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(JEITA/JSA)

**Environmental testing—Part 2-69:
Tests—Test Te/Tc: Solderability
testing of electronic components
and printed boards by the wetting
balance (force measurement)
method**

ICS 19.040;31.190

Reference number : JIS C 60068-2-69 : 2019 (E)



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Foreword

This Japanese Industrial Standard has been 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 Japan Electronics and Information Technology Industries Association (JEITA)/Japanese Standards Association (JSA) 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 Consequently, **JIS C 60068-2-69:2009** is replaced with this Standard, and **JIS C 60068-2-54:2009** has been withdrawn and replaced with this Standard.

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JIS C 60068 series consists of the following 55 parts under the general title *Environmental testing*:

Part 1: General and guidance

Part 2-1: Tests—Test A: Cold

Part 2-2: Tests—Test B: Dry heat

Part 2-6: Tests—Test Fc: Vibration (sinusoidal)

Part 2-7: Tests—Test Ga and guidance: Acceleration, steady state

Part 2-11: Tests—Test Ka: Salt mist

Part 2-13: Tests, Test M: Low air pressure

Part 2-14: Tests—Test N: Change of temperature

Part 2-17: Tests—Test Q: Sealing

Part 2-18: Tests—Test R and guidance: Water

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

Part 2-21: Tests—Test U: Robustness of terminations and integral mounting devices

Part 2-27: Tests—Test Ea: Shock

Part 2-30: Tests—Test Db: Damp heat, cyclic (12 h + +12 h cycle)

Part 2-31: Tests—Test Ec: Rough handling shocks, primarily for equipment-type specimens

Part 2-38: Tests—Test Z/AD: Composite temperature/humidity cyclic test

Part 2-39: Tests—Tests and guidance: Combined temperature or temperature and humidity with low air pressure tests

Part 2-40: Tests, Test Z/AM: Combined cold/low air pressure tests

- Part 2-41: Tests, Test Z/BM: Combined dry heat/low air pressure tests*
- Part 2-42: Tests Test Kc: Sulphur dioxide test for contacts and connections*
- Part 2-43: Tests Test Kd: Hydrogen sulphide test for contacts and connections*
- Part 2-45: Resistance to solvents (immersion in cleaning solvents)*
- Part 2-46: Tests Guidance to Test Kd: Hydrogen sulphide test for contacts and connections*
- Part 2-47: Tests—Mounting of specimens for vibration, impact and similar dynamic tests*
- Part 2-49: Tests Guidance to Test Kc: Sulphur dioxide test for contacts and connections*
- Part 2-52: Tests—Test Kb: Salt mist, cyclic (sodium chloride solution)*
- Part 2-53: Tests and guidance—Combined climatic (temperature/humidity) and dynamic (vibration/shock) tests*
- Part 2-55: Tests—Test Ee and guidance—Loose cargo testing including bounce*
- Part 2-57: Tests—Test Ff: Vibration—Time-history and sine-beat method*
- Part 2-58: Tests—Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*
- Part 2-60: Tests—Test Ke: Flowing mixed gas corrosion test*
- Part 2-61: Test methods Test Z/ABDM: Climatic sequence*
- Part 2-64: Tests—Test Fh: Vibration, broadband random and guidance*
- Part 2-65: Tests—Test Fg: Vibration—Acoustically induced method*
- Part 2-66: Test methods—Test Cx: Damp heat, steady state (unsaturated pressurized vapour)*
- Part 2-67: Tests—Test Cy: Damp heat, steady state, accelerated test primarily intended for components*
- Part 2-68: Dust and sand test*
- Part 2-69: Tests—Test Te/Tc: Solderability testing of electronic components and printed boards by the wetting balance (force measurement) method*
- Part 2-70: Tests—Test Xb: Abrasion of markings and letterings caused by rubbing of fingers and hands*
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- Part 2-80: Tests—Test Fi: Vibration—Mixed mode*
- Part 2-81: Shock—Shock response spectrum synthesis*
- Part 2-82: Tests—Test XW₁: Whisker test methods for electronic and electric components*
- Part 2-83: Tests—Test Tf: Solderability testing of electronic components for surface mounting devices (SMD) by the wetting balance method using solder paste*

