IEC 60917-1

Edition 2.0 2019-09
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Modular order for the development of mechanical structures for electrical and electronic equipment practices –
Part 1: Generic standard

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.240

ISBN 978-2-8322-7416-3

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

MODULAR ORDER FOR THE DEVELOPMENT OF MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT PRACTICES –

Part 1: Generic standard

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.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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 60917-1 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 second edition cancels and replaces the first edition published in 1998 and its Amendment 1:2000. This edition constitutes a technical revision.

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

a) added information on newly developed detail specification standards of mechanical structures for the electrical and electronic equipment practices;
b) added information on newly developed performance test standards for the verifications of environmental performances and safety aspects and issues of the thermal performance and thermal management for the electrical and electronic equipment practices;
c) introduced the relations between the mechanical structure for electrical and electronic system, the verification of environmental performance and safety aspects and issues of the thermal performance and thermal management for the electrical and electronic equipment practices.

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

FDIS	Report on voting
48D/703/FDIS	48D/708/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.

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.

A list of all parts in the IEC 60917 series, published under the general title *Modular order for the development of mechanical structures for electrical and electronic equipment practices*, can be found on the IEC website.

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.

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

~~The trend towards constantly increasing functional integration and ever smaller volume and space requirements for electronic components and integrated circuits, as well as the advent of new manufacturing methods, automatic manufacturing and testing equipment and the use of Computer Aided Engineering (CAE) systems offer users considerable technical and economic advantages.~~

~~In order to ensure that, when using newly developed components, manufacturing methods and CAE systems, the advantages can be fully exploited during planning, design, manufacture and testing, it is necessary for equipment practices to meet the following requirements (see *IEC Guide 103*):~~

~~– arrangement of products with a minimum loss of area and space;~~

There is a continuous trend towards higher functional integration and smaller electronic components and integrated circuits. At the same time, new manufacturing methods, automatic manufacturing and testing equipment, and Computer Aided Engineering (CAE) systems have created commercial advantages for their users.

For users to take technical and economic advantage of these new components and technologies during planning, design, manufacturing, and testing, it is necessary for equipment practices to meet the following requirements (see IEC Guide 103): arrangement of products with a minimum loss of area and space;

– dimensional interchangeability of products, e.g. regarding overall dimensions, mounting dimensions (fixing holes, cut-out, etc.);
– dimensional compatibility and determination of interface dimensions of products which:
  - are combined with other products, e.g. instruments, racks, panels and cabinets, etc.;
  - are used in buildings that have been built in accordance with a modular system, e.g. column spacing, room height, door height, etc.

An obstacle arises from the use of two systems of dimensioning (inch – metre) that are not compatible with each other. The use of an interface between both dimensioning systems represents one way around this obstacle. The recommendation is:

– to use only one dimensioning system and to use SI units.

The dimensions given in 5.3 of this document have been taken from System I of IEC Guide 103 in consideration with other documents on dimensional coordination.

In accordance with the above considerations, IEC 60917-1 Ed.1 was published in 1998. This generic standard for mechanical structures for electronic equipment practices has been used to meet advanced requirements for various industrial applications of micro-electronics technology.

After publication of this generic standard, development of dimensional sectional and detail specifications consisting of the metric 25 mm modular standards, IEC 60917-2-X, and 19 inch (in) conventional standards, IEC 60297-3-XXX, was undertaken. In parallel, standards to address environmental performance and safety aspects of the mechanical structures were developed as the IEC 61587 series. All these standards are based on indoor system applications. The next step for the mechanical structure was the developments of the IEC 61969 series for outdoor applications.

In the first decade of the 21st century, the IEC 62194 and IEC 62610 series were developed to define the verification of the thermal performance of enclosures and address thermal management issues of the electrical and electronic equipment practices.

This document describes the relationships between the mechanical structure for electrical and electronic systems, the verification of environmental performance and safety aspects, and the issues of the thermal performance and of the thermal management for the electrical and electronic equipment practices.

