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Environmental testing -- Part 2-83: Tests - Test Tf: Solderability testing of electronic components for surface mounting devices (SMD) by the wetting balance method using solder paste

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| 19.040 | Preskušanje v zvezi z okoljem | Environmental testing |
| 31.020 | Elektronske komponente na splošno | Electronic components in general |

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91/903/CDV

**COMMITTEE DRAFT FOR VOTE (CDV)
PROJET DE COMITÉ POUR VOTE (CDV)**

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| Proposed horizontal standard Norme horizontale suggérée <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the TC/SC secretary Les autres CE/SC sont requis d'indiquer leur intérêt, si nécessaire, dans ce CDV à l'intention du secrétaire du CE/SC | | | | | |
| Functions concerned Fonctions concernées <input type="checkbox"/> Safety Sécurité <input type="checkbox"/> EMC CEM <input checked="" type="checkbox"/> Environment Environnement <input type="checkbox"/> Quality assurance Assurance qualité | | | | | |

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Titre :

Title : IEC 60068-2-83 Ed.1.0: Environmental Testing - Part 2-83: Tests-test Tf: Solderability testing of electronic components for surface mounting devices (SMD) by the wetting balance method using solder paste

[SIST EN 60068-2-83:2012](https://standards.iteh.ai/SIST/EN/60068-2-83/2012)

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Note d'introduction

Introductory note

The title of the document had been changed to delete the words "lead free", during the preparation stage of CD. The original proposed scope was to use "lead free solder paste" but not limited to it.

The statement on the patent rights is still pending from patent holders.

| | |
|--|--|
| ATTENTION VOTE PARALLÈLE CEI – CENELEC L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle. Les membres du CENELEC sont invités à voter via le système de vote en ligne du CENELEC. | ATTENTION IEC – CENELEC PARALLEL VOTING The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) for an International Standard is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system. |
|--|--|

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

**Part 2-83: Tests – Test Tf : Solderability testing
of electronic components for surface mounting devices (SMD)
by the wetting balance method using solder paste**

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The holder of the patent rights have assured the IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of these patent rights are registered with IEC. Information may be obtained from:

EU Patent applied for by Gen3 Systems Limited. Synchronous test method for assessing soldering pastes.

JP Patent 2630712 Testing method of characteristics of solder paste and the equipment for the test.

name of holder of patent right : Malcom Co., Ltd

address: 4-15-10 Honmachi, Shibuya-ku, Tokyo, 151-0071, Japan

JP Patent 3153884 Soldering equipment for solder paste.

name of holder of patent right : Sony Corporation

IEC 60068-2-83 Ed.1

– 4 –

address: 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141-0001, Japan
 name of holder of patent right : Tarutin Kester Co., Ltd.
 address: 2-20-11 Yokokawa, Sumida-ku, Tokyo, 130-0003, Japan

JP Patent 3552061 Equipment for solderability test.
 name of holder of patent right : Sony Corporation
 address: 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141-0001, Japan
 name of holder of patent right : Tarutin Kester Co., Ltd.
 address: 2-20-11 Yokokawa, Sumida-ku, Tokyo, 130-0003, Japan

JP Pat. Appl. No. Heisei-5-256383 3498100

Testing method of solderability and the equipment used for the test, and the micro-furnace used for the test.

Patent applicant: Sony Corporation

Address: 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141-0001, Japan

Patent applicant: Tarutin Kester Co., Ltd.

Address: 2-20-11 Yokokawa, Sumida-ku, Tokyo, 130-0003, Japan

International Standard IEC 60068-2-83 has been prepared by IEC technical committee 91:

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

| FDIS | Report on voting |
|------------|------------------|
| XX/XX/FDIS | XX/XX/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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date¹⁾ 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.

