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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Mechanical structures for electrical and electronic equipment – Outdoor enclosures –
Part 1: Design guidelines



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

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – OUTDOOR ENCLOSURES –

Part 1: Design guidelines

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61969-1:2020. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 61969-1 has been prepared by subcommittee 48D: Mechanical structures for electrical and electronic equipment, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2020. This edition constitutes a technical revision.

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

a) added references to the environmental conditions defined by ETSI EN 300 019-1 and IEC 60721-2 series;
b) reference made to the correct test specifications;
c) addition of laser hazard warning in case opto-electronic equipment is used.

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

Draft	Report on voting
48D/752/CDV	48D/758/RVC

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.

A list of all parts in the IEC 61969 series, published under the general title *Mechanical structures for electrical and electronic equipment – Outdoor enclosures*, 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 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 document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 61969 is intended as a generic guide for the development of further parts within this series of standards, and it provides design guidelines for outdoor enclosures.

The products covered by the IEC 61969 series are empty enclosures for outdoor locations, to be equipped with application-specific combinations of electrical and electronic equipment, and to be used at non-weatherprotected locations above ground.

The IEC 61969 series consists of:

– a design guidelines general part: IEC 61969-1;
– a coordination dimensions standard: IEC 61969-2;
– an environmental requirements and tests, safety aspects standard: IEC 61969-3.

IEC 61969-2 and IEC 61969-3 should be read in conjunction with this document.

MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – OUTDOOR ENCLOSURES –

Part 1: Design guidelines

1 Scope

This part of IEC 61969 contains design guidelines for outdoor enclosures for electrical and electronic equipment and is applicable over a wide field of mechanical, electromechanical and electronic equipment and its installation where a modular design is used.

The objectives of this document are:

– to provide an overview of specifications for enclosures focused on requirements for outdoor applications for stationary use at non-weatherprotected locations, and

– to achieve product integrity under outdoor conditions and to ease product selection for the sourcing of outdoor enclosures from different vendors.

These enclosures are considered to contain any equipment and provide protection for the outdoor installed facilities against unwanted environmental impacts. The installed equipment can be, but is not limited to, subracks or chassis in accordance with the IEC 60917 series or IEC 60297 series. A typical outdoor enclosure is shown in Figure 1.

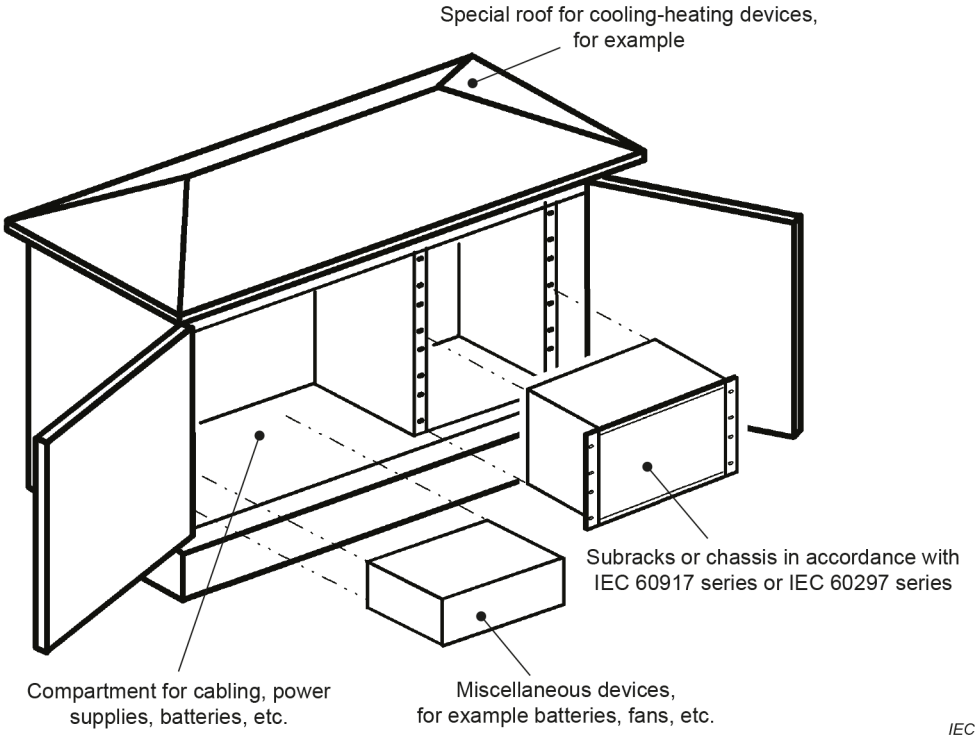


Figure 1 – Typical outdoor enclosure

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 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*~~

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

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

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60721-3-2, *Classification of environmental conditions – Part 3-2: Classification of groups of environmental parameters and their severities – Transportation and handling*

IEC 60721-3-4, *Classification of environmental conditions – Part 3-4: Classification of groups of environmental parameters and their severities – Stationary use at non-weatherprotected locations*

IEC 60754-2, *Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60825-1, *Safety of laser products – Part 1: Equipment ~~specification~~ classification and requirements*