- Part 3-1: Supporting documentation and guidance—Cold and dry heat tests*
- Part 3-2: Background information—Combined temperature/low air pressure tests*
- Part 3-3: Guidance Seismic test method for equipments*
- Part 3-4: Supporting documentation and guidance—Damp heat tests*
- Part 3-5: Supporting documentation and guidance—Confirmation of the performance of temperature chambers*
- Part 3-6: Supporting documentation and guidance—Confirmation of the performance of temperature/humidity chambers*
- Part 3-7: Supporting documentation and guidance—Measurements in temperature chambers for tests A and B (with load)*
- Part 3-8: Supporting documentation and guidance—Selecting amongst vibration tests*
- Part 3-13: Supporting documentation and guidance on Test T—Soldering*

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Environmental testing—Part 2-69: Tests—Test Te/Tc: Solderability testing of electronic components and printed boards by the wetting balance (force measurement) method

Introduction

This Japanese Industrial Standard has been prepared based on **IEC 60068-2-69: 2017**, Edition 3 (including CORRIGENDUM 1 issued in 2018), with necessary additions and modifications of technical contents to bring them in line with actual conditions in the market.

The dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard outlines test Te (Solderability testing of printed board) and test Tc [Solderability testing by balancing method, with assessment based on quantitative assessment criteria (wetting time and wettability)], the solder bath wetting balance method and the solder globule wetting balance method to determine, quantitatively, the solderability of the terminations on electronic components and printed boards. Data obtained by these methods are not intended to be used as absolute quantitative data for pass-fail purposes.

The procedures describe the solder bath wetting balance method and the solder globule wetting balance method. They are applicable to the lands of components and printed boards with metallic terminations and metallized solder pads.

This document provides the measurement procedures for solder alloys both with and without lead (Pb).

NOTE The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

IEC 60068-2-69:2017 *Environmental testing—Part 2-69: Tests—Test Te/Tc: Solderability testing of electronic components and printed boards by the wetting balance (force measurement) method* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For standards with the year indication, only the editions of the indicated year shall be applied and the revisions (including amendments) made thereafter shall not be applied. For those without the indication of the year, the most recent edition (including amendments) shall be applied.

JIS C 60068-1 *Environmental testing—Part 1: General and guidance*

NOTE Corresponding International Standard: IEC 60068-1 *Environmental testing—Part 1: General and guidance* (IDT)

JIS C 60068-2-2 *Environmental testing—Part 2-2: Tests—Test B: Dry heat*

NOTE Corresponding International Standard: IEC 60068-2-2 *Environmental testing—Part 2-2: Tests—Test B: Dry heat* (IDT)

JIS C 60068-2-20:2010 *Environmental testing—Part 2-20: Tests—Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

NOTE Corresponding International Standard: IEC 60068-2-20:2008 *Environmental testing—Part 2-20: Tests—Test T: Test methods for solderability and resistance to soldering heat of devices with leads* (IDT)

JIS C 60068-2-66 *Environmental testing—Part 2: Test methods—Test Cx: Damp heat, steady state (unsaturated pressurized vapour)*

NOTE Corresponding International Standard: IEC 60068-2-66 *Environmental testing—Part 2: Test methods—Test Cx: Damp heat, steady state (unsaturated pressurized vapour)* (IDT)

JIS H 4040 *Aluminium and aluminium alloy bars and wires*

NOTE Corresponding International Standard: ISO 6362 (all parts) *Wrought aluminium and aluminium alloys—Extruded rods/bars, tubes and profiles* (MOD)

JIS Z 3282:2017 *Soft solders—Chemical compositions and forms*

NOTE Corresponding International Standard: IEC 61190-1-3:2007 *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* and Amendment 1:2010 (MOD)

ISO 683 (all parts) *Heat-treatable steels, alloy steels and free-cutting steels*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS C 60068-1** and **JIS C 60068-2-20** apply.

