INTERNATIONAL STANDARD

IEC 60068-2-58

Second edition
1999-01

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)

Essais d'environnement –

Partie 2-58:
Essais – Essai Td – Méthodes d'essai de la soudabilité, de la résistance de la métallisation à la dissolution et de la résistance à la chaleur de soudage des composants pour montage en surface

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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)

FOREWORD

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International Standard IEC 60068-2-58 has been prepared by IEC technical committee 50: Environmental testing, and is published by IEC technical committee 91: Surface mounting technology.

This second edition cancels and replaces the first edition, published in 1989, and constitutes a technical revision.

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

FDIS	Report on voting
91/157/FDIS	91/164/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.

Annex A forms an integral part of this standard.

Annex B is for information only.

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)

1 Scope

This part of IEC 60068 outlines test Td, applicable to surface mounting devices (SMD). Soldering tests applicable to SMD in IEC 60068-2-69 and to other electrotechnical products are in IEC 60068-2-20 and IEC 60068-2-54, for which guidance is given in IEC 60068-2-44.

This standard provides standard procedures for determining the solderability, resistance to dissolution of metallization and resistance to soldering heat of surface mounting devices (SMD) (hereinafter referred to as specimens).

The procedures use either a solder bath or reflow method and are applicable only to specimens or products designed to withstand short term immersion in molten solder or limited exposure to reflow systems.

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2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60068. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60068 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*

IEC 60068-2-44:1995, *Environmental testing – Part 2: Tests – Guidance on test T: Soldering*

IEC 60068-2-54:1985, *Environmental testing – Part 2: Tests – Test Ta: Soldering – Solderability testing by the wetting balance method*

IEC 60068-2-69:1995, *Environmental testing – Part 2: Tests – Test Te: Solderability testing of electronic components for surface mount technology by the wetting balance method*

IEC 60249-2-4:1987, *Base materials for printed circuits – Part 2: Specifications – Specification No. 4: Epoxide woven, glass fabric, copper-clad laminated sheet, general purpose grade*

IEC 60749:1996, *Semiconductor devices – Mechanical and climatic test methods*

3 Terms and definitions

For the purpose of this part of IEC 60068, the terms and definitions as defined in IEC 60068-1 and IEC 60068-2-20 apply.

4 Preconditioning

4.1 The specimen shall be tested in the "as-received" condition unless otherwise specified by the relevant specification. Care should be taken that no contamination, by contact with the fingers or by other means, occurs.

4.2 When accelerated ageing is prescribed by the relevant specification, one of the methods of 4.5 of IEC 60068-2-20 shall be used.

4.3 Prior to the resistance to soldering heat test, specimens of semiconductor SMDs in plastic encapsulation shall be soaked and/or baked in accordance with the relevant specification of IEC 60749.

5 Solder bath method

5.1 Test apparatus and materials for the solder bath method

5.1.1 Solder bath

The solder bath dimensions shall comply with the requirements of 4.6.1 of IEC 60068-2-20.

5.1.2 Flux

The flux shall comply with the requirements of 4.6.2, 6.6.1 or 6.6.2 of IEC 60068-2-20 as prescribed by the relevant specification.

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5.1.3 Solder

The solder composition shall be 60 % tin and 40 % lead according to appendix B of IEC 60068-2-20.

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6 Procedure

6.1 Number of specimens

A specimen shall not be used for more than one test.

6.2 Clamping

The specimen shall be placed in a stainless steel clip as shown in figure 1. No part of the clip jaws shall make contact with the areas to be examined. The specimen shall remain in the clip while being fluxed and dipped in the solder.

6.3 Fluxing

The specimen shall be completely immersed in flux and withdrawn slowly. Any excess flux shall be removed by contact with absorbent paper.

6.4 Solder immersion

When preheating is prescribed by the relevant specification, the specified duration and temperature shall be applied immediately prior to the immersion of the specimen in the solder bath.

