

INTERNATIONAL STANDARD



REDLINE VERSION

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MECHANICAL STRUCTURES FOR ELECTRICAL AND
ELECTRONIC EQUIPMENT – OUTDOOR ENCLOSURES –****Part 1: Design guidelines****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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International Standard 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.

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) alignment with the content of ETSI EN 300 019 and IEC 60721 series latest editions, particularly with the actualization of climate conditions;
- b) new requirements added to reflect market requirements on environmental issues;
- c) improvement on terminology and overall editorial improvement.

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

FDIS	Report on voting
48D/720/FDIS	48D/723/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.

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

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.

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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

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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 IEC 61969 (all parts) are empty enclosures for outdoor locations, to be equipped with application-specific ~~solutions~~ combinations of electrical and electronic equipment, and to be used at non-weather protected locations above ground. ~~This standard is followed by~~

IEC 61969 (all parts) consists of:

- a design guidelines general part (IEC 61969-1);
- a coordination dimension standard (IEC 61969-2 ~~Ed 2~~);
- an environmental requirements and tests, safety aspects standard (IEC 61969-3 ~~Ed 2~~).

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 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-weather protected 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 ~~may~~ can be, but is not limited to, sub racks or chassis according to IEC 60917-2-2 (all parts) or IEC 60297-3-101 (all parts). A typical outdoor enclosure is shown in Figure 1.

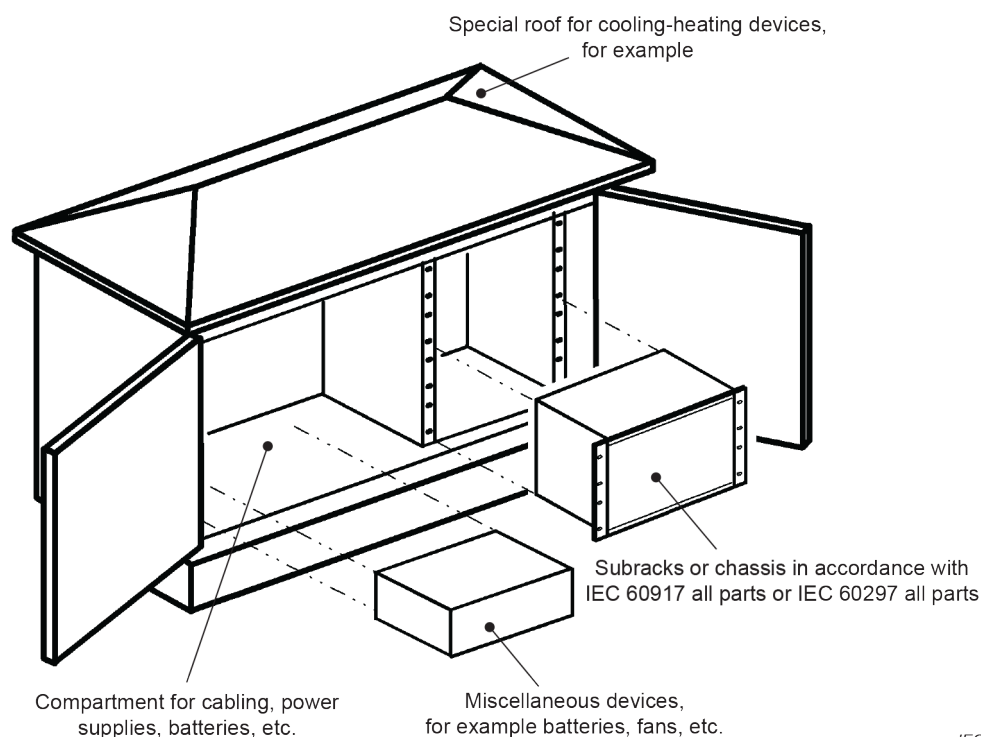


Figure 1 – Typical outdoor enclosure

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 60050-581, International Electrotechnical Vocabulary (IEV) – Part 581: Electromechanical components and mechanical structures for electronic equipment~~

~~IEC 60068 (all parts), Environmental testing~~

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 60950 (all parts), Information technology equipment – Safety~~

~~IEC 60297-3-101, Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3: Subracks and associated plug-in units~~

~~IEC 60417, Graphical symbols for use on equipment~~

~~IEC 60529, Degrees of protection provided by enclosures (IP code)~~

~~IEC 60721 (all parts), Classification of environmental conditions~~

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: Classification of groups of environmental parameters and their severities – Stationary use at non-weatherprotected locations*