~~IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*~~

~~IEC 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*~~

IEC 61034-1, *Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus*

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

IEC 61439-5, *Low-voltage switchgear and controlgear assemblies – Part 5: Assemblies for power distribution in public networks*

IEC 61587-1, *Mechanical structures for electrical and electronic equipment – Tests for IEC 60917 and IEC 60297 series – Part 1: Environmental requirements, test setups and safety aspects ~~for cabinets, racks, subracks and chassis under indoor condition use and transportation~~*

IEC 61587-2, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 2: Seismic tests for cabinets and racks*

IEC 61587-3, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 3: Electromagnetic shielding performance tests for cabinets and subracks*

IEC 61969-2, *Mechanical structures for electronic equipment – Outdoor enclosures – Part 2: Coordination dimensions*

IEC 61969-3, *Mechanical structures for electrical and electronic equipment – Outdoor enclosures – Part 3: Environmental requirements, tests and safety aspects*

IEC 62194, *Method of evaluating the thermal performance of enclosures*

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

IEC 62305-4, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

IEC 62368-1, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

ISO 1518-1, *Paints and varnishes – Determination of scratch resistance – Part 1: Constant-loading method*

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

ISO 7779, *Acoustics – Measurement of airborne noise emitted by information technology and telecommunications equipment*

ETSI EN 300 019-1-2, *Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-2: Classification of environmental conditions; Transportation*

ETSI EN 300 019-1-4, ~~*Equipment*~~ *Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations*

ETSI EN 300 019-2-2, *Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-2: Specification of environmental tests; Transportation*

ETSI EN 300 019-2-4, ~~*Equipment*~~ *Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-4: Specification of environmental tests – Stationary use at non-weatherprotected locations*

ETSI EN 300 753, ~~*Equipment*~~ *Environmental Engineering (EE); Acoustic noise emitted by telecommunications equipment*

3 Terms and definitions

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

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
outdoor enclosure
enclosure exposed to an outdoor environment, for stationary use at non-weatherprotected locations, for the protection of electrical and electronic equipment installed inside against outdoor environmental conditions

Note 1 to entry: An outdoor enclosure is applicable for a wide field of equipment (e.g. communication system, industrial or signal control, etc.).

Note 2 to entry: The typical installation locations of outdoor enclosures are shown in Figure 2.

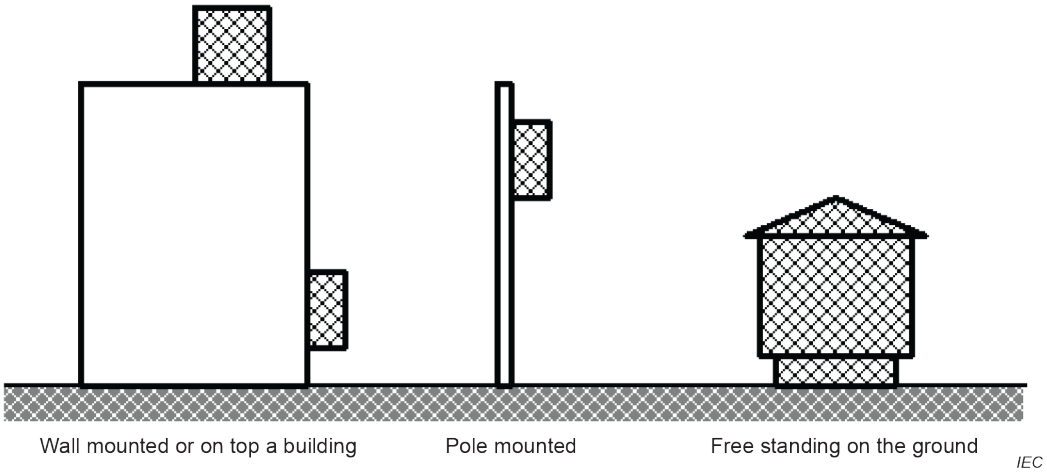


Figure 2 – Locations of outdoor enclosures

3.2
heat transfer rate
k
property with units of W/(m^{2}K), a measure of the rate of heat transfer

Note 1 to entry: Detailed calculations for determination of the enclosure design dependent heat management properties, including the heat transfer rate, are described in IEC 62194.

~~**3.3**~~
~~**static load**~~
~~maximum mechanical load that an enclosure is able to sustain in static condition without mechanical failure, as the gross weight of enclosure including all deemed equipment, multiplied by a safety factor 1,25~~

4 Coordination dimensions

The dimensions of outdoor enclosures shall consist of coordination dimensions as given in IEC 61969-2. The coordination dimensions provide the range and systematic stipulation of possible enclosure internal and external dimensions.

5 Environmental requirements, tests and safety aspects

5.1 Classification of environmental conditions

~~The classification of environmental conditions for outdoor enclosures is based on requirements as defined in IEC 60721-3-2 and IEC 60721-3-4, and the tests are in accordance with the relevant parts of the IEC 60068 series.~~

The environmental requirements for outdoor enclosures are based on the classification of environmental conditions as defined in IEC 60721-3-2 (transportation) and IEC 60721-3-4