

# INTERNATIONAL STANDARD



Connectors for electrical and electronic equipment – Tests and measurements –  
Part 1: **General** Generic specification

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## CONTENTS

FOREWORD.....	3
1 Scope <del>and object</del> .....	5
2 Normative references.....	6
3 Terms and definitions .....	6
4 Numbering of tests and measurements specification.....	10
5 Preparation for test (description and instructions).....	12
5.1 Test apparatus .....	12
5.1.1 Test equipment, fixture and gauge.....	12
5.1.2 Calibration .....	12
5.2 Preparation of specimens .....	12
5.3 Wiring .....	12
5.4 Mounting of specimen .....	13
6 <del>Standard conditions for testing</del> Test (description and instructions) .....	13
6.1 Tests and measurements .....	13
6.2 Test sequences.....	14
6.3 Combined tests .....	14
6.4 <del>Repetition of</del> Dimensional measurements .....	14
6.5 Alternative test methods.....	14
<del>Classification of non-conforming components .....</del>	
<del>    Major non-conformance .....</del>	
<del>    Minor non-conformance .....</del>	
7 Requirements .....	14
8 Documentation .....	15
Bibliography .....	16

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –  
TESTS AND MEASUREMENTS –****Part 1: ~~General~~ Generic specification**

## FOREWORD

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International Standard IEC 60512-1 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

This fifth edition cancels and replaces the fourth edition, published in 2001. It constitutes a technical revision.

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

- in Clause 3, only terms relating to the testing are defined, and IEC 61076-1 is referred to for terms of connectors.
- Clause 4 (Numbering of tests and measurement specification) is added.
- Subclause 5.1.2 (Calibration) is added.
- in Clause 6 (Test), test procedure follows IEC 60068-1.

This standard shall be used in conjunction with IEC 60512-1-101 and relevant part(s) of series IEC 60512. Part 60512-1-100 provides the list of the existing test and measuring methods published within series IEC 60512.

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

FDIS	Report on voting
48B/2667/FDIS	48B/2684/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.

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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# CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

## Part 1: ~~General~~ Generic specification

### ~~1~~ **General**

#### **1** ~~Scope and object~~

~~This part of IEC 60512 is intended to be used as a basic specification. It contains basic test methods and procedures which, when required by the detail specification, are used for testing connectors within the scope of technical committee 48. They may also be used for similar devices when specified in a detail specification.~~

~~The object of this standard is to establish test methods and measurement procedures for use in specifications for connectors.~~

~~This standard is to be used in conjunction with the generic, sectional and detail specification which will select and prescribe the tests to be used, the required degree of severity for each of them and the permissible performance limits. The detail specification will also specify the deviations in procedure, which may be inevitable when applying a test to the type of component under consideration, and it will further specify any special procedures which may be required.~~

~~In the event of conflict between this basic specification and any individual component specification, the requirements of the component specification will apply.~~

~~NOTE 1 – RF connectors will not be dealt with by this technical committee as they will be covered by technical committee 46, together with r.f. cables.~~

~~NOTE 2 – Sockets for components such as crystals or electronic tubes will be considered in co-operation with the relevant technical committee.~~

~~NOTE 3 – Safety requirements for switches will not be developed by this technical committee as they are covered by subcommittee 23J.~~

This part of IEC 60512 is intended to be used as a basis for tests and measurements specifications for electrical connectors. It provides guidance and reference for tests and measurements within the IEC 60512 series.

It includes the description and the practice of the various phases of tests and measurements (preparation, tests and measurements, requirements, documentation), in addition to basic terms and definitions applicable to any part of the IEC 60512 series.

This document is used in conjunction with IEC 60512-1-101 to establish uniform detail tests and measurements specifications.

Detail tests and measurements specifications are applicable to electrical connectors and their components (e.g. connector inserts, connector housings, locking mechanisms, contacts and terminations) within the scope of technical committee 48. They may also be used for similar devices when specified in a detail product specification.

Detail tests and measurements specifications are used in conjunction with detail product specifications which prescribe the tests to be used, the required degree of severity for each of them and the permissible performance limits. The detail product specification also specifies

the deviations in procedures, which may be required when applying a test to the type of connector or its component under consideration, and it further specifies any special procedures which may be required.

NOTE RF and fibre optical connectors are not dealt with by subcommittee 48B, however, hybrid connectors which additionally employ RF and/or fibre optic contacts, are handled by SC 48B in cooperation with TC 46 and/or TC 86.

