

INTERNATIONAL STANDARD



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

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IEC 62208:2023

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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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This commented version (CMV) of the official standard IEC 62208:2023 edition 3.0 allows the user to identify the changes made to the previous IEC 62208:2011 edition 2.0. Furthermore, comments from IEC SC 121B experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 62208 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. It is an International Standard.

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

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

- a) consideration of the modifications introduced in IEC 61439-1:2020;
- b) alignment of test procedures with the newest relevant standards.

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

Draft	Report on voting
121B/180/FDIS	121B/180/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under 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.

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INTRODUCTION

The purpose of this document is to harmonize as far as practicable all rules and requirements of a general nature applicable to empty enclosures for low-voltage switchgear and controlgear assemblies, in order to obtain uniformity of requirements and verification for empty enclosures and to avoid the need for verification in other standards.

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

1 Scope

This document applies to empty enclosures, as provided by the enclosure manufacturer, prior to the incorporation of switchgear and controlgear components by ~~the user, as supplied by the enclosure~~ the assembly manufacturer. **1**

This document 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 product standard in the IEC 61439 series), the rated voltage of which does not exceed 1 000 V AC or 1 500 V DC, and suitable for general use for either indoor or outdoor applications.

NOTE 1 Additional requirements ~~may~~ could 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.~~ **2**

NOTE 2 Empty enclosures according to this document are suitable for mounting of electrical components.

This document does not apply to enclosures which are covered by other specific products standards (e.g. ~~IEC 60670 series~~ IEC 60670-24).

Compliance with the safety requirements of the applicable product standard for the final product produced using an empty enclosure is the responsibility of the assembly manufacturer. **3**

NOTE 3 This document ~~may~~ could serve as a basis for other technical committees.

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: ~~1984~~2021, ~~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 60364 (all parts), *Low-voltage electrical installations*

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

IEC 60695-2-10:~~2000~~2021, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:~~2000~~2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test methods for end-products (GWEPT)*

IEC 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60695-11-5:2016; *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

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

~~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)*
 IEC 62262:2002/AMD1:2021

ISO 178:~~2004~~2019, *Plastics – Determination of flexural properties*

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

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

ISO 179-2:2020, *Plastics – Determination of Charpy impact properties – Part 2: Instrumented impact test*

ISO 2409:~~2007~~2020, *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 sources lamps*
~~Amendment 1 (2009)~~

ISO 11469:~~2000~~2016, *Plastics – Generic identification and marking of plastic products*

3 Terms and definitions

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

⁴ ~~There is a consolidated edition 2.1 (2001) that includes IEC 60529 (1989) and its Amendment 1 (1999).~~

² ~~To be published.~~

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

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 to entry: Throughout this document, the word enclosure is used for empty enclosure.

Note 2 to entry: For the purposes of this document, 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~~

internal space or portion of an enclosure as specified by the enclosure manufacturer intended to enclose electrical components, and which provides defined protection against external influences and contact with live parts **4**

3.3

cover

external part of the enclosure

3.4

door

hinged or sliding cover

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 1 to entry: 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 **5**~~

3.8

inspection **6**

action comprising careful scrutiny, including visual scrutiny where conditions are obvious, of an item carried out either without dismantling, or with the addition of partial dismantling as required,

supplemented by means such as measurement, in order to arrive at a reliable conclusion as to the condition of an item

[SOURCE: IEC 60050-426:2020, 426-14-02, modified – "including visual scrutiny where conditions are obvious" has been added.]

3.9 rated insulation voltage **7**

U_i

value of the RMS withstand voltage assigned by the enclosure manufacturer to the enclosure or to a part of it, characterizing the specified (long-term) withstand capability of its insulation

[SOURCE: IEC 60050-312:2014, 312-06-02, modified – Symbol U_i has been added, in the definition "rated value" has been replaced by "value", "enclosure" has been added to manufacturer, "equipment" has been replaced by "enclosure" and the Note has been deleted.]

3.10 class I enclosure **8**

enclosure with at least one provision for a basic protection and a connection to a protective conductor as provision for fault protection

Note 1 to entry: See IEC 61140:2016, 7.3 for further details.

[SOURCE: IEC 61439-1:2020, 3.7.24, modified – "assembly" has been replaced by "enclosure" and Note 2 to entry has been deleted.]

3.11 class II enclosure **8**

enclosure which is provided with the following;

- basic insulation as provision for basic protection, and
- supplementary insulation as provision for fault protection,

or in which

- basic protection and fault protection are provided by reinforced insulation

Note 1 to entry: See IEC 61140:2016, 7.4 for further details.

