



IEC 60068-2-20

Edition 5.0 2008-07

# INTERNATIONAL STANDARD

---

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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

R

---

ICS 19.040

ISBN 2-8318-9919-2

## CONTENTS

FOREWORD.....	4
1 Scope and object.....	6
2 Normative references .....	6
3 Terms and definitions .....	7
4 Test Ta: Solderability of wire and tag terminations.....	8
4.1 Object and general description of the test.....	8
4.1.1 Test methods.....	8
4.1.2 Specimen preparation.....	8
4.1.3 Initial measurements .....	9
4.1.4 Accelerated ageing .....	9
4.2 Method 1: Solder bath .....	9
4.2.1 Description of the solder bath .....	9
4.2.2 Flux .....	10
4.2.3 Procedure.....	10
4.2.4 Test conditions .....	10
4.2.5 Final measurements and requirements .....	11
4.3 Method 2: Soldering iron at 350 °C.....	11
4.3.1 Description of soldering irons .....	11
4.3.2 Solder and flux .....	12
4.3.3 Procedure.....	12
4.3.4 Final measurements and requirements .....	13
4.4 Information to be given in the relevant specification .....	13
5 Test Tb: Resistance to soldering heat.....	13
5.1 Object and general description of the test.....	13
5.1.1 Test methods.....	13
5.1.2 Initial measurements .....	14
5.2 Method 1: Solder bath .....	14
5.2.1 Description of the solder bath .....	14
5.2.2 Flux .....	14
5.2.3 Procedure.....	14
5.2.4 Test conditions .....	14
5.2.5 De-wetting .....	15
5.3 Method 2: Soldering iron .....	15
5.3.1 Description of soldering iron .....	15
5.3.2 Solder and flux .....	15
5.3.3 Procedure.....	15
5.4 Recovery.....	16
5.5 Final measurements and requirements .....	16
5.6 De-wetting (if applicable).....	16
5.7 Information to be given in the relevant specification .....	17
Annex A (informative) Example of apparatus for accelerated steam ageing process .....	18
Annex B (normative) Specification for flux constituents .....	19
Bibliography.....	20
Figure 1 – Diagram of contact angle .....	7

Figure 2 – Position of soldering iron.....	12
Figure A.1 – Example of apparatus .....	18
Table 1 – Solderability, Solder bath method: Test severities (duration and temperature).....	11
Table 2 – Resistance to soldering heat, Solder bath method: Test severities (duration and temperature) .....	15

# 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

- 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.

## 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*