BS EN IEC 60068-2-82:2019

BSI Standards Publication

Environmental testing

Part 2-82: Tests - Test Xw1: Whisker test methods for components and parts used in electronic assemblies

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National foreword

This British Standard is the UK implementation of EN IEC 60068-2-82:2019. It is identical to IEC 60068-2-82:2019. It supersedes BS EN 60068-2-82:2007, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/501, Electronic Assembly Technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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EUROPEAN STANDARD

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Supersedes EN 60068-2-82:2007

English Version

Environmental testing - Part 2-82: Tests - Test Xw1: Whisker test methods for components and parts used in electronic assemblies (IEC 60068-2-82:2019)

Essais d'environnement - Partie 2-82: Essais - Essai Xw1: Méthodes de vérification des trichites pour les composants et les pièces utilisés dans les ensembles électroniques (IEC 60068-2-82:2019)

Umgebungseinflüsse - Teil 2-82: Prüfungen - Prüfung XW1: Whisker-Prüfverfahren für Bauelemente und Teile in elektronischen Baugruppen (IEC 60068-2-82:2019)

This European Standard was approved by CENELEC on 2019-06-18. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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European foreword

The text of document 91/1562/FDIS, future edition 2 of IEC 60068-2-82, prepared by IEC/TC 91 "Electronics assembly technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60068-2-82:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-03-18
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-06-18

This document supersedes EN 60068-2-82:2007.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60068-2-82:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61191-1	NOTE	Harmonized as EN IEC 61191-1
IEC 61249-2-7	NOTE	Harmonized as EN 61249-2-7
IEC 61249-2-22	NOTE	Harmonized as EN 61249-2-22
IEC 61249-2-35	NOTE	Harmonized as EN 61249-2-35

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.
NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.
NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60068-1	2013	Environmental testing - Part 1: General and guidance	EN 60068-1	2014
IEC 60068-2-14	2009	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	2009
IEC 60068-2-20	-	Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads	EN 60068-2-20	-
IEC 60068-2-58	-	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)	EN 60068-2-58	-
IEC 60068-2-67	-	Environmental testing - Part 2-67: Tests - Test Cy: Damp heat, steady state, accelerated test primarily intended for components	EN 60068-2-67	-
IEC 60068-2-78	-	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	-
IEC 60512-16-21	2012	Connectors for electronic equipment - Tests and measurements - Part 16-21: Mechanical tests on contacts and terminations - Test 16u: Whisker test via the application of external mechanical stresses	EN 60512-16-21	2012
IEC 61192-3	2002	Workmanship requirements for soldered electronic assemblies - Part 3: Through-hole mount assemblies	EN 61192-3	2003

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2-82: Tests – Test Xw_1: Whisker test methods for components and parts used in electronic assemblies

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60068-2-82 has been prepared by IEC technical committee 91: Electronics assembly technology.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

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

– extension of the scope of the test standard from electronic to electromechanic components and press-fit pins, which are used for assembly and interconnect technology;
– significant reduction of the testing effort by a knowledge-based selection of test conditions i.e. tests not relevant for a given materials system can be omitted (see Annex D);
– harmonization with JESD 201A by omission of severities M, N for temperature cycling tests;

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– highly reduced test duration (1 000 h instead of 4 000 h) for damp-heat test by introducing test condition at elevated humidity of 85 % R.H. and a temperature of 85 °C providing increased severity.

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

FDIS	Report on voting
91/1562/FDIS	91/1573/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.

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

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

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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ENVIRONMENTAL TESTING –

Part 2-82: Tests – Test Xw_1: Whisker test methods for components and parts used in electronic assemblies

1 Scope

This part of IEC 60068 specifies tests for the whiskering propensity of surface finishes of electric or electronic components and mechanical parts such as punched/stamped parts (for example, jumpers, electrostatic discharge protection shields, mechanical fixations, press-fit pins and other mechanical parts used in electronic assemblies) representing the finished stage, with tin or tin-alloy finish. Changes of the physical dimensions of mould compounds, plastics and the like during the required test flow are not considered or assessed. The test methods have been developed by using a knowledge-based approach.

This document can also be used at sub-suppliers, like plating shops, stamping shops or other service providers to ensure a consistent surface quality within the supply chain.

These test methods are employed with defined acceptance criteria by a relevant component or application specification.

The tests described in this document are applicable for initial qualification, for periodic monitoring in accordance with Clause 7, and for changes of technology or manufacturing processes of existing surfaces in accordance with Clause 9.

The mating area of connectors is not covered by this test method. IEC 60512-16-21 applies for the mating areas of connectors.

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 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-58, *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 60068-2-67, *Environmental testing – Part 2-67: Tests – Test Cy: Damp heat, steady state, accelerated test primarily intended for components*

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

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IEC 61192-3:2002, *Workmanship requirements for soldered electronic assemblies – Part 3: Through-hole mount assemblies*[1]

IEC 60512-16-21:2012, *Connectors for electronic equipment – Tests and measurements – Part 16-21: Mechanical tests on contacts and terminations – Test 16u: Whisker test via the application of external mechanical stresses*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

3.1
whisker
metallic protrusion that grows spontaneously during storage or use

Note 1 to entry: Whiskers typically do not require any electrical field for their growth and are not to be confused with products of electrochemical migration. Signs of whiskers include:

– striations in growth direction;

– typically no branching;

– typically constant diameters.

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

For the purposes of this document, 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 to entry: For the purposes of this document, whiskers have the following characteristics (see also Annex B):

– 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 to entry: 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(chemical)-migration of an ionic species or produced during solidification.

Note 4 to entry: Whiskers are not to be confused with slivers as generated by mechanical metal processing. Whiskers are not to be confused with tubular SnO structures, which may develop under damp-heat test conditions. These structures are hollow and are typically lacking striations occurring on Sn whiskers.

3.2
termination
solderable element of a component consisting of the following elements

– base material;

– underlayer (or underlayer system, if more than one underlayer is present), if any, located under the final plating;

– final tin or tin alloy finish

[1] Withdrawn publication.

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