[SOURCE: IEC 61439-1:2020, 3.7.25, modified – "assembly" has been replaced by "enclosure".]

3.12 empty enclosure for indoor installation **9**

empty enclosure that is designed for use in locations where the normal service conditions for indoor use as specified in Clause 7 apply

3.13 empty enclosure for outdoor installation **10**

empty enclosure that is designed for use in locations where the normal service conditions for outdoor use as specified in Clause 7 apply

4 Classification

Enclosures are classified according to:

a) the type of material:

- insulating;

- metallic;
 - combination of insulating and metallic.
- b) method of ~~fixing~~ mounting:
- floor standing;
 - wall mounting;
 - flush mounting;
 - pole mounting.
- c) the intended location:
- outdoor;
 - indoor.
- d) the degree of protection:
- IP code, according to IEC 60529:1989 and IEC 60529:1989/AMD1:1999 and AMD2:2013;
 - IK code, according to IEC 62262:2002 and IEC 62262:2002/AMD1:2021.
- ~~e) the rated insulation voltage (for enclosures made of insulating materials).~~

5 Electromagnetic compatibility (EMC requirements)

EMC requirements are not applicable for enclosures according to this document.

NOTE ~~For degrees of protection provided by enclosures against electromagnetic disturbances (EM code), see IEC 61000-5-7.~~ EMC is not a basic requirement for empty enclosures to this document. However, when enclosure manufacturers want to assign a degree of protection against electromagnetic disturbances (EM code) it is referred to IEC 61000-5-7:2001. **11**

6 Information to be given regarding the enclosure

6.1 General

The following information shall be given by the enclosure 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~~ can 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 used for total insulation (equivalent to class II) assemblies with the symbol IEC 60417-5172  (2003-02) is the responsibility of the assembly manufacturer. **12**~~

6.3 Documentation

6.3.1 General **13**

The enclosure manufacturer's documentation shall include ~~all relevant constructional, mechanical characteristics;~~

- the enclosure classification (see Clause 4);
- any instruction necessary for the correct handling, assembling, mounting and service conditions of the enclosure;
- a reference to this document, and
- the following characteristics:
 - dimensions (see 6.3.2);
 - mounting arrangements (6.3.3);
 - permissible loads (see 6.3.4);
 - lifting and transport devices, if necessary (see 6.3.5);
 - ~~provisions for protection against electric shock (see 6.3.6);~~
 - protective measures (see 6.3.6);
 - ~~data of~~ thermal power dissipation capability (see 6.3.7);
 - applicable service conditions (see Clause 7);
 - location and size of protected space (see 3.2);
 - rated insulation voltage U_i of enclosures constructed of an insulating material and Class II enclosures (see 9.11.3, Table 4); **14**
 - ~~degree of protection (IK and IP codes, see 8.7 and 8.8).~~
 - degree of protection against mechanical impact (IK code, see 8.6);
 - degree of protection against contact with hazardous live parts, ingress of solid foreign bodies and water (IP code, see 8.7);
 - maximum permissible temperatures inside for which enclosures constructed of insulating material is suitable (see 9.10.2). **15**

~~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. **16**~~

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 enclosure manufacturer's documentation.

6.3.3 Mounting arrangements

The means and location of the enclosure mounting arrangements 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.~~ 17

6.3.4 Permissible loads

The permissible loads that the enclosure, mounting plates, switchgear and controlgear supports and ~~its~~ doors are able to carry shall be defined in the enclosure manufacturer's documentation. The load shall be given in Newtons.

If the enclosure includes or can include a mounting plate or switchgear and controlgear supports, the permissible load that the accessory can carry, according to the fixing means provided inside the enclosure, 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~~ measures

The enclosure manufacturer shall indicate in the technical documentation if the enclosure is suitable for a class I or class II assembly.

In the case of a class I enclosure, the enclosure manufacturer shall indicate 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).

6.3.7 Thermal power dissipation capability

The data for the thermal power dissipation capability are a function of the admissible temperature inside the enclosure. They shall be provided for the intended mounting 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, for a given power loss inside the enclosure. This will provide the assembly manufacturer with the correct data for the selection of the enclosure according to electrical equipment to be installed. The data for the thermal power dissipation capability shall be defined in the enclosure manufacturer's documentation (see also 9.15).

7 Service conditions

7.1 General

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

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