

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

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

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

IEC 60917-1:1998

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
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**MODULAR ORDER FOR THE DEVELOPMENT OF MECHANICAL  
STRUCTURES FOR ELECTRONIC EQUIPMENT PRACTICES –****Part 1: Generic standard**

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This consolidated version of IEC 60917-1 consists of the first edition (1998) [documents 48D/159/FDIS and 48D/177/RVD] and its amendment 1 (2000) [documents 48D/222/FDIS and 48D/232/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 1.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

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## 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;
- dimensional interchangeability of products, e.g. regarding overall dimensions, mounting dimensions (fixing holes, cut-outs, 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 standard have been taken from system I of *IEC Guide 103* in consideration with other documents on dimensional coordination.

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# MODULAR ORDER FOR THE DEVELOPMENT OF MECHANICAL STRUCTURES FOR 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.

### 2 Normative references

The following referenced documents are indispensable for the application 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 (IEV) – Chapter 581: Electro-mechanical components 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 60297-4:1995, *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 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 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 3827-1:1977, *Shipbuilding – Coordination of dimensions in ships' accommodation – Part 1: Principles of dimensional coordination*

### **3 Terms, terminology and definitions**

For the purpose of this International Standard, the terminology used is in accordance with the terminology in IEC 60050(581) and the following additional terms and definitions apply.

#### **3.1**

##### **equipment practice**

mechanical structure involved in housing and mounting of electronic and electromechanical systems. It provides for compatibility between mechanical parts, electrical interconnections and electronic components.

#### **3.2**

##### **modular order**

set of rules which establishes a relationship between co-ordination dimensions and the base pitch, multiple pitches and mounting pitches to be used in equipment practice

#### **3.3**

##### **co-ordination dimension**

reference dimension used to co-ordinate mechanical interfaces. This is not a manufacturing dimension with a tolerance.

NOTE An actual outside dimension of a mechanical structure related to a co-ordination dimension can only decrease.

**3.4****aperture dimension**

special co-ordination dimension for a usable space between features (structural parts)

NOTE An actual inside dimension of an aperture can only increase.

**3.5*****n***

multiplier having integer values of range continuing 1, 2, 3, ...

**3.6****base pitch (*p*)**

smallest distance between adjacent grid lines used in the equipment practices

**3.7****multiple pitch (*Mp*)**

integer multiple of the base pitch

**3.8****mounting pitch (*mp*)**

pitch used to arrange parts or assemblies in a given space.

The nominal value of a mounting pitch is achieved by using a base or multiple pitch multiplied by a factor *F* from table 2.

Actual dimensions used in an equipment practice are created from the nominal mounting pitch and they include manufacturing tolerances.

**3.9****reference plane**

a theoretical plane without thickness or tolerances, used to define spaces

**3.10****grid**

two- or three-dimensional arrangement of pitches used to co-ordinate position, complying with the modular order

**3.11****module**

three-dimensional structure where all sides are multiples of whole numbers of the pitch. It could also be used in a two-dimensional grid.

NOTE One-dimensional module is often called unit (U) in some documentation.

**3.12****suite of racks or cabinets**

row of racks or cabinets placed side by side

**rack**

free-standing or fixed structure for housing electrical or electronic equipment

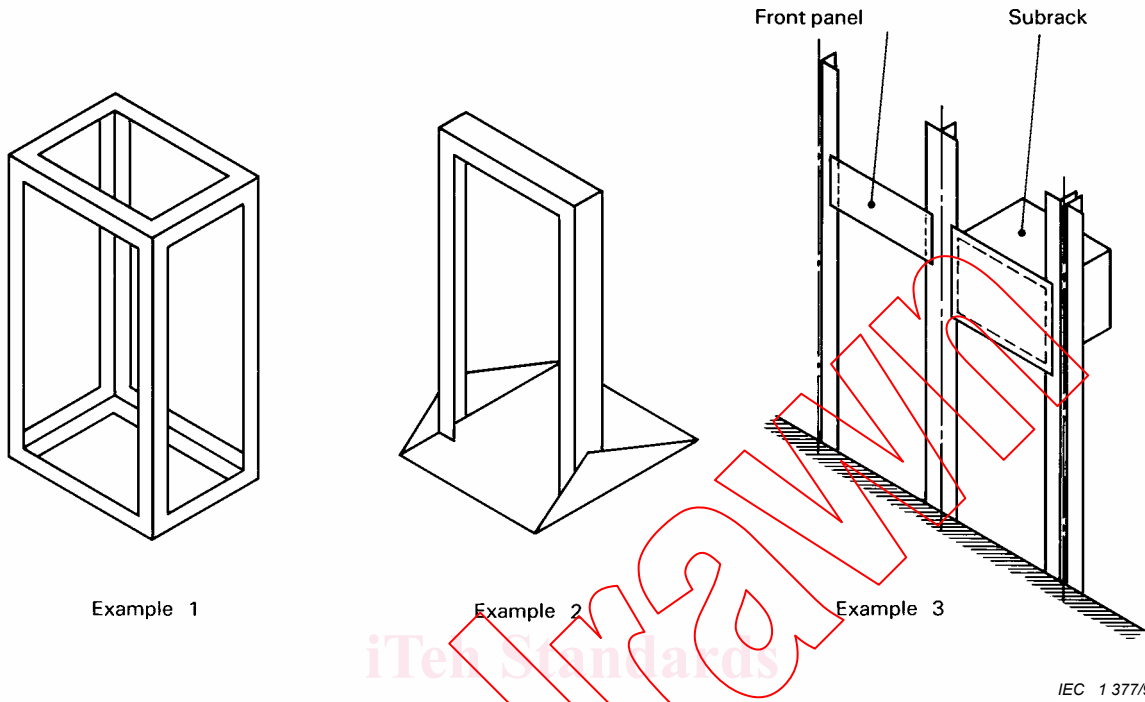


Figure 1

**cabinet**

free-standing and self-supporting enclosure for housing electrical and/or electronic equipment

It is usually fitted with doors and/or side panels which may or may not be removable.

