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IPC-TM-650
TEST METHODS MANUAL

Number	
2.3.7.1	
Subject	
Cupric Chloride Etching Method	
Date	Revision
12/94	**A**
Originating Task Group	
MIL-P-13949 Test Methods Task Group (7-11b)	

1.0 Scope This method is a means for preparation of test specimens for determination of bare dielectric material quality and properties, using cupric chloride as the etching solution for removal of copper cladding.

2.0 Applicable Documents

IPC-TM-650
Method 2.3.1.1, Chemical Cleaning of Metal Clad Laminate

3.0 Test Specimens The size of lot samples or test specimens shall be determined by the inspections or tests to be performed after etching and the capabilities of the etching equipment.

4.0 Apparatus or Material

4.1 Standard chemical etching chamber or laboratory equipment suitable to the etchant chemistry.

4.2 Air circulating oven capable of maintaining the specified temperatures and tolerances.

4.3 Personal safety equipment shall include: rubber or polyethylene gloves, plastic or coated apron and safety goggles.

4.4 Chemicals

Chemical	Concentration
Cupric Chloride, $CuCl_2$-$2H_20$	0.54 kg/l 4.5 lb/gal
Hydrochloric Acid, HCl	9.3% by weight (3N) 25% by volume
Distilled/Deionized Water	As required
Sodium Hydroxide, NaOH	10% by weight
Reagent grade isopropyl alcohol (IPA)	As required

4.5 Pattern Developing Materials Etch resist system or materials capable of producing the applicable conductor patterns.

5.0 Procedure

5.1 Preparation of Specimen

5.1.1 Shear the material to the appropriate sample or specimen size and if necessary remove the rough edges from the specimen by sanding or other suitable means. Specimens may be chemically cleaned in accordance with IPC-TM-650, Method 2.3.1.1. Specimens may also be mechanically cleaned.

5.1.2 If a conductor pattern is required, prepare the material by applying etch resist according to standard industry practices.

5.2 Etching

5.2.1 Remove the metal cladding by etching in a spray chamber or other suitable container containing 30-32* BAUME cupric chloride solution maintained at 51.7 ± 5.6°C [125 ± 10°F]. Etching time shall be minimized to prevent overexposure of the bare laminate material to the etching solution and yet allow for complete removal of the exposed metal cladding. If the specimens are etched in a laboratory environment, vigorous agitation may be required.

5.2.2 Rinse the specimens thoroughly.

5.2.3 For referee purposes, neutralize any residual etchant by quickly dipping in a 10% solution of NaOH solution and then rinse thoroughly with distilled or deionized water. Note: If this step is not followed, undercutting of the circuitry is possible, which in time could lead to inaccurate test data, such as low peel strength.

5.3 Cleaning

5.3.1 If etch resist has been used, samples shall have the resist or tape removed by standard industry practices.

5.3.2 When electrical testing is required on the material, do not allow the etched specimens to dry before they go through the cleaning process. For general testing, scrubbing with a soft natural bristle brush under running tap water and rinsing with distilled water or deionized water may be adequate. For critical testing and for referee testing, laminates shall be soaked for 10 minutes in reagent grade IPA followed immediately by a 10 minute rinse in flowing 16 megaohm deionized water.

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5.4 Drying Samples may be air dryed for subsequent material evaluations. For referee testing, an oven bake for 1 hour at 80 ± 5.6°C [176 ± 10°F] is required.

5.5 Evaluation Determine and record whether the etching procedure resulted in any unusual events, such as:

a. Dwell time in etcher necessary for complete copper removal, if longer than normal.

b. Warpage or distortion of the material.

c. Discoloration or other visual changes to the material.

6.0 *Notes* None