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

~~IEC 60917 (all parts), Modular order for the development of mechanical structures for electronic equipment practices~~

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 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 electronic equipment – Tests for IEC 60917 and IEC 60297 series – Part 1: Climatic, mechanical tests* Environmental requirements, test set-up 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 60297 – Part 3: Electromagnetic shielding performance tests for cabinets, racks and subracks~~

~~IEC 61969 (all parts) Mechanical structures for electronic equipment – Outdoor enclosures~~

IEC 62194, *Methods 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*

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

~~ISO 3864, Graphical symbols – Safety colours and safety signs~~

ISO 3864-2, *Graphical symbols – Safety colours and safety signs*

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

ETSI EN 300 019-1-4, *Equipment Engineering (EE) – Environmental conditions and environmental tests for telecommunications equipment – Part 1-4: Classification of environmental conditions – Stationary use at non-weatherprotected locations*
+ A1:1997

ETSI EN 300 194-2-4, *Equipment Engineering (EE) – Environmental conditions and environmental tests for telecommunications equipment – Part 2-4: Specification of environmental tests – Stationary use at non-weatherprotected locations*
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ETSI EN 300 753, *Equipment Engineering (EE) – Acoustic noise emitted by telecommunications equipment*

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Structures mécaniques pour équipement électrique et électronique –
Enveloppes de plein air –
Partie 1: Lignes directrices pour la conception**

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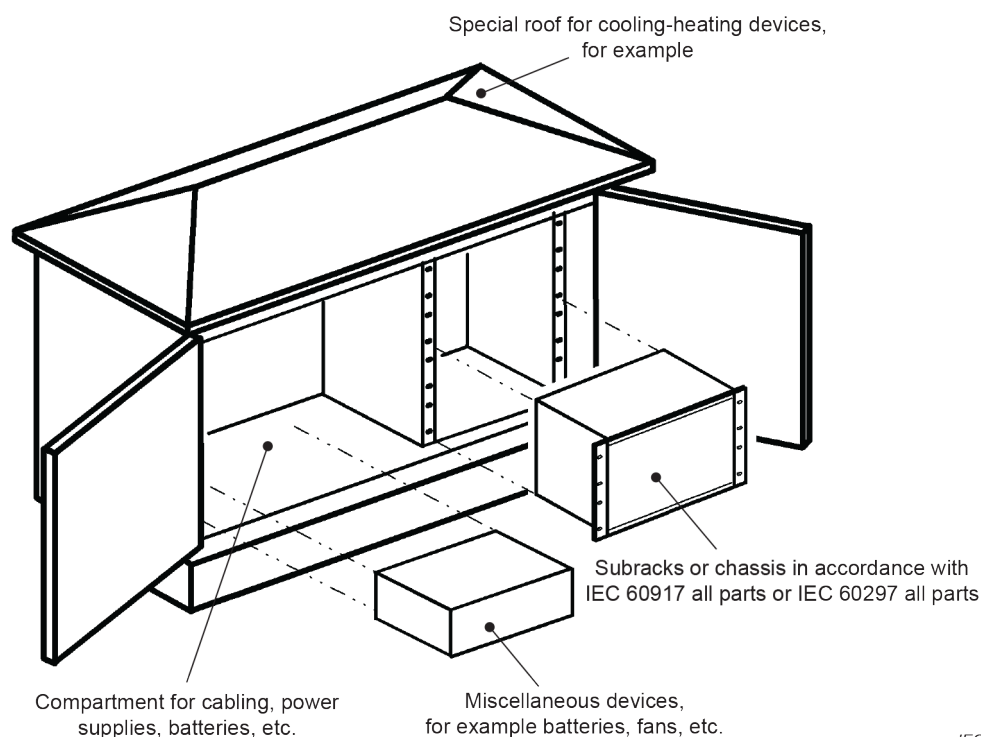


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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

STRUCTURES MÉCANIQUES POUR ÉQUIPEMENT ÉLECTRIQUE ET ÉLECTRONIQUE – ENVELOPPES DE PLEIN AIR –

Partie 1: Lignes directrices pour la conception

AVANT-PROPOS

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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La Norme internationale IEC 61969-1 a été établie par le sous-comité 48D: Structures mécaniques pour les équipements électriques et électroniques, du comité d'études 48 de l'IEC: Connecteurs électriques et structures mécaniques pour les équipements électriques et électroniques.

