7		3	
9.12	Resistance to ultra-violet (UV) radiation				[a]
9.13	Resistance to corrosion			2	
9.14	Thermal power dissipation capability			1 [b]	

[a] Tests carried out on representative sample only.

[b] Only applicable if verified by test.