MODULAR ORDER FOR THE DEVELOPMENT OF MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT PRACTICES –

Part 1: Generic standard

1 Scope ~~and object~~

~~This International Standard relates to equipment practices. The modular order is applicable to the main structural dimensions of electronic equipment mounted in various installations where dimensional interfaces have to be considered.~~

~~It refers to basic design parameters and is not intended to be used for manufacturing tolerances or clearances.~~

~~In addition, information on interfaces to other technical fields, on technology and advanced design aspects is included.~~

~~This standard also covers standard terms for parts and assemblies of mechanical structures for electronic equipment.~~

~~This generic standard gives the definitions of a modular order for mechanical structures of electronic equipment and provides for dimensional compatibility at mechanical interfaces with related engineering applications, e.g. printed boards, components, instrumentation, furniture, rooms, buildings, etc.~~

~~Furthermore, it supports the introduction and application of the modular order rules considering that:~~

~~– compatibility of interface dimensions is aimed at the electronic field on the basis of the SI unit metre;~~

~~– technical and economic advantages can be achieved when using the rules.~~

~~The terms in this standard should be used in all standards for mechanical structures of electronic equipment and in related technical documents.~~

This part of IEC 60917 specifies the relationships between equipment practices and the modular order which are applicable to the main structural dimensions of electronic and electrical equipment mounted in various installations where dimensional interfaces have to be considered for mechanical compatibility.

This document also established terms for parts and assemblies of mechanical structures for electrical and electronic equipment, to clarify the specific relations between equipment practices and modular order.

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~~:1978~~, *International Electrotechnical Vocabulary – Part 581: Electromechanical components for electronic equipment*

IEC 60297 (all parts), *Mechanical structures for electronic equipment*

~~IEC 60297-1:1986, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 1: Panels and racks*~~

~~IEC 60297-2:1982, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 2: Cabinets and pitches of rack structures*~~

~~IEC 60297-3:1984, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3: Subracks and associated plug-in units*~~

IEC 60297-3-100, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-100: Basic dimensions of front panels, subracks, chassis, racks and cabinets*

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

IEC 60297-3-102, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-102: Injector/extractor handle*

IEC 60297-3-103, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-103: Keying and alignment pin*

IEC 60297-3-104, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-104: Connector dependent interface dimensions of subracks and plug-in units*

IEC 60297-3-105, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-105: Dimensions and design aspects for 1U high chassis*

IEC 60297-3-106, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-106: Adaptation dimensions for subracks and chassis applicable with metric cabinets or racks in accordance with IEC 60917-2-1*

IEC 60297-3-107, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-107: Dimensions of subracks and plug-in units, small form factor*

IEC 60297-3-108, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-108: Dimensions of R-type subracks and plug-in units*

IEC 60297-3-109, *Mechanical structures for electrical and electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-109: Dimensions of chassis for embedded computing devices*

IEC 60297-3-110, *Mechanical structures for electrical and electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-110: Residential racks and cabinets for smart houses*

~~IEC 60297-4:1995, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 4: Subracks and associated plug-in units – Additional dimensions*~~

~~IEC 60473:1974, *Dimensions for panel-mounted indicating and recording electrical measuring instruments*~~

~~IEC 60629:1978, *Standard sheets for a modular system (for installation accessories for use in domestic and similar installations)*~~

IEC TR 60668~~:1980~~, *Dimensions of panel areas and cut-outs for panel and rack-mounted industrial-process measurement and control instruments*

IEC 60917-2~~:1992~~, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice*

IEC 60917-2-1~~:1993~~, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Section 1: Detail specification – Dimensions for cabinets and racks*

IEC 60917-2-2~~:1994~~, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Section 2: Detail specification – Dimensions for subracks, chassis, backplanes, front panels and plug-in units*

IEC 60917-2-3, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2-3: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Extended detail specification – Dimensions for subracks, chassis, backplanes, front panels and plug-in units*

IEC 60917-2-4, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2-4: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Adaptation dimensions for subracks or chassis applicable in cabinets or racks in accordance with IEC 60297-3-100 (19 in)*

