ASSOCIATION CONNECTING
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Number	
2.3.32	
Subject	
Flux Induced Corrosion (Copper Mirror Method)	
Date	Revision
06/04	**D**
Originating Task Group	
Flux Specification Task Group (5-24a)	

IPC-TM-650
TEST METHODS MANUAL

1 Scope This test method is designed to determine the removal effect the flux has (if any) on the bright copper mirror film which has been vacuum deposited on clear glass.

2 Applicable Documents

IPC J-STD-004 Requirements for Soldering Fluxes

ASTM E104 Maintaining Constant Relative Humidity by means of Aqueous Solutions

Federal Specification LLL-R-626 Rosin, Gum, Rosin Wood and Rosin Tall Oil

3 Test Specimen A minimum of 10 ml of liquid flux, a representative container of solder paste, dissolved paste flux, extracted solder preform flux or extracted cored wire flux. The reflow/extraction process should be carried out in accordance with J-STD-004.

4 Apparatus and Reagents

4.1 Control standard rosin flux, class A, type II, grade WW, of Federal Specification LLL-R-626.

4.2 Reagent grade (99% pure) 2-propanol.

4.3 Copper Mirrors (see 6.2 and 6.3).

4.4 500 ml of reagent grade 0.5% solution of ethylene diamine tetra acetic acid (EDTA).

4.5 Reagent grade ethanol or methanol.

4.6 Deionized water with a resistivity of at least 18.0 megohm centimeter.

4.7 Glass dropper.

4.8 Test cabinet capable of achieving 23 ± 3 °C [73.4 ± 5.4 °F] and 50 ± 5% relative humidity.

4.9 A relative humidity gauge having a ± 2% accuracy, or better, shall be used to continuously monitor the test environment. The gauge should be calibrated periodically.

5 Procedures

5.1 Preparation

5.1.1 Control Standard Flux Dissolve 35 g of Federal Specification LLL-R-626 rosin into 100 ml of reagent grade (99% pure) 2-propanol and stir thoroughly.

5.1.2 Temperature/Humidity Chamber When acid or salt solutions (such as reported in ASTM E104) are used, the environment shall be monitored for a minimum of 48 hours prior to exposing the copper mirror samples, to assure compliance with the 50% ± 5% relative humidity requirement.

5.1.3 Copper Mirror Test Panels

5.1.3.1 Immediately before testing, immerse the copper mirror in a 5 g/l solution of EDTA for one minute for copper oxide removal. Mirrors stored in a nonoxidizing environment do not require cleaning with the EDTA solution prior to testing. The cleaning step must be used if test results are in dispute.

5.1.3.2 Rinse the mirror thoroughly in running deionized water, immerse in clean ethanol or methanol, and dry with clean, oil free air.

5.1.3.3 Carefully examine the mirror before testing. There must be no oxide.

5.2 Test

5.2.1 Place the copper mirror test panel on a flat surface, mirror side up, and protect from dust and dirt at all times.

5.2.2 Place one drop of test flux or extract to be tested (approximately 0.05 ml) on the copper mirror test panel. Do not allow the dropper to touch the test panel.

5.2.3 Apply solder paste directly to the mirror without scratching the copper surface. Use a volume approximating 0.5 mm [0.197 in] thickness and 8.0 mm [0.350 in] diameter. (It has been determined that significant variations from this quantity have little effect for most materials.)

5.2.4 Immediately also place one drop of the control standard flux adjacent to the test flux. Do not allow the drops to touch.

5.2.5 Place the test panel in a horizontal position in the dust free cabinet at 23 ± 2 °C [73.4 ± 3.6 °F] and 50 ± 5% relative humidity for 24 ± 1/2 hours.

5.2.6 At the end of the 24 hour period, remove the test panel and remove the test flux and control standard flux by immersion in clean 2-propanol.

5.3 Evaluation

5.3.1 Carefully examine the test panel for possible copper removal or discoloration.

5.3.2 See J-STD-004 for evaluation criteria.

5.3.3 If the control flux fails the L category, repeat the entire test using a new copper mirror test panel.

5.3.4 Discoloration of the copper film due to a superficial reaction or only a partial reduction of the copper film thickness is not considered a failure.

5.3.5 A number of chemicals can cause failure of copper mirror: free halides, stronger organic and inorganic acids and free amines.

6 Notes

6.1 Safety Observe all appropriate precautions on MSDS for chemicals involved in this test method.

6.2 Preparation of Copper Mirrors

6.2.1 Apply, by vacuum deposition, a film of copper metal on one surface of a flat sheet of clear, polished glass.

6.2.2 Apply a uniform thickness of approximately 50 nm, and assure that the finished mirror permits 10 ± 5% transmission of normal incident light of nominal wave length of 500 nm. This may be determined using a suitable photoelectric spectrophotometer.

6.2.3 Prevent oxidation of the copper mirror by storing in a closed container which has been flushed with nitrogen.