4 General description of the method

4.1 General

The user should note that the test method specified in this document is intended to provide consistent and discriminatory data between various test sites. Hence the choice of alloy, temperature and flux shall be controlled.

Using this test method to control a production process is encouraged. However, as each production process will employ different alloys, temperatures and fluxes, such test results shall be agreed upon between user and supplier. In case of a dispute, the procedures of this document shall prevail.

NOTE Information regarding wetting balance for surface mount device (SMD) solderability testing is described in Annex B.

4.2 Components

The test specimen shall be a sample from the intended production batch. The test specimen is mounted into a suitable holder that is suspended from a sensitive balance. Liquid flux is then applied to the specimen that is brought into contact with the cleaned surface of the liquid solder within a solder bath, or the apex of a solder globule. The solder in either case is at a controlled temperature, and the lead or termination under test is immersed to the prescribed depth.

4.3 Printed boards

The test specimen should be a representative test specimen, a portion of the printed board being tested, or a whole board if within size limits, such that an immersion depth defined in the individual method is possible. Where there is a need for preparing a test specimen, the method of preparation shall be as agreed between user and supplier. For printed boards with a particular geometry or characteristics for which applicability of a test specified in this Standard is unclear, a preliminary test shall be performed to see if the test method is applicable before proceeding to the actual test. Test specimens may be used for rigid board surface solderability and plated-through-hole solderability.

NOTE 1 Specifics on specimen preparation and scope of applicability of the tests in this Standard, which are not given in the corresponding IEC, has been added to this Standard.

Liquid flux is then applied to the specimen that is brought into contact with the cleaned surface of a solder bath, that is at a controlled temperature and immersed to the prescribed depth.

NOTE 2 Since this Standard does not contain test requirements for solder globule method, the description related to this method has been deleted.

4.4 Measurement

The resultant forces, measured in mN, of buoyancy of molten solder and surface tension caused by wetting up of solder acting upon the immersed termination are detected by a transducer and converted into a signal that is continuously monitored as a function of time, and recorded and displayed on a computer screen.

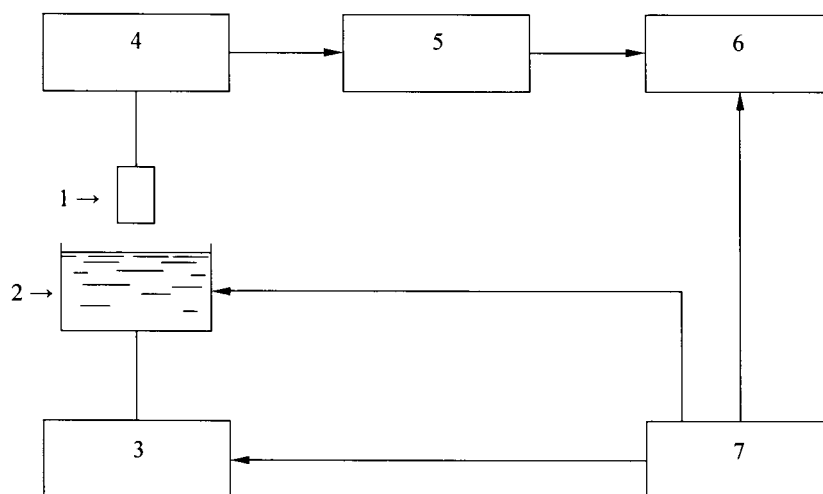
The wetting speed and the extent of wetting are derived from the force against time curve. The trace may be compared with that derived from a perfectly wetted specimen of the same nature and dimensions.

5 Description of the test apparatus

Figure 1 and Figure 2 show a suitable arrangement for the test apparatus.