Cette troisième édition annule et remplace la deuxième édition parue en 2011. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) alignement sur le contenu de l'édition la plus récente des séries ETSI EN 300 019 et IEC 60721, en particulier concernant l'actualisation des conditions climatiques;

- b) ajout de nouvelles exigences pour refléter celles du marché relatives aux questions environnementales;
- c) amélioration de la terminologie et modifications éditoriales générales.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
48D/720/FDIS	48D/723/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de la présente Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 61969, publiées sous le titre général *Structures mécaniques pour les équipements électriques et électroniques – Enveloppes de plein air*, peut être consultée sur le site web de l'IEC.

Les futures normes de cette série porteront dorénavant le nouveau titre général cité ci-dessus. Le titre des normes existant déjà dans cette série sera mis à jour lors de la prochaine édition.

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INTRODUCTION

La présente partie de l'IEC 61969 est destinée à servir de guide générique pour le développement d'autres parties au sein de cette série de normes et fournit des lignes directrices pour la conception d'enveloppes de plein air.

Les produits couverts par l'IEC 61969 (toutes les parties) sont les enveloppes vides pour les emplacements de plein air, destinées à être équipées de combinaisons d'équipements électriques et électroniques spécifiques à l'application, et à être utilisées dans des emplacements non protégés contre les intempéries au-dessus du sol.

La présente partie comprend:

- une partie générale donnant les lignes directrices pour la conception (IEC 61969-1);
- une norme traitant des dimensions de coordination (IEC 61969-2);
- une norme détaillant les exigences et essais d'environnement, et les aspects liés à la sécurité (IEC 61969-3).

Il convient que l'IEC 61969-2 et l'IEC 61969-3 soient lues conjointement avec le présent document.

STRUCTURES MÉCANIQUES POUR ÉQUIPEMENT ÉLECTRIQUE ET ÉLECTRONIQUE – ENVELOPPES DE PLEIN AIR –

Partie 1: Lignes directrices pour la conception

1 Domaine d'application

La présente partie de l'IEC 61969 fournit des lignes directrices pour la conception des enveloppes de plein air et s'applique à une grande variété d'équipements mécaniques, électromécaniques et électroniques et à leur installation en configuration modulaire.

Le présent document est destiné:

- à fournir une vue d'ensemble des spécifications applicables aux enveloppes, portant essentiellement sur les exigences propres aux applications de plein air pour une utilisation à poste fixe à des emplacements non protégés contre les intempéries, et
- à assurer l'intégrité du produit dans des conditions extérieures et à faciliter le choix du produit lors de l'approvisionnement en enveloppes de plein air auprès des différents vendeurs.

Ces enveloppes sont supposées contenir tous types d'équipements et protéger les installations situées en plein air contre les effets indésirables dus à l'environnement. L'équipement installé peut, entre autres, être constitué de bacs ou de châssis conformes à l'IEC 60917 (toutes les parties) ou l'IEC 60297 (toutes les parties). Une enveloppe de plein air typique est représentée à la Figure 1.