IEC 60917-2-5, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2-5: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Cabinet interface dimensions for miscellaneous equipment*

IEC 61554, *Panel mounted equipment – Electrical measuring instruments – Dimensions for panel mounting*

IEC 61587 (all parts), *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 series*

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

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

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

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

IEC TS 62454, *Mechanical structures for electronic equipment – Design guide: Interface dimensions and provisions for water cooling of electronic equipment within cabinets of the IEC 60297 and IEC 60917 series*

IEC 62610 (all parts), *Mechanical structures for electrical and electronic equipment – Thermal management for cabinets in accordance with IEC 60297 and IEC 60917 series*

IEC Guide 103:1980, *Guide on dimensional co-ordination*

~~ISO 31:1992, *Quantities and units*~~

~~ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*~~

ISO 1006~~:1983~~, *Building construction – Modular coordination – Basic module*

ISO 1040~~:1983~~, *Building construction – Modular coordination – Multimodules for horizontal coordinating dimensions*

ISO 1791, *Building construction – Modular co-ordination – Vocabulary*

ISO 2848, *Building construction – Modular coordination – Principles and rules*

~~ISO 3827-1:1977, *Shipbuilding – Coordination of dimensions in ships' accommodation – Part 1: Principles of dimensional coordination*~~

ISO 3394, *Packaging – Complete, filled transport packages and unit loads – Dimensions of rigid rectangular packages*

ISO 3676, *Packaging – Complete, filled transport packages and unit loads – Unit load dimensions*

ISO 6514, *Building construction – Modular coordination – Sub-modular increments*

ISO 80000-1:2009, *Quantities and units – Part 1: General*

ISO 80000-3:2006, *Quantities and units – Part 3: Space and time*

IEC 60917-1

Edition 2.0 2019-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Modular order for the development of mechanical structures for electrical and electronic equipment practices – Part 1: Generic standard

Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électriques et électroniques – Partie 1: Norme générique

IEC 60917-1:2019-09(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

MODULAR ORDER FOR THE DEVELOPMENT OF MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT PRACTICES –

Part 1: Generic standard

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.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60917-1 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 second edition cancels and replaces the first edition published in 1998 and its Amendment 1:2000. This edition constitutes a technical revision.

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

a) added information on newly developed detail specification standards of mechanical structures for the electrical and electronic equipment practices;
b) added information on newly developed performance test standards for the verifications of environmental performances and safety aspects and issues of the thermal performance and thermal management for the electrical and electronic equipment practices;

c) introduced the relations between the mechanical structure for electrical and electronic system, the verification of environmental performance and safety aspects and issues of the thermal performance and thermal management for the electrical and electronic equipment practices.

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

FDIS	Report on voting
48D/703/FDIS	48D/708/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.

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.

A list of all parts in the IEC 60917 series, published under the general title *Modular order for the development of mechanical structures for electrical and electronic equipment practices*, can be found on the IEC website.

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.

INTRODUCTION

There is a continuous trend towards higher functional integration and smaller electronic components and integrated circuits. At the same time, new manufacturing methods, automatic manufacturing and testing equipment, and Computer Aided Engineering (CAE) systems have created commercial advantages for their users.

For users to take technical and economic advantage of these new components and technologies during planning, design, manufacturing, and testing, it is necessary for equipment practices to meet the following requirements (see IEC Guide 103): arrangement of products with a minimum loss of area and space;

– dimensional interchangeability of products, e.g. regarding overall dimensions, mounting dimensions (fixing holes, cut-out, etc.);
– dimensional compatibility and determination of interface dimensions of products which:
  - are combined with other products, e.g. instruments, racks, panels and cabinets, etc.;
  - are used in buildings that have been built in accordance with a modular system, e.g. column spacing, room height, door height, etc.

An obstacle arises from the use of two systems of dimensioning (inch – metre) that are not compatible with each other. The use of an interface between both dimensioning systems represents one way around this obstacle. The recommendation is:

– to use only one dimensioning system and to use SI units.