The apparatus specifications are given in Annex A.

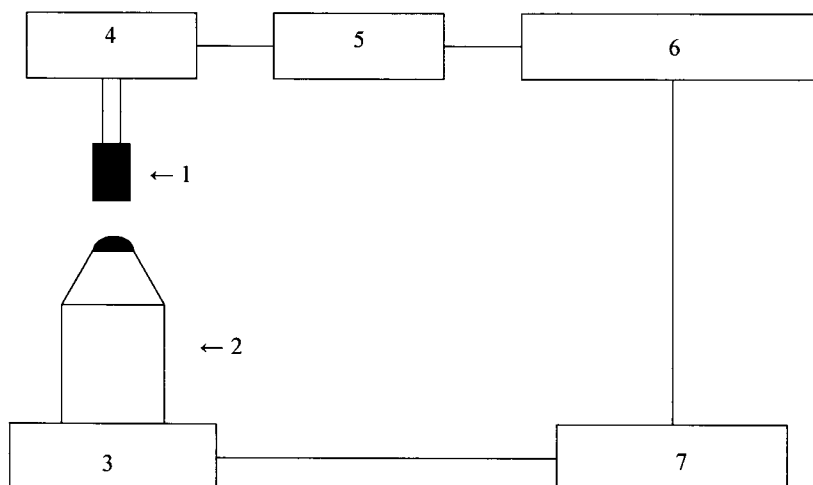
The specimen is suspended from a sensitive balance and a mechanism used to either raise the solder to meet the specimen or lower the specimen into the solder. After conditioning, the transducer signal is passed to a computer, where the force against time curve may be displayed and analysed.



Key

- | | |
|---------------------------------|------------------------------------|
| 1 Specimen | 2 Solder bath |
| 3 Solder bath lifting mechanism | 4 Sensitive balance and transducer |
| 5 Signal conditioner | 6 Computer |
| 7 Control box | |

Figure 1 Arrangement for the test apparatus (solder bath wetting balance method)



Key

- | | |
|----------------------|------------------------------------|
| 1 Specimen | 2 Globule block |
| 3 Lifting mechanism | 4 Sensitive balance and transducer |
| 5 Signal conditioner | 6 Computer |
| 7 Control box | |

NOTE A globule block is composed of an aluminium body and iron pins (see A.3).

Figure 2 Arrangement for the test apparatus (solder globule wetting balance method)

6 Preparation of specimens

6.1 Cleaning

Unless otherwise indicated in the component specification, the specimen shall be tested in the as-received condition and care should be taken to ensure that no part of the surface to be tested becomes contaminated, particularly by contact with the fingers, during the preparation and handling of the specimen.

If required by the component specification, the specimen may be cleaned by immersion in a neutral organic solvent at room temperature. The specimen should be allowed to dry in air before testing. No other cleaning is permitted.

6.2 Preconditioning

If required by the component specification, the component may be subjected to preconditioning before testing as specified in Table 1. Preconditioning shall be performed for 4 h at 155 °C unless otherwise agreed between user and supplier (Table 1, condition F).

In the past, it has been practice to use the term “accelerated ageing” which, as given in **JIS C 60068-2-20, 4.1.1**, has the following six alternative conditions that may be used as an alternative if agreed between user and supplier:

Condition A — ageing 1a of **JIS C 60068-2-20**;

Condition B — ageing 1b of **JIS C 60068-2-20**;

Condition C — ageing 1b of **JIS C 60068-2-20**, but for 8 h;

Condition D — ageing 1b of **JIS C 60068-2-20**, but for 16 h;

Condition E — ageing 4 of **JIS C 60068-2-20**;

Condition F — ageing 3a of **JIS C 60068-2-20**.

NOTE These conditions A to F correspond to the condition categories shown in Table 1.