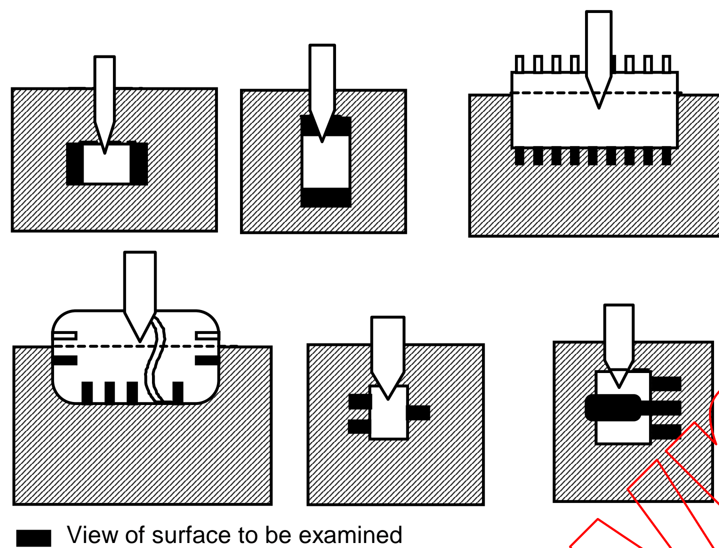

Figure 1 – Examples of immersion

6.4.1 Severities

The duration and temperature of immersion shall be selected from table 1, unless otherwise prescribed by the relevant specification. Guidance on the choice of severities, including those for lower grades of resistance to soldering heat and dissolution of metallization, is given in annex B.

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Table 1 – Severities (duration and temperature)

Property tested	Severity								
	(215 ± 3) °C			(235 ± 5) °C			(260 ± 5) °C		
	(3 ± 0,3) s	(10 ± 1) s	(40 ± 1) s	(2 ± 0,2) s	(5 ± 0,5) s	(10 ± 1) s	(5 ± 0,5) s	(10 ± 1) s	(30 ± 1) s
Wetting	X	X		X	X				
Dewetting							X		
Resistance to dissolution of metallization									X
Resistance to soldering heat			X			X	X	X	

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The oxide film on the solder bath shall be skimmed off immediately before immersion.

The immersion and withdrawal speed shall be between 20 mm/s and 25 mm/s.

6.4.2 Attitude

Two attitudes of immersion are standardized:

Attitude A: For most specimens, the areas to be examined shall be immersed not less than 2 mm below the solder meniscus (but not to a greater depth than necessary; see figure 1) with the seating plane vertical.

Attitude B: For certain specimens (see B.3.4), the specimen may be floated on the solder, but only when testing resistance to soldering heat.

If the relevant specification does not mention the attitude, *attitude A* shall be adopted.

7 Solder reflow methods

7.1 Test apparatus and materials

The following two methods may be used to determine the suitability of SMDs for reflow soldering or when they are only designed for reflow soldering processes and when the solder bath (dipping) method is not appropriate.

Where the characteristics of an SMD are such that both reflow methods are applicable, then infrared, forced gas or vapour phase shall take precedence over hot plate reflow. The applicable test method shall be stated in the relevant specification.

7.1.1 Solder paste

The particle mesh size of the solder paste shall be 160 or finer.

The metal composition shall be in accordance with the solder specification in B.1 of IEC 60068-2-20.

The composition of the flux shall comply with the flux specification in annex C of IEC 60068-2-20.

The viscosity range and method of measurement shall be specified in the relevant specification.

7.1.2 Test substrates

7.1.2.1 Test substrates for infrared, forced gas or vapour phase solder reflow

The test substrate shall consist of an unmetallized (no tracks or lands) piece of ceramic (alumina 90 % to 98 %) or glass epoxy (see IEC 60249-2-4).

Dimensional details shall be given in the relevant specification.

7.1.2.2 Test substrate for hot plate solder reflow

The test substrate shall consist of an unmetallized (no tracks or lands) piece of ceramic (alumina 90 % to 98 %).

Dimensional details shall be given in the relevant specification.

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