The dimensions given in 5.3 of this document have been taken from System I of IEC Guide 103 in consideration with other documents on dimensional coordination.

In accordance with the above considerations, IEC 60917-1 Ed.1 was published in 1998. This generic standard for mechanical structures for electronic equipment practices has been used to meet advanced requirements for various industrial applications of micro-electronics technology.

After publication of this generic standard, development of dimensional sectional and detail specifications consisting of the metric 25 mm modular standards, IEC 60917-2-X, and 19 inch (in) conventional standards, IEC 60297-3-XXX, was undertaken. In parallel, standards to address environmental performance and safety aspects of the mechanical structures were developed as the IEC 61587 series. All these standards are based on indoor system applications. The next step for the mechanical structure was the developments of the IEC 61969 series for outdoor applications.

In the first decade of the 21st century, the IEC 62194 and IEC 62610 series were developed to define the verification of the thermal performance of enclosures and address thermal management issues of the electrical and electronic equipment practices.

This document describes the relationships between the mechanical structure for electrical and electronic systems, the verification of environmental performance and safety aspects, and the issues of the thermal performance and of the thermal management for the electrical and electronic equipment practices.

MODULAR ORDER FOR THE DEVELOPMENT OF MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT PRACTICES –

Part 1: Generic standard

1 Scope

This part of IEC 60917 specifies the relationships between equipment practices and the modular order which are applicable to the main structural dimensions of electronic and electrical equipment mounted in various installations where dimensional interfaces have to be considered for mechanical compatibility.

This document also established terms for parts and assemblies of mechanical structures for electrical and electronic equipment, to clarify the specific relations between equipment practices and modular order.

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 – Part 581: Electromechanical components for electronic equipment*

IEC 60297 (all parts), *Mechanical structures for electronic equipment*

IEC 60297-3-100, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-100: Basic dimensions of front panels, subracks, chassis, racks and cabinets*

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

IEC 60297-3-102, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-102: Injector/extractor handle*

IEC 60297-3-103, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-103: Keying and alignment pin*

IEC 60297-3-104, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-104: Connector dependent interface dimensions of subracks and plug-in units*

IEC 60297-3-105, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-105: Dimensions and design aspects for 1U high chassis*

IEC 60297-3-106, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-106: Adaptation dimensions for subracks and chassis applicable with metric cabinets or racks in accordance with IEC 60917-2-1*

IEC 60297-3-107, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-107: Dimensions of subracks and plug-in units, small form factor*

IEC 60297-3-108, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-108: Dimensions of R-type subracks and plug-in units*

IEC 60297-3-109, *Mechanical structures for electrical and electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-109: Dimensions of chassis for embedded computing devices*

IEC 60297-3-110, *Mechanical structures for electrical and electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-110: Residential racks and cabinets for smart houses*

IEC TR 60668, *Dimensions of panel areas and cut-outs for panel and rack-mounted industrial-process measurement and control instruments*

IEC 60917-2, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice*

IEC 60917-2-1, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Section 1: Detail specification – Dimensions for cabinets and racks*

IEC 60917-2-2, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Section 2: Detail specification – Dimensions for subracks, chassis, backplanes, front panels and plug-in units*

IEC 60917-2-3, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2-3: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Extended detail specification – Dimensions for subracks, chassis, backplanes, front panels and plug-in units*

IEC 60917-2-4, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2-4: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Adaptation dimensions for subracks or chassis applicable in cabinets or racks in accordance with IEC 60297-3-100 (19 in)*

IEC 60917-2-5, *Modular order for the development of mechanical structures for electronic equipment practices – Part 2-5: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice – Cabinet interface dimensions for miscellaneous equipment*

IEC 61554, *Panel mounted equipment – Electrical measuring instruments – Dimensions for panel mounting*

IEC 61587 (all parts), *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 series*

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

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

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

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

IEC TS 62454, *Mechanical structures for electronic equipment – Design guide: Interface dimensions and provisions for water cooling of electronic equipment within cabinets of the IEC 60297 and IEC 60917 series*

