

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Environmental testing –
Part 2-82: Tests – Test XW₁: Whisker test methods for electronic and electric
components**

**Essais d'environnement –
Partie 2-82: Essais – Essai XW₁: Méthodes de vérification des trichites pour les
composants électroniques et électriques**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

**Part 2-82: Tests – Test XW₁: Whisker test methods
for electronic and electric components**

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International Standard IEC 60068-2-82 has been prepared by IEC technical committee 91: Electronics assembly technology.

This bilingual version, published in 2008-04, corresponds to the English version.

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

FDIS	Report on voting
91/651/FDIS	91/685/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.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60068 series, under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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- withdrawn,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.

The contents of the corrigendum of December 2009 have been included in this copy.

Withdrawn

ENVIRONMENTAL TESTING –

Part 2-82: Tests – Test XW₁: Whisker test methods for electronic and electric components

1 Scope

This part of IEC 60068 specifies whisker tests for electric or electronic components representing the finished stage, with tin or tin-alloy finish. However, the standard does not specify tests for whiskers that may grow as a result of external mechanical stress.

This test method is employed by a relevant specification (international component or application specification) with transfer of the test severities to be applied and with defined acceptance criteria.

Where tests described in this standard are considered for other components, e.g. mechanical parts as used in electrical or electronic equipment, it should be ensured that the material system and whisker growth mechanisms are comparable.

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

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-20:1979, *Environmental testing – Part 2-20: Tests – Test T: Soldering*

IEC 60068-2-58:2004, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 61192-3:2002, *Workmanship requirements for soldered electronic assemblies – Part 3: Through-hole mount assemblies*

IEC 61760-1:2006, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60068-1, as well as the following, apply.

3.1

whisker

metallic protrusion which spontaneously grows during storage or use

NOTE 1 Whiskers typically do not require any electrical field for their growth and may not be mixed with products of electrochemical migration. Typical signs of whiskers include:

- striations in growth direction;
- typically no branching;
- typically constant diameters.

Exceptions are known, but rare and may require detailed investigation.

For the purposes of this standard, whiskers are considered if

- they have an aspect ratio (length/width) greater than 2,
- they have a length of 10 µm or more.

NOTE 2 For the purposes of this standard, whiskers have the following characteristics:

- they can be kinked, bent, or twisted; they usually have a uniform cross-sectional shape;
- they may have rings around the circumference of the column.

NOTE 3 Whiskers are not to be confused with dendrites which are fern-like growths on the surface of a material which can be formed as a result of electro-migration of an ionic species or produced during solidification.

3.2

material system

termination consists of the following elements:

- a) base material;
- b) underlayer, if any, located under the final plating;
- c) final tin or tin alloy plating.

NOTE There may be additional layers between the base material and the underlayer. The penultimate layer is the used bulk material or the deposited layer underneath the final tin or tin alloy plating of the component.

4 Test equipment

The test equipment shall comprise the following elements:

4.1 Desiccator

The desiccator shall be capable of providing the conditions of temperature and humidity specified in 6.1.

4.2 Humidity chamber

The humidity chamber shall meet all the requirements of IEC 60068-2-78 and be capable of providing the conditions specified in 6.2.

4.3 Thermal cycling chamber

The thermal cycling chamber shall meet all the requirements of IEC 60068-2-14, test Na and be capable of providing the conditions specified in 6.3.

4.4 Optical microscope

An optical stereo-microscope with a magnification of at least 50 times and an appropriate illumination, capable of detecting whiskers with a length of 10 µm.

If used for measurement, the microscope shall be equipped with a scale or electronic detection system capable for length measurement with an accuracy of at least ±5 µm.

4.5 Scanning electron microscope

A scanning electron microscope (SEM) capable of investigating the surface of the specimen, preferably equipped with a handling system capable to tilt and rotate the specimen.