IEC 60512-11-1

Edition 2.0 2019-05

INTERNATIONAL STANDARD

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Connectors for electrical and electronic equipment – Tests and measurements – Part 11-1: Climatic tests – Test 11a – Climatic sequence

Connecteurs pour équipements électriques et électroniques – Essais et mesures – Partie 11-1: Essais climatiques – Essai 11a – Séquence climatique



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Connecteurs pour équipements électriques et électroniques – Essais et mesures – Partie 11-1: Essais climatiques – Essai 11a – Séquence climatique

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

Part 11-1: Climatic tests – Test 11a – Climatic sequence

FOREWORD

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International Standard IEC 60512-11-1 has been prepared by sub-committee 48B: Electrical connectors, 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 1995. This edition constitutes a technical revision.

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

a) formatting and clause numbering according to the latest IEC template and the latest IEC 60512-1-101 blank detail (tests and measurements) specification;
b) update and expansion of normative references;
c) better specification of various details regarding tests.

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

CDV	Report on voting
48B/2688/CDV	48B/2722/RVC

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.

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 60512 series, published under the general title *Connectors for electrical and electronic equipment – Tests and measurements*, can be found on the IEC website.

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.

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INTRODUCTION

This part of IEC 60512 provides a standard test method for electrical connectors based upon IEC 60068-2-61, which is referenced as a basis.

The value of a sequence of climatic tests, particularly for the testing of components, has been witnessed a long time ago by the inclusion of a “climatic sequence” in IEC 60068-1 (in the 2013 edition, it is covered in Clause 6, with guidance in Annex B).

With the increasing importance of the IEC Quality Assessment System for Electronic Components (IECQ) it had become necessary to define that test sequence more precisely than could be done therein, with the object of providing for satisfactory reproducibility of the test.

IEC 60068-2-61 was then established by IEC TC 104, describing in detail a composite test specifying a “climatic sequence” for specimens of products, primarily components, that is based on Clause 6 of IEC 60068-1:2013, and it includes guidance in informative annexes for specification writers and those performing the test.

Test Z/ABDM of IEC 60068-2-61 is a “composite test” as defined in IEC 60068-1 rather than a “sequence” as defined in the same standard. Because of the well-established use of “sequence” in references to Clause 6 of IEC 60068-1:2013, TC 104 decided that “sequence” should have continued to be used in referring to the operations in this composite test. This document also adheres to this decision.

This part of IEC 60512 tailors the above mentioned general-purpose composite climatic test to the specific needs of electrical connectors.

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CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

Part 11-1: Climatic tests – Test 11a – Climatic sequence

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1 Scope

This part of IEC 60512, when required by the detail (product) specification, is used for testing connectors within the scope of IEC technical committee 48. This test may also be used for similar devices (i.e. when the degradation mechanisms are the same) when specified in a detail (product) specification.

The object of this test is to define a standard test method to assess the ability of connectors to function in a specified manner, in a specified environment which might be encountered during normal use, including storage.

This document provides a standard composite test method for determining the suitability of connectors when subjected to environmental conditions consisting of a sequence of temperature, humidity and, where required, low air pressure environmental stresses.

The order of application of the stresses and the conditions for the change from one step to the next have been chosen to accelerate, amplify and allow potential interactions of degradation mechanisms of the same type as those observed under natural climatic conditions.

In this composite test, connector specimens are exposed to environmental tests in a standard order and categorized according to their climatic category as assigned by the detail (product) specification, except that the third group of digits is used as an indication of the number of cycles in step 5 of the damp heat cyclic test according to IEC 60512-11-12.

Where any modification is necessary, the relevant connector detail (product) specification provides the necessary information for each step in the method.

This test is frequently specified to follow other tests involving mechanical stress, for example tests for robustness of terminations, solderability, shock and vibration, as a means of determining whether the sealing of the specimen has been damaged.

