

INTERNATIONAL STANDARD

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

IEC 60068-2-20:2008

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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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Email: csc@iec.ch

Tel.: +41 22 919 02 11

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Witholdrawn

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads

FOREWORD

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International Standard IEC 60068-2-20 has been prepared by IEC technical committee 91: Electronics assembly technology.

This fifth edition cancels and replaces the fourth edition, published in 1979 and its Amendment 2 (1987). Amendment 2 includes Amendment 1. This fifth edition constitutes a technical revision and includes test conditions and requirements for use of lead-free solder.

The major technical changes with regard to the fourth edition are the following:

- the solder globule test is deleted;
- test conditions and requirements for lead-free solders are added.

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

FDIS	Report on voting
91/764/FDIS	91/774/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.

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

A list of all the 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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

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WITHDRAWN

ENVIRONMENTAL TESTING –

Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads

1 Scope and object

This part of IEC 60068 outlines Test T, applicable to devices with leads. Soldering tests for surface mounting devices (SMD) are described in IEC 60068-2-58.

This standard provides procedures for determining the solderability and resistance to soldering heat of devices in applications using solder alloys, which are eutectic or near eutectic tin lead (Pb), or lead-free alloys.

The procedures in this standard include the solder bath method and soldering iron method.

The objective of this standard is to ensure that component lead or termination solderability meets the applicable solder joint requirements of IEC 61191-3 and IEC 61191-4. In addition, test methods are provided to ensure that the component body can resist against the heat load to which it is exposed during soldering.

NOTE Information about wetting time and wetting force can be obtained by test methods using a wetting balance. See IEC 60068-2-54 (solder bath method) and IEC 60068-2-69 (solder bath and solder globule method for SMDs).

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, *Environmental testing – Part 1: General and guidance*

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

IEC 60068-2-66, *Environmental testing – Part 2-66: Test methods: Test Cx: Damp heat, steady state (unsaturated pressurized vapour)*

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

IEC 60194, *Printed board design, manufacture and assembly – Terms and definitions*

IEC 61191-3, *Printed board assemblies – Part 3: Sectional specification – Requirements for through-hole mount soldered assemblies*

IEC 61191-4, *Printed board assemblies – Part 4: Sectional specification – Requirements for terminal soldered assemblies*

3 Terms and definitions

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

3.1

colophony

natural resin obtained as the residue after removal of turpentine from the oleo-resin of the pine tree, consisting mainly of abietic acid and related resin acids, the remainder being resin acid esters

NOTE "Rosin" is a synonym for colophony, and is deprecated because of the common confusion with the generic term "resin".

3.2

contact angle

in general the angle enclosed between two planes, tangent to a liquid surface and a solid/liquid interface at their intersection (see Figure 1). In particular the contact angle of liquid solder in contact with a solid metal surface

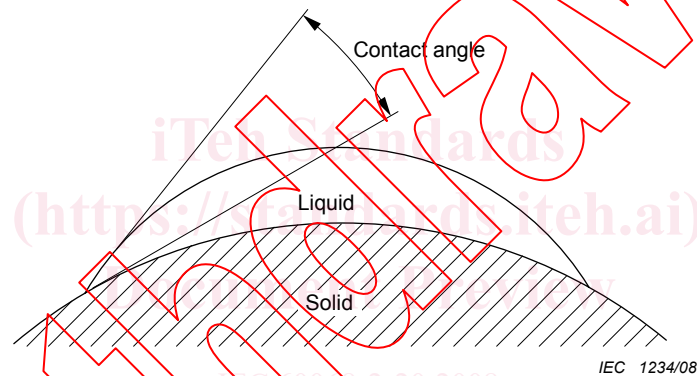


Figure 1 – Diagram of contact angle

3.3

wetting

formation of an adherent coating of solder on a surface. A small contact angle is indicative of wetting

3.4

non-wetting

inability to form an adherent coating of solder on a surface. In this case the contact angle is greater than 90°

3.5

de-wetting

retraction of molten solder on a solid area that it has initially wetted

NOTE In some cases an extremely thin film of solder may remain. As the solder retracts the contact angle increases.

3.6

solderability

ability of the termination or lead of device to be wetted by solder at the temperature of the termination or lead which is assumed to be the lowest temperature in the soldering process within solderable temperature of solder alloy

3.7

soldering time

time required for a defined surface area to be wetted under specific conditions

3.8

resistance to soldering heat

ability of device to withstand the highest temperature of the termination or lead in soldering process, within applicable temperature range of solder alloy

3.9

lead-free solder

alloy that does not contain more than 0,1 % lead (Pb) by weight as its constituent and is used for joining components to substrates or for coating surfaces

[75.1904 of IEC 60194]

4 Test Ta: Solderability of wire and tag terminations

4.1 Object and general description of the test

4.1.1 Test methods

Test Ta provides two different test methods to determine the solderability of the areas on wire and tag terminations that are required to be wetted by solder.

- Method 1: Solder bath
- Method 2: Soldering iron

The test method to be used shall be indicated in the relevant specification. The solder bath method is the one which simulates most closely the soldering procedures of flow soldering and similar soldering processes.

The soldering iron method may be used in cases where Method 1 is impracticable.

If required by the relevant specification, the test conditioning may be preceded by accelerated ageing. The following are recommended conditions:

Ageing 1a: 1 h steam ageing

Ageing 1b: 4 h steam ageing

Ageing 2: 10 days damp heat, steady state condition (40 ± 2) °C; (93 ± 3) % RH
(Test Cab)

Ageing 3a: 4 h at 155 °C dry heat (Test Bb)

Ageing 3b: 16 h at 155 °C dry heat (Test Bb).

Ageing 4: 4 h unsaturated pressurized vapour (Test Cx)

NOTE The test specimens may be introduced into the chamber at any temperature from laboratory temperature to the specified temperature.

4.1.2 Specimen preparation

The surface to be tested shall be in the "as received" condition and shall not be subsequently touched by the fingers or otherwise contaminated.

The specimen shall not be cleaned prior to the application of a solderability test. If required by the relevant specification, the specimen may be degreased by immersion in a neutral organic solvent at room temperature.