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**Component Heat Resistance to Wave Soldering**

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**1. SCOPE**

This specification defines the test procedure and criteria for assessing acceptability of components for use in wave soldering processes.

**2. MATERIAL**

- Solder - Any solder alloy that is completely liquid at the test temperature ( $240$  or  $265 \pm 5^\circ\text{C}$ )
- Flux - For solder bath method: 25% by weight of colophony in 75% by weight of 2-propanol (isopropanol) or ethyl alcohol (see appendix C of IEC 60068-2-20). The flux activity shall conform with the level "low (0)" according to IEC 61190-1-1, which means it has a halide content of  $<0.01$  wt % (Cl, Br, F).

**3. EQUIPMENT**

- Microscope - Optical microscope capable of 30X magnification for visual inspection.
- Dimensional Measurement Instruments - Tools/instruments used for measuring dimensions shall be capable per standard GR&R qualification methods. Measurement microscopes, calipers and go/no-go gauges are acceptable.
- Solder Bath - Not less than 40 mm in depth and not less than 300 ml in volume.

**4. PROCEDURE**

## 4.1. Specimen Requirements

Unless otherwise specified in the referencing document, select a minimum of 5 components for each test.

## 4.2. Initial Inspection and Dimensional Measurement

Conduct an inspection of all plastic housings for any defects or deformation. Using a qualified measurement tool/instrument, measure and record the critical to function properties and dimensions specified in the referencing document.

## 4.3. Test Methods

- A. Condition A - For tin-lead wave solder simulation, the solder bath temperature shall be maintained at  $240 \pm 5^\circ\text{C}$ . The hold time in the solder shall be  $10 +2/-0$  seconds.
- B. Condition B - For lead free wave solder simulation of typical components, the solder bath temperature shall be maintained at  $265 \pm 5^\circ\text{C}$ . The hold time in the solder shall be  $10 +2/-0$  seconds.
- C. Condition C - For lead free wave solder simulation of temperature sensitive devices, such as relays, the solder bath temperature shall be maintained at  $260 +0/-5^\circ\text{C}$ . The hold time in the solder shall be  $5 +2/-0$  seconds. Testing to this specification qualifies product for wave solder hold times up to 5 seconds maximum in the application.

#### 4.4. Solder Bath Method - Test Procedure

**NOTE**

*It is strongly recommended to utilize fixturing which can automatically control the rate of motion into and out of the solder bath and the duration of time in the solder bath to ensure consistency of results.*

##### A. Component Clamping

1. Fix the specimen in a dipping device or clamping device or tweezers.
2. Orient the specimen so the primary axis of the solderable portion of the leads is normal to the solder bath.

##### B. Component Terminal Fluxing

1. The terminal leads to be tested shall be immersed in the flux described in paragraph 3. for 5 to 10 seconds.
2. Excess flux shall be eliminated by draining for 5 to 20 seconds.

##### C. Component Dipping (Exposure to Soldering)

1. Wipe the surface of the molten solder to eliminate dross prior to each test.
2. Lower the component into the solder bath at a rate of  $25 \pm 6$  mm per second until the leads are inserted into the solder bath and the component body is 1 to 2 mm above the surface of the solder.

##### D. Component Withdrawal

Raise the component out of the solder bath at a rate of  $25 \pm 6$  mm per second and remove it from the fixture.

##### E. Remarks

1. The component body may contain plastic pegs, PCB locating or fixing features etc, that protrude below the main component body. In such cases, the pegs will be submerged in the solder in order to position the main component body within 2 mm above the solder surface.
2. Optionally, an adjustable handling device (robot) may be used to ensure the immersion and withdrawal rate and the holding time as well.

#### 4.5. Final Inspection and Dimensional Measurement

Conduct an inspection of each specimen at 30X magnification and note any blisters, deformation/warpage or melting. Using a qualified measurement tool/instrument, measure and record the dimensions and verify any other functions or properties specified in the referencing document.

#### 4.6. Inspection Criteria

Note if any of the following occur:

- Any blistering, deformation/warpage, melting or discoloration.
- Any change in measured dimensions from initial to final.

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## 5. REFERENCING DOCUMENT

The following shall be specified in the referencing document:

- Test specimen preparation, if other than specified herein.
- Specimen description.
- Specimen drawing with at least 3 dimensions (typically overall length, width and height) of interest highlighted.
- Dimensional requirements if appropriate, e.g. qualification testing.

## 6. TEST REPORT

The test report shall contain the following:

- Type of solder alloy used
- Type of flux used
- Applied solder temperature
- Immersion time
- Measured dimensions and changes in critical to function properties..

**NOTE** *If specified that a mounting board, plastic sheet, epoxy-resin board, etc. be used, the terminal hole size shall be such that diametrical clearance between the hole and component terminals shall not exceed 0.71 mm nor be less than 0.15 mm. The board shall have no circuitry or copper surfaces. The board shall be of appropriate size and shall protrude 19.05 mm minimum around the periphery of the specimen.*