IEC 62610 (all parts), *Mechanical structures for electrical and electronic equipment – Thermal management for cabinets in accordance with IEC 60297 and IEC 60917 series*

IEC Guide 103:1980, *Guide on dimensional co-ordination*

ISO 1006, *Building construction – Modular coordination – Basic module*

ISO 1040, *Building construction – Modular coordination – Multimodules for horizontal coordinating dimensions*

ISO 1791, *Building construction – Modular co-ordination – Vocabulary*

ISO 2848, *Building construction – Modular coordination – Principles and rules*

ISO 3394, *Packaging – Complete, filled transport packages and unit loads – Dimensions of rigid rectangular packages*

ISO 3676, *Packaging – Complete, filled transport packages and unit loads – Unit load dimensions*

ISO 6514, *Building construction – Modular coordination – Sub-modular increments*

ISO 80000-1:2009, *Quantities and units – Part 1: General*

ISO 80000-3:2006, *Quantities and units – Part 3: Space and time*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

_____

ORDRE MODULAIRE POUR LE DÉVELOPPEMENT DES STRUCTURES MÉCANIQUES POUR LES INFRASTRUCTURES ÉLECTRIQUES ET ÉLECTRONIQUES –

Partie 1: Norme générique

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.
2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
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.
6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60917-1 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 deuxième édition annule et remplace la première édition publiée en 1998, ainsi que son Amendement 1:2000. Cette édition constitue une révision technique.

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

a) informations ajoutées sur les nouvelles normes de spécification particulière de structures mécaniques pour les infrastructures électroniques et électriques;

b) informations ajoutées sur les nouvelles normes d'essai de performances destinées à la vérification des performances environnementales, les aspects de la sécurité et le sujet des performances thermiques et de la gestion thermique pour les infrastructures électroniques et électriques;

c) introduction des relations entre la structure mécanique pour les systèmes électriques et électroniques, la vérification des performances environnementales, les aspects de la sécurité et le sujet des performances thermiques et de la gestion thermique pour les infrastructures électroniques et électriques.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
48D/703/FDIS	48D/708/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.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Les prochaines normes de cette série porteront le nouveau titre général nommé ci-dessus. Les titres des normes existantes de la série seront mis à jour lors de leur prochaine édition.

Une liste de toutes les parties de la série IEC 60917, publiées sous le titre général *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électriques et électroniques*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de cette publication 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 à la publication recherchée. A cette date, la publication sera

- reconfirmée,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

INTRODUCTION

Il existe une tendance constante vers une intégration plus fonctionnelle, des composants électroniques et des circuits intégrés plus petits. Dans le même temps, l'arrivée de nouvelles méthodes de fabrication, d'équipements automatiques de fabrication, d'essai, de l'utilisation de systèmes d'ingénierie assistée par ordinateur (IAO), offre des avantages commerciaux aux utilisateurs.

Afin que les utilisateurs exploitent les avantages techniques et économiques des composants et des technologies récemment développés durant la planification, la conception, la fabrication et les essais, il est nécessaire que les infrastructures satisfassent aux exigences suivantes (voir Guide IEC 103): arrangement des produits avec le minimum de perte d'espace et de place;

– interchangeabilité dimensionnelle des produits en tenant compte par exemple des dimensions hors-tout, des dimensions de montage (trous de fixation, découpes, etc.);
– compatibilité dimensionnelle et détermination des interfaces des produits qui:
  - sont combinés à d'autres produits, par exemple instruments de mesure, armoires, panneaux, bâtis, etc.;
  - sont utilisés dans des immeubles construits selon un ordre modulaire, par exemple pour l'espacement des colonnes, la hauteur des pièces, des portes, etc.

L'obstacle principal provient de la nécessité fréquemment rencontrée de se servir de deux systèmes de référence pour les dimensions (pouce-mètre) qui ne sont pas compatibles. L'utilisation d'une interface entre les deux systèmes représente une solution qui, en fait, n'est pas satisfaisante. La solution qui s'impose est:

– l'utilisation d'un seul système de référence pour les dimensions, et du système d'unités SI.