Table 1 Preconditioning

Condition category	Precondition type	Exposure parameters	Use recommendation	Applicability by finish
A	Steam	1 h ± 5 min	Preferred	Non-tin and non-tin alloy containing finishes
B		4 h ± 10 min	Preferred	Non-tin and non-tin alloy containing finishes
C		8 h ± 15 min	Optional	Non-tin and non-tin alloy containing finishes
D		16 h ± 30 min	Optional	Non-tin and non-tin alloy containing finishes
E	Unsaturated pressurized vapour (120 °C, 85 % RH)	4 h ± 10 min	Preferred	All finishes
F	155 °C dry bake	4 h ± 15 min	Preferred	All finishes

7 Materials

7.1 Solder

7.1.1 General

The solder to be used for both the solder bath and for the solder globule wetting balance test shall be as specified in **7.1.2** and **7.1.3**. Solder contamination control and solder mass for globule wetting balance test shall be as specified in **7.1.4** and **7.1.5**, respectively.

7.1.2 Solder alloy containing lead

The solder alloy composition shall be Sn60Pb40, Sn63Pb37 or Sn62Pb36Ag2. (Refer to the **JIS Z 3282** designation 1 for the alloy name).

NOTE The presence of silver in the solder reduces the dissolution effect on silver-containing metallization on components and therefore can be used when required by the relevant component specification.

7.1.3 Lead-free solder alloy

The preferred alloy composition to be used should consist of either a mass fraction of 3.0 % Ag, 0.5 % Cu, 96.5 % Sn (Sn96.5Ag3Cu0.5) or 0.7 % Cu, 99.3 % Sn (Sn99.3Cu0.7). (Refer to **JIS Z 3282** designation 1 for the alloy name.)

NOTE Sn96.5Ag3Cu0.5 is also known as SAC305.

Other lead-free solder alloys may be used upon agreement between user and supplier.

7.1.4 Solder contamination control

The solder in solder baths used for solderability testing shall be chemically or spectrographically analyzed or replaced each 30 operating days. The levels of contamination and Sn content shall be within those shown in Table 2. The intervals between analyses may be lengthened if the test results indicate that the contamination limits are not being approached. The composition of the lead-free solder, including contamination levels, shall be maintained during testing with the silver and copper element levels adjusted for alloy requirements.

An operating day consists of any eight-hour period, or any portion thereof, during which the solder is liquefied and used. If contamination exceeds the limits specified in Table 2, then the solder shall be changed and the intervals between analysis shall be shortened. A sampling plan shall be developed, implemented, and documented. It shall also indicate the process control of the solder contamination.

Table 2 Maximum limits of solder bath contaminants

Contaminant	Maximum mass fraction contaminant limit	
	Sn-Pb alloys ^{a), b)} %	Sn96.5Ag3Cu0.5 alloys ^{c), d)} %
Copper	0.300	1.100 ^{e)}
Gold	0.200	0.200
Cadmium	0.005	0.005
Zinc	0.005	0.005
Aluminium	0.006	0.006
Antimony	0.500	0.200
Iron	0.020	0.020
Arsenic	0.030	0.030
Bismuth	0.250	0.250
Silver	0.100	4.000 ^{e)}
Nickel	0.010	0.050
Lead	—	0.100
Notes ^{a)} The tin content of the solder shall be maintained within ± 1.5 % of the nominal alloy being used. Tin content shall be tested at the same frequency as testing for copper/gold contamination. The balance of the bath shall be lead and/or the items listed above. ^{b)} The total of copper, gold, cadmium, zinc, and aluminium contaminants shall not exceed 0.4 %. Not applicable to lead-free alloys. ^{c)} The tin content of the solder shall be maintained within ± 1 % of the nominal alloy being used. Tin content shall be tested at the same frequency as testing for copper/silver concentration. The balance of the bath shall be the items listed above. ^{d)} Other lead-free solder alloy contamination limits may be used upon agreement between user and supplier. ^{e)} The mass fraction includes the solder composition.		

