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

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COMMITTEE DRAFT FOR VOTE (CDV)
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Also of interest to the following committees Intéresse également les comités suivants IEC TC 40, 47, 47D, 93, 104	Supersedes document Remplace le document 91/554/CD – 91/602A/CC

Functions concerned
Fonctions concernées

☐ Safety / Sécurité ☐ EMC / CEM ☐ Environment / Environnement ☐ Quality assurance / Assurance qualité

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Titre :

Title :

IEC 60068-2-20, Ed. 5: Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of leaded devices

Note d'introduction

La version française sera diffusée au stade FDIS

Introductory note

This CDV was prepared based on 91/554/CD and the discussion results of 91/602A/CC

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.
Un bulletin de vote séparé pour le vote CENELEC leur sera envoyé par le Secrétariat Central 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.
A separate form for CENELEC voting will be sent to them by the CENELEC Central Secretariat.

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: 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. 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 (Bath method) and IEC 60068-2-69 (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 – Part 1: General and guidance*

IEC 60068-2-2, *Test B: Dry Heat*

IEC 60068-2-66*, Test Cx: Damp heat, steady state (unsaturated pressurized vapour)*

IEC 60068-2-78, *Test Ca: Damp Heat, Steady State*

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

IEC 61190-1-3, *Attachement materials; requirements for electrical grade solder alloys and fluxed and non-fluxed solid solders*

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

3 Terms and definitions

3.1 colophony
a 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.

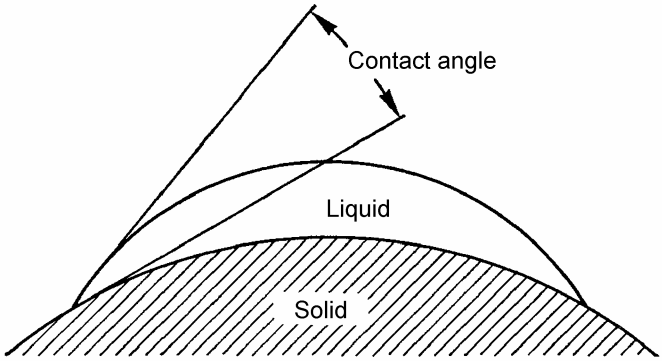

Figure 1

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

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

3.5 de-wetting
the retraction of molten solder on a solid area that it has initially wetted. 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
the 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
see definition in 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 proecesses; however, it is not practicable to express the results as a number.

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 (Test Ca)

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

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

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

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.

4.1.3 Initial measurements

The specimens shall be visually examined and, if required by the relevant specification, electrically and mechanically checked.

4.1.4 Accelerated ageing

If accelerated ageing is required by the relevant specification, one of the following procedures shall be adopted. At the end of the conditioning, the specimen shall be subjected to standard atomspheric conditions for testing for not less than 2 h and not more than 24 h.

NOTE Terminations may be detached if the ageing temperature is higher than the component's maximum operating or storage temperature, or if the component is likely to degrade considerably at 100 °C in steam and thus affect the solderability in a manner which would not normally occur in natural ageing.

4.1.4.1 Ageing 1

The relevant specification shall indicate whether ageing 1a (1 h in steam) or ageing 1b (4 h in steam) is to be used. For these procedures the specimen is suspended, preferably with the termination vertical, with the area to be tested positioned 25 mm to 30 mm above the surface of boiling distilled water which is contained in a borosilicate glass or stainless steel vessel of