

# Mechanical structures for electronic equipment — Tests for IEC 60917 and IEC 60297—

**Part 1: Climatic, mechanical tests and  
safety aspects for cabinets, racks,  
subracks and chassis**

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### Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 22, three annex ZA pages, an inside back cover and a back cover.

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**Mechanical structures for electronic equipment  
Tests for IEC 60917 and IEC 60297  
Part 1: Climatic, mechanical tests and safety aspects for cabinets,  
racks, subracks and chassis  
(IEC 61587-1:1999)**

Structures mécaniques pour  
équipement électronique - Essais pour  
la CEI 60917 et la CEI 60297  
Partie 1: Essais climatiques, mécaniques  
et aspects de la sécurité des baies,  
bâtis, bacs à cartes et châssis  
(CEI 61587-1:1999)

Mechanische Bauweisen für  
elektronische Einrichtungen - Prüfungen  
für IEC 60917 und IEC 60297  
Teil 1: Klimatische, mechanische  
Prüfungen und Sicherheitsaspekte für  
Schränke, Gestelle, Baugruppenträger  
und Einschübe  
(IEC 61587-1:1999)

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung  
**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

### Foreword

The text of document 48D/197/FDIS, future edition 1 of IEC 61587-1, prepared by SC 48D, Mechanical structures for electronic equipment, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61587-1 on 1999-08-01.

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Annexes designated "normative" are part of the body of the standard.  
In this standard, annex ZA is normative.  
Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the International Standard IEC 61587-1:1999 was approved by CENELEC as a European Standard without any modification.

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# MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT – TESTS FOR IEC 60917 AND IEC 60297 –

## Part 1: Climatic, mechanical tests and safety aspects for cabinets, racks, subracks and chassis

### 1 Scope and object

This part of IEC 61587 specifies mechanical tests, climatic tests and safety aspects for cabinets, racks, subracks and chassis as defined in the detail standards of IEC 60917 and IEC 60297 for indoor and outdoor applications. It applies in whole or part only to the mechanical structures for electronic equipment practices according to IEC 60297 and IEC 60917 and does not apply to electronic equipment or systems.

The object of this standard is to ensure physical integrity and environmental performance in cabinets, racks, subracks and chassis, taking into account the need for different levels of performance in different applications. It is intended to give the user a level of confidence in the selection of an equipment practice to meet his specific needs.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61587. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61587 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests – Tests A: Cold*

IEC 60068-2-2:1974, *Environmental testing – Part 2: Tests – Tests B: Dry heat*

IEC 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11:1981, *Environmental testing – Part 2: Tests – Test Ka: Salt mist*

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30:1980, *Environmental testing – Part 2: Tests – Test Db and guidance: Damp heat, cyclic (12 +12-hour cycle)*

IEC 60068-2-42:1982, *Environmental testing – Part 2: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-43:1976, *Environmental testing – Part 2: Tests – Test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-49:1983, *Environmental testing – Part 2: Tests – Guidance to test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

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, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 4: Subracks and associated plug-in units – Additional dimensions*

IEC 60512-2:1985, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods – Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*

IEC 60603-2:1995, *Connectors for frequencies below 3 MHz for use with printed boards – Part 2: Detail specification for two-part connectors with assessed quality for printed boards, for basic grid of 2,54 mm (0,1 in) with common mounting features*

IEC 60654-4:1987, *Operating conditions for industrial-process measurement and control equipment – Part 4: Corrosive and erosive influences*

IEC 60707,— *Flammability of solid non-metallic materials when exposed to flame sources – List of test methods* (second edition, to be published)

IEC 60917-1:1998, *Modular order for the development of mechanical structures for electronic equipment practices – Part 1: Generic standard*

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 61010-1:1990, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*

IEC 61076-4-100:1994, *Connectors with assessed quality for use in d.c. and low frequency analogue applications and in digital applications with high speed data rates – Part 4: Printed board connectors – Section 100: Detail specification for two-part connector modules having a grid of 2,5 mm (0,098 in) for printed boards and backplanes*

### 3 General

The specified levels of performance and kinds of tests of this specification can be combined as required. Compliance to individual subclauses and levels is permissible. Individual tests and severities are referred to by letters and numbers (see table 1 for examples which, from each subclause and relevant table, show a selection of representative and well-known values).

The various tests should be performed using the same specimen wherever it is possible. Experience has shown that the sequence of tests listed in this standard (see also IEC 60068-1) enables the test sequence to be performed using the same test specimen except where the individual test results preclude further testing of the same specimen, i.e. the test damages (destroys) the specimen.

**Table 1 – Examples showing references to tests**

| Test                                  | Subrack IEC 60297-3 | Subrack IEC 60917-2-2 | Cabinet             |
|---------------------------------------|---------------------|-----------------------|---------------------|
| Climatic                              | C1 C2 C3            |                       |                     |
| Industrial atmosphere                 | A1 A2 A3            |                       |                     |
| Static load                           | SL1                 | SL2 SL3 SL4           | SL5 SL6 SL7         |
| Dynamic load<br>(shock and vibration) | DL1 DL2 DL3         |                       | DL4 DL5 DL6         |
| Impact                                | –                   | –                     | K1 K2 K3            |
| Protection (IP)                       | –                   | –                     | IP20 IP30 IP42 IP54 |

#### Application example:

Subrack in accordance with IEC 60917-2-2 complies with the following test requirements:

- climatic: C2 (see table 2);
- industrial atmosphere: no test applied;
- static load: SL2 (see table 6);
- shock and vibration: DL1 (see table 11);
- safety aspects: 6.1;
- protection to: IP30 (see table 13).