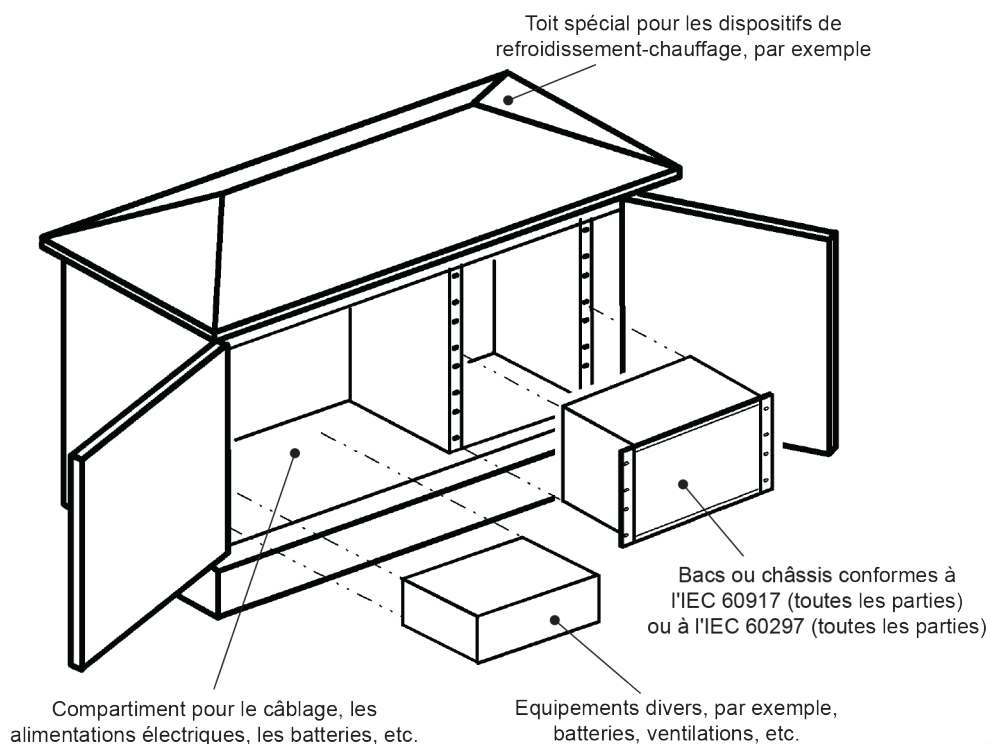


Figure 1 – Enveloppe de plein air typique

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60068-2-75, *Essais d'environnement – Partie 2-75: Essais – Essai Eh: Essais au marteau*

IEC 60417, *Symboles graphiques utilisables sur le matériel* (disponible à l'adresse <http://www.graphical-symbols.info/equipment>)

IEC 60529, *Degrés de protection procurés par les enveloppes (Code IP)*

IEC 60695-11-10, *Essais relatifs aux risques du feu – Partie 11-10: Flammes d'essai – Méthodes d'essai horizontal et vertical à la flamme de 50 W*

IEC 60721-3-2, *Classification des conditions d'environnement – Partie 3: Classification des groupements des agents d'environnement et de leurs sévérités – Section 2: Transport et manutention*

IEC 60721-3-4, *Classification des conditions d'environnement – Partie 3: Classification des groupements des agents d'environnement et de leurs sévérités – Section 4: Utilisation à poste fixe, non protégé contre les intempéries*

IEC 60825-1, *Sécurité des appareils à laser – Partie 1: Classification des matériels et exigences*

IEC 60950-1, *Matériels de traitement de l'information – Sécurité – Partie 1: Exigences générales*

IEC 61010-1, *Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire – Partie 1: Exigences générales*

IEC 61140, *Protection contre les chocs électriques – Aspects communs aux installations et aux matériels*

IEC 61439-5, *Ensembles d'appareillage à basse tension – Partie 5: Ensembles pour réseaux de distribution publique*

IEC 61587-1, *Structures mécaniques pour équipement électronique – Essais pour les séries IEC 60917 et IEC 60297 – Partie 1: Exigences environnementales, montage d'essai et aspects liés à la sécurité des baies, bâtis, bacs à cartes et châssis dans des conditions d'utilisation intérieure ou de transport*

IEC 62194, *Méthodes d'évaluation de la performance thermique des enveloppes*

IEC 62262, *Degrés de protection procurés par les enveloppes de matériels électriques contre les impacts mécaniques externes (code IK)*

IEC 62305-4, *Protection contre la foudre – Partie 4: Réseaux de puissance et de communication dans les structures*

ISO 1518-1, *Peintures et vernis – Détermination de la résistance à la rayure – Partie 1: Méthode à charge constante*

ISO 3864-2, *Symboles graphiques – Couleurs de sécurité et signaux de sécurité*

ISO 7779, *Acoustique – Mesurage du bruit aérien émis par les équipements liés aux technologies de l'information et aux télécommunications*

ETSI EN 300 019-1-4, *Equipment Engineering (EE) – Environmental conditions and environmental test for telecommunications equipment – Part 1-4: Classification of environmental conditions – Stationary use at non-weather protected locations* (disponible en anglais seulement)

ETSI EN 300 019-2-4, *Equipment Engineering (EE) – Environmental conditions and environmental tests for telecommunications equipment – Part 2-4: Specification of environmental tests – Stationary use at non-weather protected locations* (disponible en anglais seulement)

ETSI EN 300 753, *Equipment Engineering (EE) – Acoustic noise emitted by telecommunications equipment* (disponible en anglais seulement)