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Environmental testing—Part 2 : Tests—Test Td : Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by the Japan Electronics and Information Technology Industries Association (JEITA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS C 0054 : 1994** is replaced with this Standard.

This revision has been prepared based on **IEC 60068-2-58 : 1999** *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)* for the purpose of conforming to the International Standard.

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In the event of any doubts arising as to the contents,
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Environmental testing—Part 2 : Tests— Test Td : Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)

Introduction This Japanese Industrial Standard has been prepared based on the second edition of **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)* published in 1999 with modifying the technical contents.

Portions with sidelines or underlined with dots are the matters in which the original International Standard is modified. The modified contents and their explanations are shown in annex 2.

1 Scope This Standard outlines test Td, applicable to surface mounting devices (SMD). Soldering tests applicable to SMD in **IEC 60068-2-69** and to other electro-technical products are in **JIS C 0050** and **JIS C 0053**, 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) (hereafter 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.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC 60068-2-58 : 1999 *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)* (MOD)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect apply limiting only to the most recent edition (including amendments).

JIS C 0010 *Environmental testing Part 1 : General and guidance*

Remarks : **IEC 60068-1** : 1988 *Environmental testing—Part 1 : General and guidance* is identical with the said standard.

JIS C 0050 *Basic environmental testing procedures Part 2 : Tests. Test T : Soldering*

Remarks : **IEC 60068-2-20** : 1979 *Environmental testing—Part 2—Test T : Soldering* is identical with the said standard.

JIS C 0053 *Environmental testing Part 2 : Tests. Test Ta : Soldering. Solderability testing by the wetting balance method*

Remarks : **IEC 60068-2-54** : 1985 *Environmental testing—Part 2—Test Ta : Solderability testing by the wetting balance method* is identical with the said standard.

JIS C 6484 *Copper-clad laminates for printed wiring boards—Glass fabric base, epoxy resin*

Remarks : **IEC 60249-2-4** : 1987 *Base materials for printed circuits—Part 2 : Specifications—No. 4 : Epoxy woven glass fibre copper-clad laminated sheet, general purpose grade* is equivalent to the said standard.

JIS Z 3282 *Soft solders—Chemical compositions and forms*

IEC 60068-2-44 : 1995 *Environmental testing—Part 2—Guidance to Test T : Soldering*

IEC 60068-2-69 : 1995 *Environmental testing—Part 2—Guidance to Test Te : Soldering : Solderability testing of electronic components for surface mount technology by the wetting balance method*

IEC 60749 : 1996 *Semiconductor device—Mechanical and climatic test methods*

3 Definitions For the purposes of this Standard, the definitions as defined in **JIS C 0010** and **JIS C 0050** 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 **JIS C 0050** 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**.

Information : The relevant specification of **IEC 60749** is described in annex 1.

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 JIS C 0050.

5.1.2 Flux The flux shall comply with the requirements of 4.6.2, 6.6.1 or 6.6.2 of JIS C 0050 as prescribed by the relevant specification.

5.1.3 Solder The solder composition shall be 60 % tin and 40 % lead according to annex B of JIS C 0050.

NOTE : Solder may be used S-n 60 Pb 40 A (H 60 A) or S-Sn 63 Pb 37 A (H 63 A) of JIS Z 3282 according to the agreement between the parties concerned.

6 Procedure for solder bath method

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.

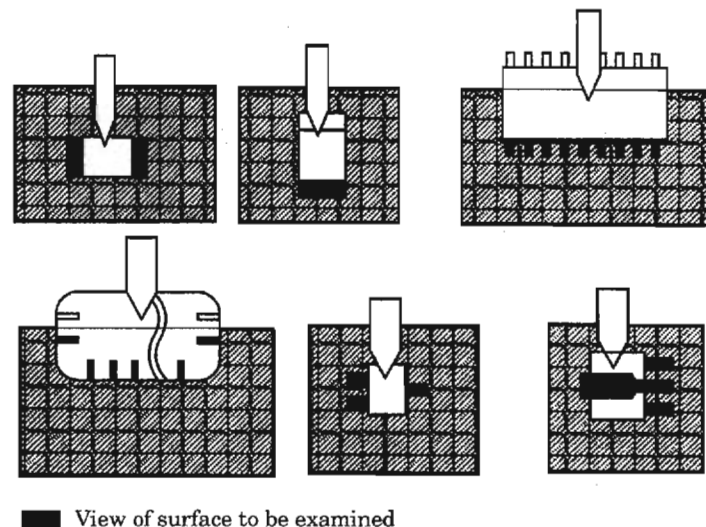


Figure 1 Examples of immersion

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.3.

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	× ×	× ×	
Dewetting			×
Resistance to dissolution of metallization			×
Resistance to soldering heat	×	×	× ×

NOTE : Durations marked with × are to be applied.

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 **B.1** of **JIS C 0050**.

The composition of the flux shall comply with the flux specification in annex C of **JIS C 0050**.