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IPC-TM-650 TEST METHODS MANUAL

1 Scope This test method describes the procedure for establishing the service temperature for metal-clad flexible base material (laminate) as described in IPC-4204 as well as cover materials and adhesive bonding films (unsupported adhesive and supported bond plies) as described in IPC-4203. For purposes of this test method, cover material **shall** consist of coverlay and coverfilm but **shall not** include covercoat materials. Properties evaluated after thermal aging in this test are: visual, peel strength and dielectric strength.

2 Applicable Documents

2.1 IPC¹

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

IPC-TM-650 Test Methods Manual²

2.4.9 Peel Strength, Flexible Dielectric Materials

2.4.13 Solder Float Resistance Flexible Printed Wiring Materials

IPC-4203 Adhesive Coated Dielectric Films for Use as Cover Sheets for Flexible Printed Circuitry and Flexible Adhesive Bonding Films

IPC-4562 Metal Foil for Printed Board Applications

2.2 ASTM International³

ASTM D-149 Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

3 Bond Strength Test Procedure

3.1 Specimen Preparation for Metal-Clad Flexible Base Material (Laminate)

3.1.1 Prepare twelve specimens according to the procedure outlined for method A of IPC TM-650, method 2.4.9, using appropriate photolithographic processes. Etch four conductors 3.2 mm [0.126 in] wide, 5.7 mm [0.224 in] pitch, 230 -

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250 mm [9 - 10 in] long on a nominal 25 mm [1 in] wide strip of flexible base dielectric (see Figure 1).

Single-clad or double-clad flexible base material **shall** be tested in the format supplied. If the flexible base material under test is double-clad, prepare a separate set of specimens for each side. It is permissible to leave the unetched copper on the non-test side (see Notes 6.1 and 6.2).

3.2 Specimen Preparation for Cover Material

3.2.1 Single-clad base material **shall** be produced from specimens of the cover materials. Cover material **shall** be bonded to the shiny side of 34.3 μm [1.35 mil] copper foil, type CU-E1-1S or CU-E7-1S per IPC-4562 (CU-E1-1S **shall** be the referee material). Copper foil cleaning **shall** be per the manufacturer's normal cleaning procedure. The referee cleaning procedure **shall** be per Table 1.

3.2.2 Prepare twelve specimens according to the procedure outlined for method A of IPC TM-650, method 2.4.9, using appropriate photolithographic processes. Etch four conductors 3.2 mm [0.126 in] wide, 5.7 mm [0.224 in] pitch, 230 - 250 mm [9 - 10 in] long on a nominal 25 mm [1 in] wide strip of flexible base dielectric (see Figure 1).

3.3 Specimen Preparation for Adhesive Bonding Film

3.3.1 Metal-clad flexible base material **shall** be produced from specimens of the adhesive bonding film being evaluated. Adhesive bonding film **shall** be bonded to the shiny side of 34.3 μm [1350 μin] ED copper foil, type CU-E1-1S or RA copper foil, CU-E7-1S per IPC-4562 (CU-E1-1S **shall** be the referee material). Adhesive bonding film **shall** be bonded between the copper foil and CU-E1-1S as support material as illustrated in Figure 2. Copper foil cleaning **shall** be per the manufacturer's normal cleaning procedure. The referee cleaning procedure **shall** be per Table 1, the same as detailed in IPC-4203.

Prepare specimens according to the procedure outlined for method A of IPC TM-650, method 2.4.9, using appropriate