7.1.5 Solder mass for solder globule wetting balance method

For the solder globule wetting balance method, the solder shall be in the form of pellets or cut wire (hereafter referred to as solder pellets) with a mass of $200 \text{ mg} \pm 10 \text{ mg}$ for use on a 4 mm diameter pin globule support block, $100 \text{ mg} \pm 10 \text{ mg}$ for use on a 3.2 mm diameter pin globule support block (hereafter referred to as pin support block), $25 \text{ mg} \pm 2.5 \text{ mg}$ for use on a 2 mm diameter pin support block, and $5 \text{ mg} \pm 0.5 \text{ mg}$ for use on a 1 mm diameter pin support block (see Table 3).

Table 3 Pin support block and solder pellet

Pin diameter mm	Pellet mass mg
1	5 ± 0.5
2	25 ± 2.5
3.2	100 ± 10
4	200 ± 10

A new solder pellet shall be used for each test except in the case of a step and repeat technique. Separate dedicated pin support blocks should be used for tin-lead and lead-free alloys to avoid cross-contamination between these as well as between different lead-free alloys. Refer to Annex C regarding dimpled globule support block.

7.2 Flux

7.2.1 Rosin based flux

The preferred fluxes for the test are rosin based as shown below. See Table 4 for the details.

- a) Non-activated
- b) Low activated
- c) High activated

Table 4 Rosin based flux compositions

Constituent ^{a)}	Composition by mass fraction %		
	Non-activated	Low activated	High activated
Colophony (rosin)	25 ± 0.5	25 ± 0.5	25 ± 0.5
Diethylammonium hydrochloride (CAS No. 660-68-4)	None	0.15 ± 0.01	0.39 ± 0.01
2-propanol (Isopropyl alcohol) (CAS No. 67-63-0) or ethyl alcohol (CAS No. 64-17-5) as an alternative	75 ± 0.5	74.85 ± 0.5	74.61 ± 0.5
Mass of chlorine of solids ^{b)}	0	0.2	0.5
Notes ^{a)} See JIS C 60068-2-20 , Annex B for specification.			
^{b)} Expressed as free chlorine based on the colophony content.			

7.2.2 Flux maintenance

The flux to be used for testing should be taken from the supplied container and poured into a small cup (e.g. beaker). Flux applied for testing should be taken from this cup. After use the unused flux left in the cup should be discarded.

7.2.3 Test flux selection criteria

Refer to **B.5** for information regarding the adoption and use of these test fluxes.

8 Procedure

8.1 Test temperature

8.1.1 Solder alloy containing lead

Solder temperature prior to test and during test shall be 235 °C ± 3 °C.

8.1.2 Lead-free solder alloy

Unless otherwise specified in the relevant specification, the temperature of the solder prior to the test shall be $245\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ for Sn96.5Ag3Cu0.5 and $250\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ for Sn99.3Cu0.7 alloys.

8.2 Test procedure

8.2.1 Applicable test procedure

Subclause 8.2.2 applies for leaded non-SMD components (axial/radial wire terminal components excluding leaded SMD).

Subclause 8.2.2 or 8.2.3 applies for non-leaded SMD or leaded SMD (e.g. SOT, SOIC) as applicable.

Subclause 8.2.4 applies for printed boards.

8.2.2 Solder bath wetting balance procedure

The specimen is mounted in a suitable holder to give the desired dipping angle and the termination(s) is/are centred above the solder bath. Preferred dipping angles are given in Table 5.

The temperature of the solder prior to the test shall be as described in 8.1.

Prior to testing, a continuous layer of the appropriate flux is applied to the portion of the component termination to be tested, and excess flux droplets are removed by touching against absorbent paper. It is very important that excess flux is not allowed to enter the specimen holder or remain on the component. The presence of excess flux will cause explosive boiling as the flux solvent makes contact with the molten solder.