Les dimensions indiquées en 5.3 du présent document ont été extraites du Système I du Guide IEC 103, en considération d'autres documents sur les dimensions de coordination.

Conformément aux considérations ci-dessus, l'IEC 60917-1 Ed.1 est parue en 1998. La présente norme générique pour le développement des structures mécaniques pour les infrastructures électroniques a été utilisée pour satisfaire aux exigences spécifiques des diverses applications industrielles de la technologie microélectronique.

Après la publication de la présente norme générique, le développement de spécifications particulières et intermédiaires de dimensions, constituées des normes modulaires, IEC 60917-2-X, avec une métrique de 25 mm et les normes conventionnelles, IEC 60297-3-XXX, avec une métrique de 19 pouces, a été réalisé. En parallèle, des normes visant à traiter les performances environnementales et les aspects de la sécurité des structures mécaniques ont été développées, comme la série IEC 61587. Toutes ces normes sont basées sur des applications de système intérieures. L'étape suivante pour la structure mécanique fut le développement de la série IEC 61969 pour les applications de plein air.

Au cours de la première décennie du 21^{e} siècle, les séries IEC 62194 et IEC 62610 ont été développées afin de définir la vérification des performances thermiques des enveloppes et de s'occuper du sujet de la gestion thermique pour les infrastructures électroniques et électriques.

Le présent document décrit les relations entre la structure mécanique pour les systèmes électriques et électroniques, la vérification des performances environnementales, les aspects de la sécurité et le sujet des performances thermiques et de la gestion thermique pour les infrastructures électroniques et électriques.

ORDRE MODULAIRE POUR LE DÉVELOPPEMENT DES STRUCTURES MÉCANIQUES POUR LES INFRASTRUCTURES ÉLECTRIQUES ET ÉLECTRONIQUES –

Partie 1: Norme générique

1 Domaine d'application

La présente partie de l'IEC 60917 spécifie les relations entre les infrastructures et l'ordre modulaire qui sont applicables aux dimensions structurelles principales de l'équipement électronique et électrique monté au sein de diverses installations où des interfaces dimensionnelles doivent être considérées pour une compatibilité mécanique.

Le présent document établit également les termes pour les composants et les ensembles des structures mécaniques pour l'équipement électrique et électronique, afin de clarifier les relations spécifiques entre les infrastructures et l'ordre modulaire.

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 60050-581, *Vocabulaire Electrotechnique International – Partie 581: Composants électromécaniques pour équipements électroniques*

IEC 60297 (toutes les parties), *Structures mécaniques pour équipements électroniques*

IEC 60297-3-100, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-100: Dimensions de base des panneaux avant, des bacs, des châssis, des bâtis et des baies*

IEC 60297-3-101, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-101: Bacs et blocs enfichables associés*

IEC 60297-3-102, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-102: Poignée d'injecteur/d'extracteur*

IEC 60297-3-103, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-103: Codage et broche d'alignement*

IEC 60297-3-104, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-104: Dimensions de l'interface des bacs et blocs enfichables en fonction du connecteur*

IEC 60297-3-105, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-105: Dimensions et aspects de conception pour les châssis d'une hauteur de 1U*

IEC 60297-3-106, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-106: Dimensions d'adaptation des bacs et des châssis, applicables aux baies ou aux bâtis dimensionnés selon le système métrique, conformément à l'IEC 60917-2-1*

IEC 60297-3-107, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-107: Dimensions des bacs et blocs enfichables de petit facteur de forme*

IEC 60297-3-108, *Structures mécaniques pour équipements électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces) – Partie 3-108: Dimensions des bacs de type R et des blocs enfichables*

IEC 60297-3-109, *Structures mécaniques pour équipements électriques et électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces)- Partie 3-109: Dimensions des châssis pour dispositifs informatiques intégrés*