## 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:~~1988~~ 2013, *Environmental testing – Part 1: General and guidance*

IEC 60352-1:1997, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60352-2:2006, *Solderless connections – Part 2: Crimped connections – General requirements, test methods and practical guidance*  
IEC 60352-2:2006/AMD1:2013

IEC 60352-3:1993, *Solderless connections – Part 3: Solderless accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-4:1994, *Solderless connections – Part 4: Solderless non-accessible insulation displacement connections – General requirements, test methods and practical guidance*  
IEC 60352-4:1994/AMD1:2000

IEC 60352-5:2012, *Solderless connections – Part 5: Press-in connections – General requirements, test methods and practical guidance*

IEC 60352-6:1997, *Solderless connections – Part 6: Insulation piercing connections – General requirements, test methods and practical guidance*

IEC 60352-7:2002, *Solderless connections – Part 7: Spring clamp connections – General requirements, test methods and practical guidance*

IEC 60352-8:2011, *Solderless connections – Part 8: Compression mount connections – General requirements, test methods and practical guidance*

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

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

IEC 61076-1, *Connectors for electronic equipment – Product requirements – Part 1: Generic specification*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61076-1 as well as the following 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>

#### **1.3.1**

##### **family**

~~group of electromechanical components which predominantly display a particular physical characteristic and/or fulfil a specific function~~

~~Example — Family: connectors~~

#### **1.3.2**

##### **sub-family**

~~group of electromechanical components derived by further subdivision of a family and having similar application features~~

~~Example — Sub-family: rectangular connectors~~

#### **1.3.3**

##### **type and style**

~~the definitions for "type" and "style", referring to a particular component, are given in the detail specification~~

~~Examples — Type: rectangular multipole connectors with blade contacts.~~

~~Style: rectangular multipole connectors with blade contacts, housing and contact configuration.~~

#### **1.3.4**

##### **basic specification**

~~specification which is applicable to all electromechanical components or a large group thereof~~

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#### **1.3.5**

##### **generic specification**

~~specification which is applicable to a family of electromechanical components~~

#### **1.3.6**

##### **sectional specification**

~~specification which is applicable to a sub-family of electromechanical components~~

#### **1.3.7**

##### **blank detail specification**

~~while not being in themselves a specification level, blank detail specifications may be provided for the guidance of those concerned with the preparation of detail specifications~~

#### **1.3.8**

##### **detail specification**

~~specification which is derived from a sectional specification. It covers a particular component or a group of related components. It describes that component or group of components, including all necessary values and characteristics, and gives the inspection requirements and appropriate references to the generic or sectional specification~~

#### **1.3.9**

##### **inspection (test) lot**

~~specified quantity of identical electromechanical components presented together for testing in accordance with the relevant test schedule~~

**1.3.10****test specimen**

~~single electromechanical component to be tested in accordance with the procedure laid down in this standard~~

**1.3.11****test**

~~complete series of operations covered by any one heading and normally consisting of the following:~~

- ~~—pre-conditioning (where required);~~
- ~~—initial measurement (where required);~~
- ~~—conditioning;~~
- ~~—recovery (where required);~~
- ~~—final examination and measurements~~

**3.1****ambient temperature**

temperature of the air in free air conditions at such a distance from the specimen that the effect of the dissipation is negligible

Note 1 to entry: In practice, the ambient temperature is taken as the average of temperatures measured at a number of points in a horizontal plane situated between 0 mm and 50 mm below the specimen at half the distance between the specimen and the wall of the chamber, or at 1 m distance from the specimen, whichever is less. Suitable precautions should be taken to avoid heat radiation affecting these measurements.

[SOURCE: IEC 60068-1: 2013, 3.9.2]

**3.2****combined test**

test during which a specimen is subjected simultaneously to two or more environmental influences

Note 1 to entry: Tests with simultaneous influence of a) temperature and humidity; b) temperature, humidity and specific (including chemically active) medium; and c) temperature and solar radiation are not related to combined tests.

Note 2 to entry: Combined tests, as a rule, are used to provide simultaneous climatic and mechanical influences.

Note 3 to entry: Measurements are usually taken at the start and at the end of the test.

[SOURCE: IEC 60068-1:2013, 3.14]

**3.3****conditioning**

exposure of a specimen to environmental conditions, ~~including electrical load~~, in order to determine the effect of such conditions on the specimen

[SOURCE: IEC 60068-1:2013, 3.3, modified: title changed to "conditioning" from original "testing".]

