ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES ®

2215 Sanders Road
Northbrook, IL 60062-6135

IPC-TM-650
TEST METHODS MANUAL

Number	
2.6.8	
Subject	
Thermal Stress, Plated-Through Holes	
Date	Revision
05/04	**E**
Originating Task Group	
Rigid Printed Board Performance Task Group (D-33a)	

1 Scope This test is performed for the purpose of determining whether plated-through holes can withstand the thermodynamic effects of the extreme heat to which they may be exposed during the assembly, rework, or repair process.

2 Applicable Documents

J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies

J-STD-004 Requirements for Soldering Fluxes

IPC-2221 Generic standard on Printed Board Design

IPC-TM-650 Test Methods Manual

2.1.1 Microsectioning

2.1.1.2 Microsectioning – Semi or Automatic Technique Microsection Equipment (Alternate)

3 Test Specimen

3.1 The test specimen shall be a printed board, a portion of a printed board or a test coupon as described in IPC-2221, which allows for microsection evaluation of both the largest component holes and the smallest holes on the board.

3.2 The test specimen shall be removed from a printed board or test coupon as specified in IPC-TM-650, Method 2.1.1 or Method 2.1.1.2, prior to precondition bake.

4 Apparatus or Material

4.1 Drying oven capable of maintaining a uniform temperature between 121C to 149 °C [250 °F to 300 °F].

4.2 Solder pot, electrically heated, thermostatically controlled, of sufficient size, containing at least 0.9 kg of Sn60Pb40 or Sn63Pb37 solder conforming to the contaminant level specified in J-STD-001.

4.3 Thermocouple indicator or other devices to measure the solder temperature 19 mm ± 6.4 mm [0.748 in ± 0.252 in] below the surface.

4.4 Desiccator with suitable desiccant.

4.5 Microscope (100X to 200X magnification).

4.6 Stop Watch or Timer.

4.7 Rosin Flux, type ROL1 per J-STD-004, or flux agreed upon between customer and vender.

4.8 Tongs.

4.9 Suitable solvent for flux removal following the thermal stress such as isopropyl alcohol.

5 Procedure

5.1 The test specimen shall be conditioned by drying in an oven for an appropriate period at 121 °C to 149 °C [250 °F to 300 °F] to remove the moisture in the specimen. For referee purposes, a dry for a minimum of six hours at 121 °C to 149 °C [250 °F to 300 °F] shall be used. Thicker or more complex specimens may require longer baking times.

5.2 Place the test specimen in a desiccator on a ceramic plate to cool to room temperature.

5.3 Remove the test specimen from the desiccator using tongs. Flux coat the surface and plated-through holes to insure solder filling.

5.4 Verify that the temperature of the solder (at a probe depth of 19 mm ± 6.4 mm [0.748 in ± 0.252 in] from the surface of the solder) is maintained at one of the following specified test conditions (see 6.1):

(a) Test Condition A (default) 288 °C ± 5 °C [550 °F ± 9 °F]

(b) Test Condition B 260 °C ± 5 °C [500 ° ± 9 °F]

(c) Test Condition C 232 °C ± 5 °C [450 °F ± 9 °F]

5.5 Remove the dross from the solder pot surface and lay the test specimen on the solder for 10 seconds +1, -0 seconds (see 6.2).

5.6 Using tongs, carefully remove the test specimen from the solder and place it on a piece of insulator to cool to room temperature (see 6.3).

5.7 Evaluation

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5.7.1 After cleaning, microsection the specimen as defined in IPC-TM-650, Method 2.1.1 or Method 2.1.1.2.

5.7.2 Examine the microsection for compliance of the plated-through holes to the applicable performance specification requirements. Any nonconformities shall be noted.

6. *Notes*

6.1 Performance specifications should specify the test condition and any deviations to this test method. If no test condition is specified, use Test Condition A.

6.2 The test specimen is not to be held against the surface of the molten solder.

6.3 Do not physically shock specimen while the solder in the plated-through holes is still liquid.