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 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-13:1983, *Basic environmental testing procedures – Part 2-13: Tests – Test M: Low air pressure*

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

IEC 60068-2-61:1991, *Environmental testing – Part 2: Tests – Test Z/ABDM: Climatic sequence*

IEC 60512-1, *Connectors for electrical and electronic equipment – Tests and measurements – Part 1: Generic specification*

IEC 60512-1-101, *Connectors for electronic equipment – Tests and measurements – Part 1-101: Blank detail (product) specification*

IEC 60512-1-1, *Connectors for electronic equipment – Tests and measurements – Part 1-1: General examination – Test 1a: Visual examination*

IEC 60512-2-1, *Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60512-2-2, *Connectors for electronic equipment – Tests and measurements – Part 2-2: Electrical continuity and contact resistance tests – Test 2b: Contact resistance – Specified test current method*

IEC 60512-3-1, *Connectors for electronic equipment – Tests and measurements – Part 3-1: Insulation tests – Test 3a: Insulation resistance*

IEC 60512-4-1, *Connectors for electronic equipment – Tests and measurements – Part 4-1: Voltage stress tests – Test 4a: Voltage proof*

IEC 60512-11-9, *Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11i: Dry heat*

IEC 60512-11-10, *Connectors for electronic equipment – Tests and measurements – Part 11-10: Climatic tests – Test 11j: Cold*

IEC 60512-11-11, *Connectors for electronic equipment – Tests and measurements – Part 11-11: Climatic tests – Test 11k: Low air pressure*

IEC 60512-11-12, *Connectors for electronic equipment – Tests and measurements – Part 11-12: Climatic tests – Test 11m: Damp heat, cyclic*

IEC 60512-13-1, *Connectors for electronic equipment – Tests and measurements – Part 13-1: Mechanical operation tests – Test 13a: Engaging and separating forces*

IEC 60512-13-2, *Connectors for electronic equipment – Tests and measurements – Part 13-2: Mechanical operation tests – Test 13b: Insertion and withdrawal forces*

IEC 60512-17-1, *Connectors for electronic equipment – Tests and measurements – Part 17-1: Cable clamping tests – Test 17a: Cable clamp robustness*

IEC 60512-17-2, *Connectors for electronic equipment – Tests and measurements – Part 17-2: Cable clamping tests – Test 17b: Cable clamp resistance to cable rotation*

IEC 60512-17-3, *Connectors for electronic equipment – Tests and measurements – Part 17-3: Cable clamping tests – Test 17c: Cable clamp resistance to cable pull (tensile)*

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IEC 60512-17-4, *Connectors for electronic equipment – Tests and measurements – Part 17-4: Cable clamping tests - Test 17d: Cable clamp resistance to cable torsion*

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 60512-1 and IEC 60512-1-101 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Preparations

4.1 Test equipment

The test equipment required to carry out this test is that required for carrying out each of the individual tests, including variants and methods, with the required severities prescribed for the sequence.

When using a single test chamber in which the conditions specified for the different steps in the sequence are successively established, special care is necessary (see Clause B.3 in IEC 60068-2-61:1991).

The use of a test chamber with automatic transfer of the specimen between compartments can, in general, be regarded as equivalent to the use of separate test chambers. Also, with test chambers with automatic transfer, it should be ensured that the recovery conditions at the end of each step are satisfied, particularly for step 2 (see 8.2.2 of IEC 60068-2-61:1991).

4.2 Preparation of the specimen

Unless otherwise specified, the number of specimens specified by the detail (product) specification shall be tested in the as-received condition.

4.3 Mounting of specimen

The specimen, equipped with any accessories normally supplied with the connector, shall be mounted and wired in accordance with the detail (product) specification, as appropriate.

When required by the detail (product) specification, the specimen shall be operated the number of times specified prior to test.

For each of the individual tests carried out in this composite test, the detail (product) specification shall specify the condition of the specimen, for example operated or non-operated, mated or unmated.

5 Test method

5.1 Preconditioning

The duration of the preconditioning shall be at least 1 h under standard atmospheric conditions for testing as defined in IEC 60068-1.

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