IEC 60297-3-110, *Structures mécaniques pour équipements électriques et électroniques – Dimensions des structures mécaniques de la série 482,6 mm (19 pouces)- Partie 3-110: Bâtis et baies domestiques pour maisons intelligentes*

IEC TR 60668, *Dimensions des surfaces et des ajourages à prévoir pour les appareils de mesure et de commande montés en tableaux ou en tiroirs dans les processus industriels*

IEC 60917-2, *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électroniques – Partie 2: Spécification intermédiaire – Dimensions de coordination pour les interfaces des infrastructures au pas de 25 mm*

IEC 60917-2-1, *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électroniques – Partie 2: Spécification intermédiaire – Dimensions de coordination pour les interfaces des infrastructures au pas de 25 mm – Section 1: Spécification particulière – Dimensions pour baies et bâtis*

IEC 60917-2-2, *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électroniques – Partie 2: Spécification intermédiaire – Dimensions de coordination pour les interfaces des infrastructures au pas de 25 mm – Section 2: Spécification particulière – Dimensions pour bacs, châssis, fonds de paniers, faces avant et unités enfichables*

IEC 60917-2-3, *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électroniques – Partie 2-3: Spécification intermédiaire – Dimensions de coordination pour les interfaces des infrastructures au pas de 25 mm – Spécification particulière étendue – Dimensions pour bacs, châssis, fonds de panier, faces avant et unités enfichables*

IEC 60917-2-4, *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électroniques – Partie 2-4: Spécification intermédiaire – Dimensions de coordination pour les interfaces des infrastructures au pas de 25 mm – Dimensions d'adaptation des bacs ou des châssis, applicables dans les baies ou les bâtis, conformément à l'IEC 60297-3-100 (19 pouces)*

IEC 60917-2-5, *Ordre modulaire pour le développement des structures mécaniques pour les infrastructures électroniques – Partie 2-5: Spécification intermédiaire – Dimensions de coordination pour les interfaces des infrastructures au pas de 25 mm – Dimensions pour les interfaces des baies pour équipements divers*

IEC 61554, *Appareils montés en tableaux – Instruments de mesure électriques – Dimensions pour le montage en tableaux*

IEC 61587 (toutes les parties), *Structures mécaniques pour équipement électronique – Essais pour les séries IEC 60917 et IEC 60297*

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

IEC 61969-2, *Structures mécaniques pour équipement électronique – Enveloppes de plein air – Partie 2: Dimensions de coordination*

IEC 61969-3, *Structures mécaniques pour équipement électronique – Enveloppes de plein air – Partie 3: Exigences environnementales, essais et aspects de la sécurité*

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

IEC TS 62454, *Structures mécaniques pour équipement électronique – Guide de conception: Dimensions d'interface et dispositions relatives au refroidissement par l'eau des équipements électroniques dans les armoires des séries IEC 60297 et IEC 60917*

IEC 62610 (toutes les parties), *Structures mécaniques pour équipements électriques et électroniques – Gestion thermique pour les armoires conformes aux séries IEC 60297 et IEC 60917*

Guide IEC 103:1980, *Guide pour la coordination dimensionnelle*

ISO 1006, *Construction immobilière – Coordination modulaire – Module de base*

ISO 1040, *Construction immobilière – Coordination modulaire – Multimodules pour dimensions de coordination horizontale*

ISO 1791, *Construction immobilière – Coordination modulaire – Vocabulaire*

ISO 2848, *Construction immobilière – Coordination modulaire – Principes et règles*

ISO 3394, *Emballages – Emballages d'expédition complets et pleins et charges unitaires – Dimensions des emballages rectangulaires rigides*

ISO 3676, *Emballages – Emballages d'expédition complets et pleins et charges unitaires – Dimensions d'unité de charge*

ISO 6514, *Construction immobilière – Coordination modulaire – Accroissements inframodulaires*

ISO 80000-1:2009, *Grandeurs et unités – Partie 1: Généralités*

ISO 80000-3:2006, *Grandeurs et unités – Partie 3: Espace et temps*