1. www.ipc.org

2. Current and revised IPC Test Methods are available on the IPC Web site (www.ipc.org/html/testmethods.htm)

3. www.astm.org

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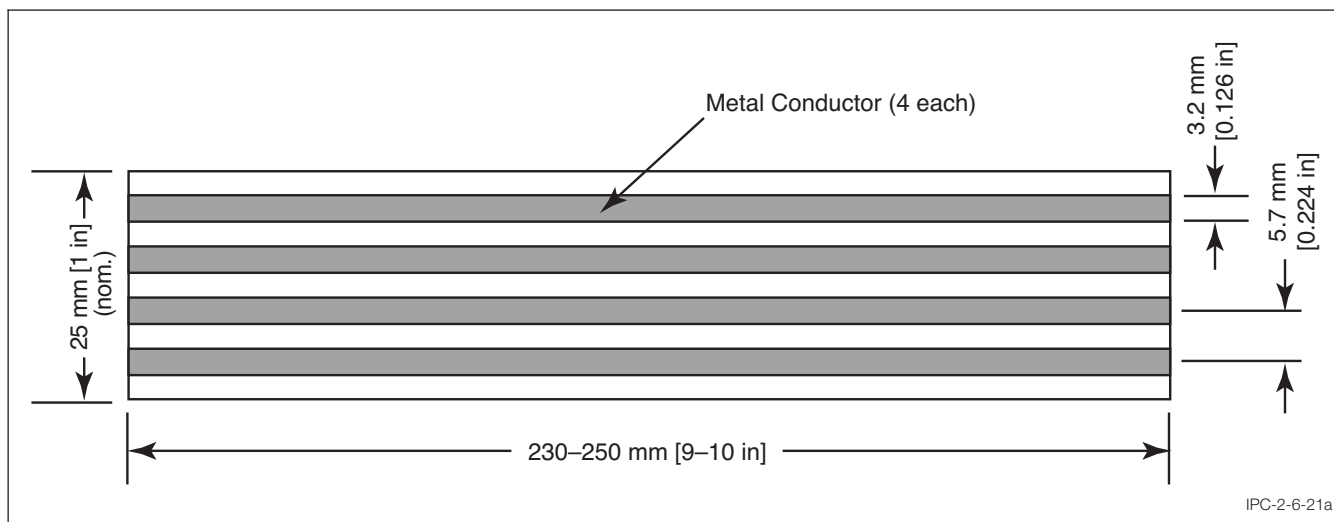


Figure 1 Construction of Specimens for Peel Strength Testing

Table 1 Cleaning Process for Shiny Copper

Step	Process	Material	Temperature	Time
1	Soak Clean	Use commercially available acid or alkaline cleaners	Per supplier recommended temperature	Per supplier recommended time
2	Rinse	Running tap water	Room Temperature	3 - 5 minutes
3	Microetch	Sodium persulfate: Two liters of deionized water, 280 grams of sodium persulfate, 25 cc sulfuric acid	Room Temperature	1 - 2 minutes
4	Rinse	Running tap water	Room Temperature	1 minute
5	Acid Dip	Sulfuric acid 10% by volume, dilution 1.8 liters deionized water, 200 cc sulfuric acid 96% assay	Room Temperature	45 seconds
6	Rinse	Running tap water	Room Temperature	1 minute
7	Rinse	Deionized water	Room Temperature	1 minute
8	Dry	Force air dry or blot with paper towels	Room Temperature	1 - 3 minutes
9	Bake	Bake in clean air-circulating oven	110 ± 5 °C [230.0 ± 9.0 °F]	10 to 15 minutes
10	Lamination	*Maximum delay between bake and lamination shall be 30 minutes		

*Lamination conditions (e.g., pressure, temperature, time, etc.) **shall** conform to suppliers' recommendations.

photolithographic processes such that a minimum of twelve good specimens are yielded at the end of 3.4.5. On the "Test Surface," etch four conductors 3.2 mm [0.126 in] wide, 5.7 mm [0.224 in] pitch, 230 - 250 mm [9 - 10 in] long on a nominal 25 mm [1 in] wide strip of flexible base dielectric (see Figures 1 and 2).

3.4 Conditioning and Aging Procedure

3.4.1 Twelve specimens, as described in section 3, **shall** be subjected to a stabilization period of a minimum of 24 hours at 23 °C ± 2 °C [73.4 °F ± 3.6 °F] and 50% ± 5% RH.