ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES

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Number	
2.1.3	
Subject	
Plated-Through Hole Structure Evaluation	
Date	Revision
8/76	**A**
Originating Task Group	
N/A	

IPC-TM-650
TEST METHODS MANUAL

1 Scope After selective chemical removal of the glass-epoxy from around the through hole and its associated circuitry, an examination can be made with a microscope of the plated-through hole (PTH), pad, and conductor at any angle.

2 Applicable Documents None

3 Test Specimen The specimen is a part of a glass-epoxy multilayer or double-sided PCB, which contains a PTH and its associated interconnected circuitry, which is selected for closer examination.

4 Apparatus

4.1 A fume hood is to be used, due to the corrosive chemicals used for this evaluation.

4.2 A microscope, capable to examine the specimen at magnifications of 50X to 100X

4.3 A stirring hot plate, capable of maintaining a temperature at 50°C.

4.4 Equipment The following equipment is needed to perform this test:

- Goggles
- Face mask
- Acid resistant apron or coat
- Acid resistant respirator
- Polyethylene beaker
- Polyvinyl chloride gloves
- Pyrex (glass) beaker
- Sodium dichromate sulfuric acid (Sp. Gr. 1.84)
- Support stand
- Hydrofluoric acid (48%)
- Thermometer
- Utility clamp
- Thermometer clamp

5 Procedure

Caution: *Hydrofluoric and fluosulfonic acids and their vapors are extremely toxic and corrosive. They should never be opened or handled except with full protective clothing and under a fume hood.*

5.1 Reagents For the sulfuric chromic solution, take 35 ml of a saturated sodium dichromate ($Na_2Cr_2O_7$) solution and add 1 liter of concentrated sulfuric acid (H_2SO_4) in a Pyrex vessel immersed in a cold water bath. In a polyethylene beaker, make a fluosulfonic acid mixture using one part by weight of sulfuric acid (H_2SO_4) and three parts by weight of hydrofluoric acid (H.F. 48%).

5.2 Immersion In a Pyrex beaker of predetermined size, add enough sulfuric chromic solution to completely immerse the specimen. Heat the solution to 50°C on a hot plate and immerse the specimen. After the reaction is completed (the disappearance of small bubbles), remove the specimen and rinse in distilled water. Remove excess water with a tissue and immerse the specimen in a fluosulfonic acid mixture at room temperature. After two minutes, remove the specimen from the fluosulfonic acid mixture, rinse in distilled water, and remove excess water with a tissue. Repeat this process until the desired amount of exposed circuitry is obtained.

5.3 Test Evaluation Examine the specimen under the microscope and observe the structure and condition of the PTH, interconnections, and layer-to-layer registration.

6 *Notes* Fluosulfonic acid must always be contained in a polyethylene beaker.