**3.4****free air conditions**

conditions within an infinite space where the movement of the air is affected only by the heat-dissipating specimen itself

### 3.5

#### lower limiting temperature

##### LLT

minimum temperature of a connector as defined by the climatic category assigned by the manufacturer in which a connector is intended to operate

Note 1 to entry: The LLT of a connector is covered by the climatic category as defined in IEC 60068-1, together with the ULT and the duration of the damp heat test.

[SOURCE: IEC 61984:2008, 3.16]

### 3.6

#### maximum continuous operating temperature

##### $COT_{max}$

maximum ambient temperature at which the connector can be fully (on all poles) and continuously (without interruption) loaded at its rated current, without mechanical and/or electrical deterioration, i.e. without exceeding its upper limiting temperature (ULT)

### 3.7

#### minimum continuous operating temperature

##### $COT_{min}$

minimum ambient temperature at which the connector can be still continuously operated within its ratings, without mechanical and/or electrical deterioration

### 3.8

#### pre-conditioning

treatment of a specimen ~~for the purpose~~ with the object of removing, or partly counteracting, the effects of its previous history

Note 1 to entry: Where pre-conditioning is called for, it is the first process in the test procedure.

Note 2 to entry: Pre-conditioning may be affected by subjecting the specimen to climatic, electrical, or any other conditions required by the relevant specification in order that the properties of the specimen may be stabilized before measurement and test.

[SOURCE: IEC 60068-1:2013, 3.2]

### 3.9

#### rated current

current value assigned by the manufacturer, which the connector can carry continuously (without interruption) and simultaneously through all its contacts wired with the largest specified conductor, preferably at an ambient temperature of 40 °C, without the upper limiting temperature being exceeded

Note 1 to entry: If other ambient temperature values are used for the definition of the rated current, the manufacturer should state in the technical documentation, the ambient temperature on which the rating is based, with reference, if appropriate, to the derating curve defined in IEC 60512, test 5b.

[SOURCE: IEC 61984:2008, 3.27]

### 3.10

#### rated temperature

temperature value assigned by the manufacturer, which is based on maximum continuous operating temperature ( $COT_{max}$ ) and minimum continuous operating temperature ( $COT_{min}$ )

### 3.11

#### rated voltage

value of voltage assigned by the manufacturer to the connector and to which operation and performance characteristics are referred

Note 1 to entry: A connector may have more than one rated voltage value.

Note 2 to entry: Rated voltage is based on clearance and creepage distance, refer IEC 60664-1.

[SOURCE: IEC 61984:2008, 3.27]

**3.12  
recovery**

treatment of a specimen, after conditioning, in order ~~to stabilize its~~ that the properties of the specimen may be stabilized before measurement

[SOURCE: IEC 60068-1:2013, 3.4]

**3.13  
sequence of tests**

sequence in which the specimen is exposed successively to two or more test environments

Note 1 to entry: The durations of intervals between the exposures to different test environments are such that they normally have no significant effect on the specimen.

Note 2 to entry: Pre-conditioning and recovery periods are usually performed between the different exposures.

Note 3 to entry: Measurements are usually taken before and after each exposure, the final measurement of one test being the initial measurement of the next.

[SOURCE: IEC 60068-1: 2013,3.16]

**3.14  
specimen**

connector(s), mated set of connectors, component(s) and/or connector assembly(ies) to be tested

Note 1 to entry: The detail product specification describes what is intended as a specimen.

**3.15  
thermal stability**

state when the temperatures of all parts of the specimen are within 3 K, or as otherwise prescribed by the relevant specification, of their final temperature

Note 1 to entry: Stability is defined as when three consecutive values of temperature raise, taken at 5 min intervals, do not differ by more than 3 K of each other.

[SOURCE: IEC 60068-1:2013, 3.11]

**3.16  
upper limiting temperature  
ULT**

maximum temperature in the connector as outcome (sum) of the ambient temperature and the temperature rise due to current flow, at which the connector is intended to be still operable

Note 1 to entry: At ambient temperature equal to ULT, the available temperature rise due to current flow is zero, thus the current carrying capacity of the connector is zero.

Note 2 to entry: The ULT of a connector is covered by the climatic category as defined in IEC 60068-1, together with the LLT and the duration of the damp heat test.

[SOURCE: IEC 61984:2008, 3.15]

**4 Numbering of tests and measurements specification**

The former test method standards were published in booklets, with several related tests in one document, while the present test method standards are published as individual documents.