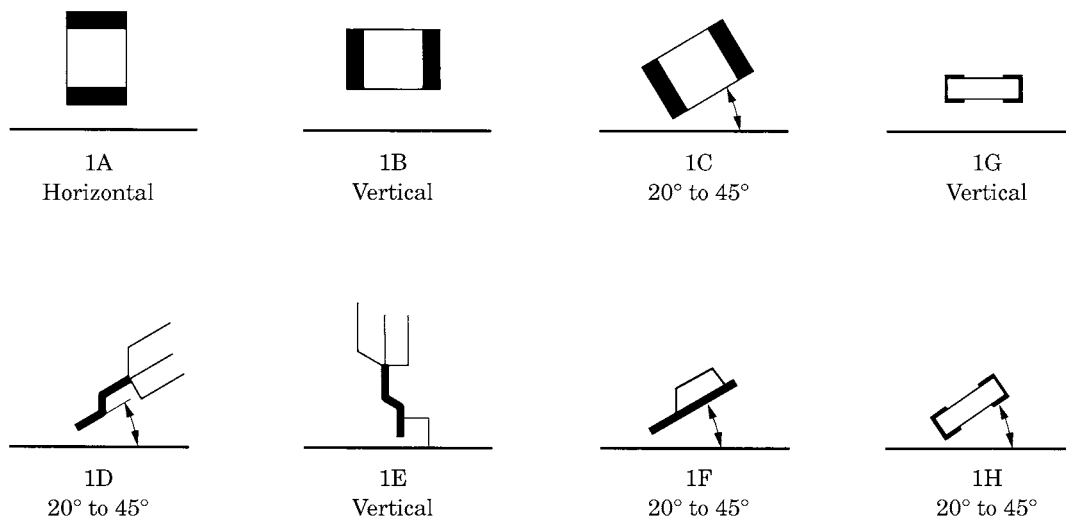
Immediately prior to testing, wipe the oxide from the solder bath surface with a non-wettable blade. If required by a relevant standard e.g., the sensitive balance (see Figure 1) and chart recorder are adjusted to the zero position.

- a) **Leaded non-SMD component:** Hang the specimen on the apparatus so that the lower edge of the component is $20\text{ mm} \pm 5\text{ mm}$ above the solder surface. The specimens are then brought into contact at a speed between 5 mm/s and 20 mm/s so that they are immersed to the required depth within 0.2 s .
- b) **SMD components:** It is important to ensure that the test specimen, at the start of the test, is positioned on the equipment at a distance of $10\text{ mm} \pm 2\text{ mm}$ from the solder surface and to allow the specimen to preheat/dry for $30\text{ s} \pm 15\text{ s}$ prior to immersion into the solder globule. This period is required to remove the solvent from the flux prior to the test and to prevent explosive boiling when the specimen and solder come into contact. Loading and unloading of test specimens may, of course, be at a much greater distance, for example greater than 20 mm . The specimen and solder are brought into contact at a speed between 1 mm/s and 5 mm/s .