¹⁾ The National Committees are requested to note that for this publication the maintenance result date is

ENVIRONMENTAL TESTING –

Part 2-83: Tests – Test Tf: Solderability test of electronic components for surface mounting devices (SMD) by the wetting balance method using solder paste

1 Scope

This standard provides methods for comparative investigation of the wettability of the metallic terminations or metallized terminations of SMDs with solder pastes.

Data obtained by these methods are not intended to be used as absolute quantitative data for pass – fail purposes.

NOTE Different solderability test methods for SMD are described in IEC 60068-2-58 and IEC 60068-2-69. IEC 60068-2-58 prescribes visual evaluation using solder bath and reflow method, IEC 60068-2-69 prescribes wetting balance evaluation using solder bath and solder globule method.

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 – Electricity and Electronics – General rules*

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

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 60068-2-69, *Environmental Testing - Part 2: Tests – Test Te: Solderability testing of electronic components for surface mount technology by the wetting balance method*

IEC 60194, *Printed Board Design, Manufacture and Assembly - Terms and Definition*

IEC 61189-5, *Test Methods for electrical materials, interconnection structures and assemblies – Part 5: Test methods for printed board assemblies*

IEC 61190-1-3, *Attachment materials for electronic assembly - Part 1-3: Requirements for electronic grade solder alloys and fluxed and non-fluxed solid solders for electronic soldering applications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60068-1, IEC 60068-2-20, IEC 60068-2-58, IEC 60194, and IEC 61190-1-3 and the following apply.

3.1

wettability

ease with which a metal or metal alloy can be wetted by molten solder

3.2

wetting balance method

method to measure wetting performance and solderability by measuring vertical force (difference with surface tension and buoyancy) to the specimen and recording as a function of time, when the specimen is immersed into molten solder

3.3

starting point of heating

time of the start of temperature rise by heating the solder paste applied to a testing jig

3.4

zero line

line extended to the time axis of the force experienced by the specimen as indicated by the test equipment (force sensor) when the specimen is taken out from the molten solder after end of measurement

4 Test

4.1 General description

The specimen is held on a holder suitable to the specimen and is suspended from sensitive balance. The specimen is immersed into solder paste applied onto the test jig plate, then solder paste is heated to melt. The resultant of the vertical forces of buoyancy and surface tension (here after, referred as “acting force”) acting upon the immersed specimen by force sensor and converted into a signal which is continuously recorded or monitored as a function of time on recorder. The evaluation of the wetting force is made by comparison of the forces experienced by specimens of the same shape and sizes.

4.2 Test methods

There are three methods as described below. The choice of the method shall be specified in the relevant specification.

- a) Quick heating method: The wettability of electrodes of a component is evaluated while the solder paste is melted in a rapid temperature rise. Solder paste temperature rise with the specimen remains immersed in the solder paste.
- b) Synchronous method: The wettability of electrodes of a component is evaluated while the solder paste is melted in a rapid temperature rise. Solder paste temperature rise with the specimen being immersed into the solder paste.
- c) Temperature profile method: Solder paste is melted using a similar temperature profile used in production and the wettability of the electrodes of a component is evaluated.

NOTE1 This test (Tf) may be applicable to leaded SMD packages. In order to achieve comparable and repeatable results, test Tf is preferably done on straight leads.

NOTE2 Solder paste to be used is not specified in this Standard.

5 Preconditioning

Unless otherwise specified in the detailed specification of the component, the test shall be made on the specimens as received and care shall be taken not to contaminate the specimens by fingers and other items. The specimen may be immersed in organic solvent at room temperature to remove possible contamination such as grease attached to the surface if the preconditioning is specified in the specification. No other method shall be used to clean the specimen. The specimen thus cleaned may be dried in air.

When accelerated ageing is prescribed by the relevant specification, one of the methods of 4.1.4 (Ageing 1) of IEC 60068-2-20 shall be used. The aging condition shall be specified in the relevant specification.

