



3000 Lakeside Drive, Suite 309S  
Bannockburn, IL 60015-1249

# IPC-TM-650 TEST METHODS MANUAL

**1 Scope** This method describes a procedure for quantifying the presence of voids in flexible printed board materials.

**1.1 Inclusions** This test method no longer addresses inclusions which are inspected using ASTM D-149.

## 2 Applicable Documents and Terms and Definitions

### 2.1 Applicable Documents

#### 2.1.1 IPC<sup>1</sup>

**IPC-4202** Flexible Base Dielectrics for Use in Flexible Printed Circuitry

**IPC-4203** Cover and Bonding Material for Flexible Printed Circuitry

**IPC-4204** Flexible Metal-Clad Dielectrics for Use in Fabrication of Flexible Printed Circuitry

#### 2.1.2 American Society for Testing and Materials (ASTM)<sup>2</sup>

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

### 2.2 Terms and Definitions

**2.2.1 Void (Bubble/Hole)** The absence of any substances in a localized area.

**3 Specimens** Each specimen: 30 cm x 30 cm [approx. 12 in x 12 in].

### 4 Test Equipment

|   |                      |
|---|----------------------|
| Number<br><b>2.1.13</b>   |                      |
| Subject<br><b>Inspection for Voids in Flexible Printed Board Materials</b>          |                      |
| Date<br><b>05/12</b>  | Revision<br><b>B</b> |
| Originating Task Group<br><b>Flexible Circuits Test Methods Subcommittee (D-15)</b> |                      |

**4.1** A shear, paper cutter or similar cutting tool for cutting 30 cm X 30 cm [12 in X 12 in] samples.

**4.2** Microscope or optical inspection device capable of up to 30X magnification.

**4.3** Etching system capable of removal of metal cladding.

**4.4** Chemical etchant capable of metal removal without detrimental effect to either the adhesive or dielectric.

**4.5** Suitable light table for inspecting 30 cm x 30 cm [approx. 12 in x 12 in] samples.

### 5 Procedure

**5.1 Test Specimen Preparation** Three test specimens 30 cm x 30 cm [approx. 12 in x 12 in] in size are to be prepared for examination/inspection. If the specimens are metal clad, the metal foil is to be 100% removed by chemical etching, followed by rinsing and drying. If the specimens are adhesive-coated on one or both sides, the protective cover sheet(s) is/are to be completely removed.

**5.2 Test Specimen Examination** Using the light table and 30X magnification microscope or optical inspection device, inspect 100% of each of the three 30 cm x 30 cm [approx. 12 in x 12 in] test specimens for voids. Measure and record the number of voids found, along with the longest dimension of each void to the nearest 0.013 mm [500 µin], which is considered to be the size of the void.

Record the size in mm [in], quantity, and type of void found (bubble, hole, etc.). The requirements for number and size of the voids are defined in the appropriate materials specifications: IPC-4202, IPC-4203 or IPC-4204.

1. www.ipc.org  
2. www.astm.org