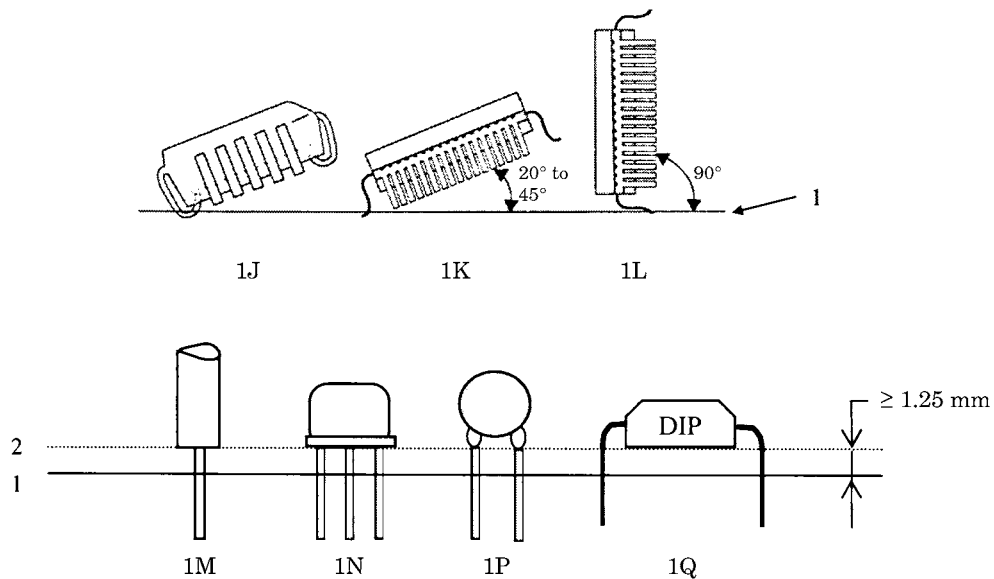
The recommended immersion depth into the solder of the surface to be tested shall be as specified in Table 5. See also Figure 3. Table 5 shows the solder dipping angle for SMD, leaded SMD components as well as leaded non-SMD components.

Table 5 Recommended solder bath wetting balance test conditions

Component examples		Dipping angle ^{a)}	Immersion position (see Figure 3)	Immersion depth mm
Type	Size code			
Leaded non-SMD	—	Vertical	1M, 1N, 1P, 1Q	2 to 4
SMD (porcelain capacitors)	1608M ^{b)} 2012M ^{b)} 3216M ^{b)} 4532M ^{b)}	Horizontal, vertical or 20° to 45°	1A, 1B, 1C	0.04 to 0.10
SMD (resistors)	1608M ^{b)} 2012M ^{b)} 3216M ^{b)}	Horizontal, vertical or 20° to 45°	1A, 1B, 1C, 1G ^{d)} , 1H ^{d)}	
Leaded SMD	SOT 23 SOT 89 SOT 223 SOIC 16 ^{c)} SOIC 28 ^{c)} VSO 40 ^{c)} QFP 48 ^{c)} QFP 160 ^{c)} PLCC 44 ^{c)} PLCC 84 ^{c)}	Vertical or 20° to 45°	1D, 1E, 1F 1J, 1K, 1L	
Cylindrical SMD	—	Horizontal, vertical or 20° to 45°	1A, 1B, 1C	
SOD 80	—	Vertical or 20° to 45°	1B, 1C	
For sizes below 1608M, the solder globule wetting balance method (see 8.2.3) should be used instead. The recommended dwell time is 5 s, except for SOT 89 and SOT 223 components, where 10 s is recommended. The recommended immersion speed for all components is between 1 mm/s and 5 mm/s, except for leaded non-SMD where between 5 mm/s and 20 mm/s is recommended. The immersion depths are recommended values. When appropriate, a higher immersion depth or longer dwell time can be chosen, for example in case of inadequate thermal heat transfer. See B.7.3.1 for precautions.				
Notes ^{a)} Orientation of the specimen terminals or leads towards the solder surface. ^{b)} (The size codes in inch which are given in the corresponding International Standard are not used in Japan and therefore have been deleted from the table in this Standard.) ^{c)} These leads may be cut and tested individually, but care should be taken not to deform the part of the lead to be tested. This operation should be performed after ageing, if any ageing procedure is applied. ^{d)} 1G and 1H in Figure 3 a) are applicable to the components which do not have an electrode toward the solder surface when 1B is applied, where presence of an electrode toward the solder surface is unknown.				



a) Examples of immersion A to H



Key

- 1 Molten solder surface 2 Seating plane

b) Examples of immersion J to Q

Figure 3 Immersion conditions for solder bath wetting balance method

The solder and specimen are held in this position for not less than 5 s and then separated.

The withdrawal rate is not specified as the force curve is not analysed once the specimen starts to separate from the solder.

The time sequence of the test is shown in Table 6. To maintain repeatability, the test sequence time should be as short as possible.