The Institute for Interconnecting and Packaging Electronic Circuits
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IPC-TM-650
TEST METHODS MANUAL

Number	
2.3.24	
Subject	
Porosity of Gold Plating	
Date	Revision
2/78	
Originating Task Group	
N/A	

1 Scope This test method provides procedures to determine the porosity of gold plating on both copper and nickel surfaces by chemical means. This method may also be used to test rhodium or palladium.

2 Applicable Documents None

3 Test Specimens

3.1 Any test, pre-production, or production sample of gold-plated circuitry

4 Apparatus

4.1 Whatman No. 542 filter paper

4.2 Glass lab trays

4.3 Powdered Alumina (or Magnesia)

4.4 Distilled water, 4 liters

4.5 Aluminum panels, 15 cm x 15 cm (high purity)

4.6 12 volt DC power supply

4.7 Photographic blotting paper

4.8 One pint of 10% solution cadmium chloride

4.9 One pint of hydrochloric acid (1.16 to 1.8 specific gravity)

4.10 One pint of 5% solution sodium sulfide

4.11 Lab press (or clamps)

4.12 0.8% solution Nioxime (cyclohexane 1:2 dione dioxime)

5 Procedure

5.1 Preparation

5.1.1 The high-purity aluminum panels must at all times be free from grease and foreign matter likely to cause inoperative areas on the cadmium sulfide paper.

5.1.2 In order to preserve the active life of the cadmium sulfide papers, they should be stored in a dark, sealed container. The shelf life of the papers is approximately four to six weeks.

5.1.3 After this test, the contacts must be cleaned again as before, rinsed in hot distilled water, and carefully dried. The used cadmium sulfide paper must not be stored in contact with the plated surface of the board.

5.2 Gold on Copper Test Method

5.2.1 Soak the Whatman 542 filter paper for 10 minutes in a fresh 10% solution of cadmium chloride in distilled water containing 0.1% by volume of hydrochloric acid.

5.2.2 Remove the excess solution by blotting.

5.2.3 Allow the paper to dry partially, then immerse in a fresh 5% solution of sodium sulfide in distilled water for 30 seconds, after which time the paper must be of a uniform yellow color (indicating a complete precipitate of cadmium sulfide).

5.2.4 Soak the photographic blotting paper in distilled water and dry to a degree of dryness that produces consistent, sharply defined electrograms.

5.2.5 Lightly clean the gold plating with powdered alumina (or magnesia) and water to remove any extraneous surface contamination, then flush with distilled water and dry. The cleaned surfaces must be kept clean until the test is completed.

5.2.6 Place a piece of the cadmium sulfide paper on the plated sample (which acts as the anode) followed by a piece of the photographic blotting paper, the latter being in contact with a freshly cleaned high-purity aluminum panel (which acts as the cathode).

5.2.7 Compress the assembly so that the pressure between the cadmium sulfide paper and the sample is uniform and between 14 kg/cm2 and 18 kg/cm2.

5.2.8 While the assembly is under compression, pass a smooth, ripple free DC source not exceeding 12 volts between the cathode and anode.

5.2.9 Set the current initially at 8 mA/cm^2 of anode area and energize for 30 seconds.

5.2.10 Allow the electrograms produced on the cadmium sulfide paper to dry.

5.2.11 A corresponding brown stain on the paper reveals the presence of any defect in the plated coating.

5.2.12 Visually examine the specimen at 10X magnification.

5.3 Gold on Nickel Method

5.3.1 Soak the Whatman 542 filter paper for 10 minutes in a 0.8% solution of nioxime (cyclohexane 1:2 dione dioxime) and distilled water.

5.3.2 Remove the excess solution with blotting paper. The paper must be hung up to dry.

5.3.3 Repeat the steps in 5.2, except moisten the piece of nioxime paper with distilled water and expose the ammonia vapor.

5.3.4 Remove the excess by blotting. The ''backing pad'' of photographic blotting paper is to be used dry.

5.3.5 Expose the electrograms produced on the nioxime paper to ammonia vapor, then allow to dry.

5.3.6 A corresponding purple-red stain on the paper reveals the presence of any defects in the gold plating.

5.3.7 Visually examine the specimens at 10X magnification.