



# INTERNATIONAL STANDARD



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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 31.240

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – OUTDOOR ENCLOSURES –

## Part 3: Environmental requirements, tests and safety aspects

### 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
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**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

International Standard IEC 61969-3 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/721/FDIS	48D/724/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.

This International Standard is to be used in conjunction with IEC 61969-1:2020.

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.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

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- withdrawn,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

**IMPORTANT – The 'colour inside' logo on the cover page of this publication 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

~~IEC 61969-3 Ed.2.0 provides basic environmental test requirements to be used in the absence of local regulatory or application specific environmental test requirements. This provides manufacturers and users of generic outdoor enclosure solutions with minimum performance compliance criteria; thermal solutions pending on the environment an outdoor enclosure is subjected to.~~

The products covered by IEC 61969 (all parts) are empty enclosures for outdoor locations, to be equipped with application-specific combinations of electrical and electronic equipment, and to be used at non-weather protected locations above ground.

IEC 61969 (all parts) 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).

This document provides basic environmental requirements and tests, as well as safety aspects, to be used for outdoor enclosures in absence of local regulatory documents, or of application-specific environmental test requirements.

This document provides manufacturers and users of generic outdoor enclosures with minimum performance compliance criteria. The thermal management solution depends on the specific environment of the outdoor enclosure.

Since forced air heat dissipation and acoustic noise are closely related, noise limitations are typically defined by local regulatory ~~limitations~~ documents.

~~Typically, it becomes the~~ It is responsibility of the outdoor enclosure vendor to provide a solution for thermal management within the local regulatory noise limitations.

# MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – OUTDOOR ENCLOSURES –

## Part 3: Environmental requirements, tests and safety aspects

### 1 Scope

This part of IEC 61969 specifies a set of basic environmental requirements and tests, as well as safety aspects for outdoor enclosures under conditions of non-weather protected locations above ground.

The purpose of this document is to define a minimum level of environmental performance in order to meet requirements of storage, transport and final installation. The intention is to establish basic environmental performance criteria for outdoor enclosure compliance.

### 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 (all parts), Environmental testing~~

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

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

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-10, *Environmental testing – Part 2-10: Tests – Test J and guidance: Mould growth*

IEC 60068-2-11, *Basic environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-31, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens*

IEC 60068-2-60, *Environmental testing – Part 2-60: Tests – Test Ke: Flowing mixed gas corrosion test*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

~~IEC 60417, Graphical symbols for use on 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: Classification of groups of environmental parameters and their severities – Section 2: Transportation*~~

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

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

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

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

~~IEC 61010, *Safety requirements for electrical equipment for measurement, control, and laboratory use*~~

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

~~IEC 61439-5, *Low voltage switchgear and control gear 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 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, racks and subracks*~~

IEC 61969-1:2020, *Mechanical structures for electrical and electronic equipment – Outdoor enclosures – Part 1: Design guidelines*

~~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*~~

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

~~ISO 2533, *Standard atmosphere*~~

ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

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

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

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

Withdrawn



# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

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

**Structures mécaniques pour équipement électrique et électronique –  
Enveloppes de plein air –  
Partie 3: Exigences et essais d'environnement, et aspects liés à la sécurité**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – OUTDOOR ENCLOSURES –

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### FOREWORD

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Withhold

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

ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

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## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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

#### Partie 3: Exigences et essais d'environnement, et aspects liés à la sécurité

##### 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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- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
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La Norme internationale IEC 61969-3 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 avec le contenu des dernières éditions 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/721/FDIS	48D/724/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.

Cette Norme Internationale doit être utilisée conjointement avec l'IEC 61969-1:2020.

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.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

## INTRODUCTION

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.

L'IEC 61969 (all parts) 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).

Le présent document fournit les exigences et les essais d'environnement de base, ainsi que les aspects liés à la sécurité, à utiliser pour les enveloppes de plein air en l'absence de documents réglementaires locaux ou d'exigences d'essais d'environnement spécifiques à l'application.

Il offre aux fabricants et aux utilisateurs d'enveloppes de plein air génériques des critères minimaux de conformité de performances. La solution de gestion thermique dépend de l'environnement de l'enveloppe de plein air.

Etant donné que la dissipation de chaleur par circulation d'air forcée et le bruit acoustique sont étroitement liés, les limites de bruit sont généralement définies par les documents réglementaires locaux.

Il incombe au fournisseur d'enveloppes de plein air de fournir une solution liée à la gestion thermique respectant les limites de bruit réglementaires locales.

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

## Partie 3: Exigences et essais d'environnement, et aspects liés à la sécurité

### 1 Domaine d'application

La présente partie de l'IEC 61969 spécifie un ensemble d'exigences et d'essais d'environnement de base, ainsi que les aspects liés à la sécurité relatifs aux enveloppes de plein air placées dans les conditions suivantes: emplacement non protégé contre les intempéries, au-dessus du sol.

L'objet du présent document est de définir un niveau minimal de performances environnementales, afin de répondre aux exigences de stockage, de transport et d'installation finale. Il s'agit d'établir des critères de performances environnementales de base en vue de la conformité des enveloppes de plein air.

### 2 Références normatives

Les documents suivants cités dans le texte 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 60068-2-1, *Essais d'environnement – Partie 2-1: Essais – Essais A: Froid*

IEC 60068-2-2, *Essais d'environnement – Partie 2-2: Essais – Essais B: Chaleur sèche*

IEC 60068-2-6, *Essais d'environnement – Partie 2-6: Essais – Essai Fc: Vibrations (sinusoïdales)*

IEC 60068-2-10, *Essais d'environnement – Partie 2-10: Essais – Essai J et guide: Moisissures*

IEC 60068-2-11, *Essais fondamentaux climatiques et de robustesse mécanique – Partie 2-11: Essais – Essai Ka: Brouillard salin*

IEC 60068-2-14, *Essais d'environnement – Partie 2-14: Essais – Essai N: Variation de température*

IEC 60068-2-27, *Essais d'environnement – Partie 2-27: Essais – Essai Ea et guide: Chocs*

IEC 60068-2-30, *Essais d'environnement – Partie 2-30: Essais – Essai Db: Essai cyclique de chaleur humide (cycle de 12 h + 12 h)*

IEC 60068-2-31, *Essais d'environnement – Partie 2-31: Essais – Essai Ec: Choc lié à des manutentions brutales, essai destiné en premier lieu aux matériels*

IEC 60068-2-60, *Essais d'environnement – Partie 2-60: Essais – Essai Ke: Essai de corrosion dans un flux de mélange de gaz*

IEC 60068-2-78, *Essais d'environnement – Partie 2-78: Essais – Essai Cab: Chaleur humide, essai continu*

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

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

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 61587-2, *Structures mécaniques pour équipements électroniques – Essais pour la CEI 60917 et la CEI 60297 – Partie 2: Essais sismiques pour baies et bâtis*

IEC 61969-1:2020, *Structures mécaniques pour équipement électrique et électronique – Enveloppes de plein air – Partie 1: Lignes directrices pour la conception*

IEC 62368-1, *Équipements des technologies de l'audio/vidéo, de l'information et de la communication – Partie 1: Exigences de sécurité*

ISO 3744, *Acoustique – Détermination des niveaux de puissance acoustique et des niveaux d'énergie acoustique émis par les sources de bruit à partir de la pression acoustique – Méthodes d'expertise pour des conditions approchant celles du champ libre sur plan réfléchissant*

ISO 4892-2, *Plastiques – Méthodes d'exposition à des sources lumineuses de laboratoire – Partie 2: Lampes à arc au xénon*

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 (disponible en anglais seulement)*