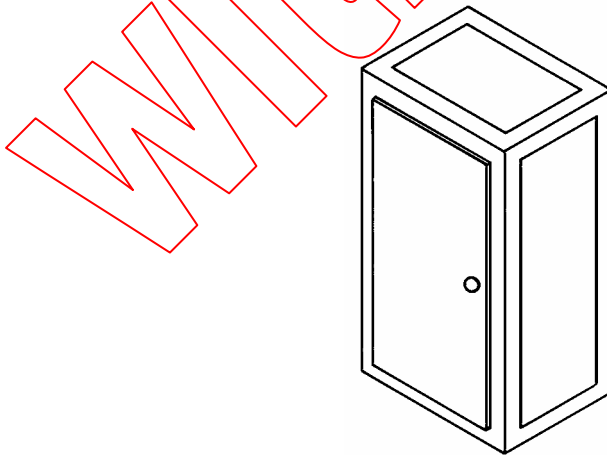
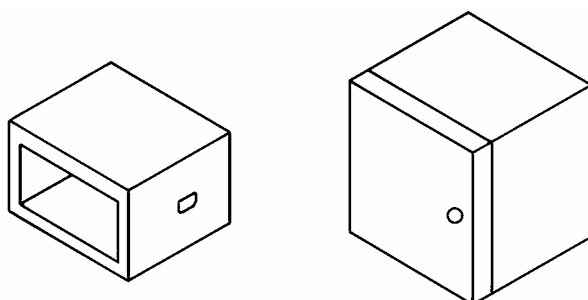


Figure 2

**case**

table, bench or wall mounting enclosure in which electrical and/or electronic equipment can be housed

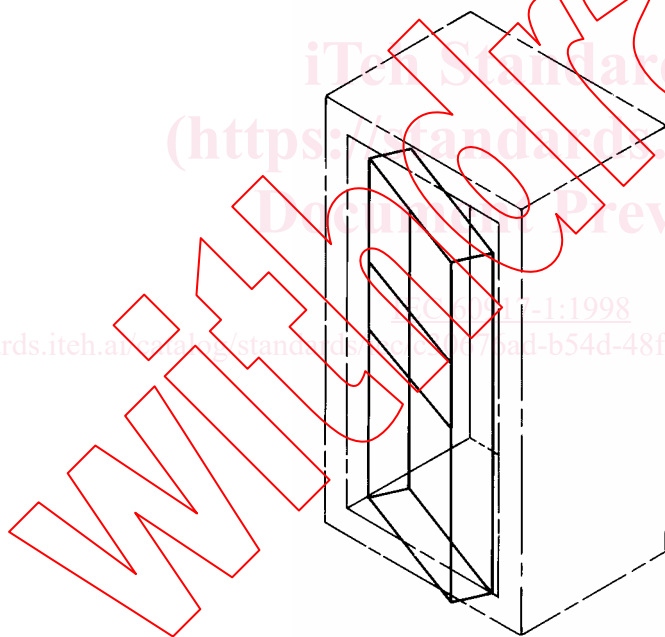


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**Figure 3****swing frame**

hinged frame for holding electrical and/or electronic equipment

The frame swings to permit access to the reverse side.

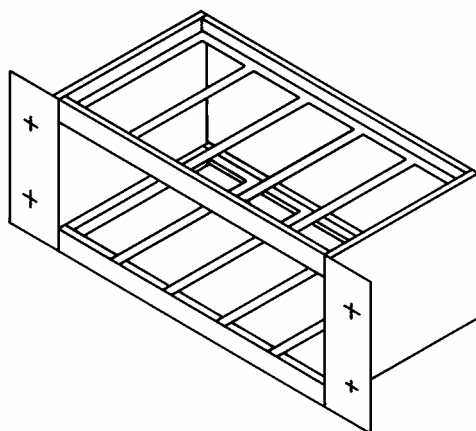


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**Figure 4**

**subrack**

structural unit for housing printed boards with components inserted, and plug-in units

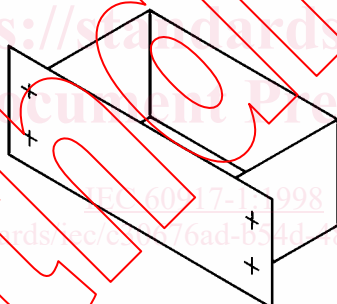


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Figure 5

**chassis**

mechanical structure designed specifically to support associated electrical and electronic components

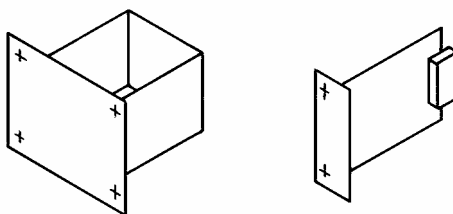


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Figure 6

**plug-in unit**

unit which plugs into a subrack and is supported by guides. These units can be of various types, ranging from a printed board with components inserted to a frame or box-type unit designed with a plug-in connection.



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Figure 7