6 Preparation

6.1 Solder paste

Use solder paste that has been stored in a sealed container and stored in an environment of dark place and below 10 °C. Before conducting this test, it is important to prepare the solder paste properly:

- The solder paste must be allowed to achieve ambient conditions that shall be nominally 25 °C±5 °C and 50 %RH±10 %RH for 8 h or in accordance with the manufacturer's data sheet.
- Open the supply container(s); remove any internal cover, scrape off paste adhering to the lid(s), internal covers, and the container walls; and add this material to the paste in the supply container(s).
- Using a spatula, stir the paste gently for 1 min to 2 min to homogenize it; taking care to avoid the introduction of air.
- If necessary, gently transfer the paste to a test container of sufficient volume, taking care to avoid the introduction of air.

6.2 Test jig plate

Test jig plates shall be stored in a sealed container. Immediately prior to their use, they shall be acid cleaned. A new test jig plate shall be used for each test. Unused test Jig plates shall be discarded and not be returned to the sealed container.

6.3 Specimen Holder

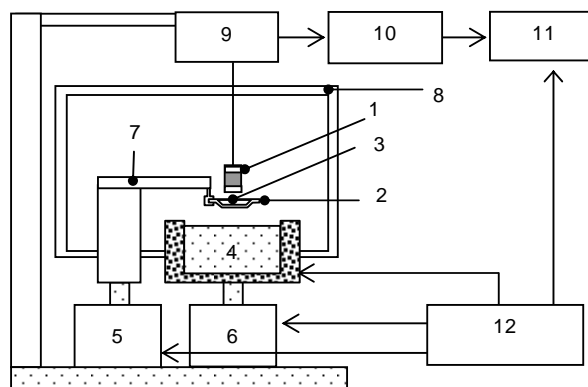
The specimen holder is usually contaminated by creeping of flux used in a test. A specimen holder shall be cleaned using neutral organic solvent. It is desirable to use ultrasonic agitation in cleaning.

7 Quick heating method SIST EN 60068-2-83:2012

7.1 Equipment

The equipment used for the quick heating method consists of measurement, heating and lift system as shown in Figure 1. The detailed requirements to the equipment are specified in Annex A.

- The measuring system consists of the force sensor that can measure the force vertically acted on a specimen, signal transducer and a recorder.
- The heating system shall be capable of controlling the determined set temperature within ± 3 °C.
- The lift system shall be capable of carrying out immersion and withdrawal of the specimen as specified in 7.5.2.



Key

| | | | |
|---|-------------------------|----|---------------------------------|
| 1 | Specimen | 7 | Holding jig of a test jig plate |
| 2 | Test jig plate | 8 | Housing |
| 3 | Solder paste | 9 | Sensor |
| 4 | Heating bath | 10 | Transducer |
| 5 | Lift for test jig plate | 11 | Recorder |
| 6 | Lift for heating bath | 12 | Controller |

Figure 1 – Examples of the quick heating method test equipment

7.2 Test jig plate

The test jig plate shall be as specified in Table 1.

Table 1 - Specification of the test jig plate for quick heating and synchronous method

| Item | Specification of the test jig |
|-------------------------------|--|
| Material | Oxygen-free phosphate copper |
| Shape | Circular indented pan |
| Dimensions (L, W) | Less than 30 mm one side, or less than total area of 900 mm ² |
| Thickness (t) | 0,3 mm \pm 0,03mm |
| Drawn diameter (D_1, D_2) | 9 mm to 10 mm at the bottom, 13 mm to 14 mm at the top |
| Drawn depth (h) | 0,4 mm \pm 0,04 mm |
| Solder resist (D_3, D_4) | Inner diameter of 10 mm \pm 0,02 mm, and over 20 mm for the outer diameter |
| Resist coat thickness | 0,035 mm \pm 0,01 mm |
| Warp | \pm 0,05 mm (for the longer side for a rectangular shape) |

An example of the test jig plate used in the quick heating and synchronous method is shown in Figure 2.

