



IPC-4204A
Amendment 1
2013 - October

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

A standard developed by IPC

Association Connecting Electronics Industries



The Principles of Standardization

In May 1995 the IPC's Technical Activities Executive Committee (TAEC) adopted Principles of Standardization as a guiding principle of IPC's standardization efforts.

Standards Should:

- Show relationship to Design for Manufacturability (DFM) and Design for the Environment (DFE)
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feedback system on use and problems for future improvement

Standards Should Not:

- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

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

Replace Section 1.1.2 with the following:

1.1.2 Specific Designation The specific designation should be in the form shown in the following example, and is intended for use on material purchase orders by *fabricators* (see 6.1). The specific designation should not be used by designers on master drawings to indicate their material selection, as the designation is lengthy and requires fabricator level knowledge in making the detailed selections.

NOTE: The alpha character “Z” replaces and is entirely equivalent to the alpha character “O” (ref: Table 1-5) in the original release (prior revision) of this IPC standard. This interchange of characters within the designation will help alleviate confusion from using both the alpha character “O” and the digit “0” from the original release of this IPC standard. Legacy designs that utilize a designation and material description from the original release of this IPC standard [alpha character “O” (from Table 1-5)] may continue to be used. Supplier material certifications will reflect the current IPC standard’s revision, and accordingly, the alpha character “Z” in the designation.

Example of specific designation:

IPC-4204/1 – E1E2M2/2 CU-W7-1P/IP

Where:

IPC-4204/1 – *Nonspecific Designation (see 1.1.1) specifying copper-clad dielectric with acrylic adhesive*

E – *Base Dielectric Type Designation (see 1.1.2.1) specifying polyimide*

1 – *Reinforcement Method Designation (see 1.1.2.2) specifying non-reinforced*

E – *Reinforcement Type Designation (see 1.1.2.3) specifying non-reinforced film*

2 – *Base Dielectric Thickness Designation (see 1.1.2.4) specifying 50microns [0.002 in]*

M – *Adhesive Type Designation (see 1.1.2.5) specifying acrylic adhesive*

2/2 – *Adhesive Thickness Designation (see 1.1.2.6) specifying 50 micron both sides (Not used for adhesiveless product)*

CU-W7-1P/IP – *Metal Cladding Designation (see 1.1.2.7) specifying wrought rolled annealed copper, 35 microns both sides with no treatment*

Replace Section 2.1 with the following:

2.1 IPC¹

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

IPC-TM-650 Test Methods Manual²

2.1.13 Inspection for Inclusions and Voids in Flexible Printed Wiring Materials

2.2.4 Dimensional Stability, Flexible Dielectric Materials

2.3.2 Chemical Resistance of Printed Wiring Materials

2.4.3 Flexural Endurance

2.4.13 Solder Float

2.4.15 Surface Finish, Metal Foils

2.4.16 Initiation Tear Strength, Flexible Insulating Materials

2.4.17.1 Propagation Tear Strength, Flexible Insulating Materials

2.4.19 Tensile Strength and Elongation, Flexible Printed Wiring Materials

2.5.5.3 Permittivity (Dielectric Constant) and Loss Tangent (Dissipation Factor) of Materials (Two Fluid Cell Method)

2.5.5.5 Stripline Test for Permittivity and Loss Tangent (Dielectric Constant and Dissipation Factor) at X-Band

2.5.5.9 Permittivity and Loss Tangent, Parallel Plate, 1 MHz to 1.5 GHz

2.5.17 Volume and Surface Resistivity of Printed Wiring Materials

- 2.6.1 Fungus Resistance, Printed Wiring Material
- 2.6.2 Moisture Absorption, Flexible Printed Wiring
- 2.6.18 Low Temperature Flexibility
- 2.6.21 Service Temperature of Metal-Clad Flexible Laminated, Cover Material and Adhesive Bonding Films

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

IPC-4203 Cover and Bonding Material for Flexible Printed Circuitry

IPC-4562 Metal Foil for Printed Board Applications

IPC-9191 General Requirements for Implementation of Statistical Process Control

Replace Section 2.5 with the following:

2.5 ISO⁶

ISO 10012-1 Quality Assurance Requirements For Measuring Equipment - Part 1: Metrological Confirmation System For Measuring Equipment

ISO 17025 General Requirements for the Competence of Testing and Calibration Laboratories

Replace Section 3.5.2 with the following:

3.5.2 Wrinkles, Creases, Streaks and Scratches Scratches are not permitted where any part of the defect is $\geq 20\%$ of the nominal foil thickness (i.e., $3.4\ \mu\text{m}$ [$134\ \mu\text{in}$] for $17\ \mu\text{m}$ [$669\ \mu\text{in}$] metal) or have more than five occurrences per $300\ \text{mm} \times 300\ \text{mm}$ [$11.8\ \text{in} \times 11.8\ \text{in}$]. Any scratch with a depth $> 5\%$ of the nominal foil thickness **shall not** be counted, regardless of length. The maximum allowable scratch length is $100\ \text{mm}$ [$3.937\ \text{in}$] for any scratch with a depth $\geq 5\%$ and $< 20\%$ of the nominal foil thickness. Any wrinkles and creases are AABUS. The allowable depth, width and quantity of wrinkles and creases and the allowable height, width and quantity of streaks **shall** be AABUS. After etching of the metal cladding, the adhesive layer **shall** be free of streaks, scratches, voids, gel particles, or contamination, AABUS.

Replace Section 3.9 with the following:

3.9 Electrical Requirements As values may change with construction, environmental and operating frequency variations, it is recommended that the material supplier be contacted to verify the electrical properties.