



ASSOCIATION CONNECTING  
ELECTRONICS INDUSTRIES®

IPC-4204

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

Developed by the Flexible Circuits Base Materials Subcommittee (D-13)  
of the Flexible Circuits Committee (D-10) of IPC



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Users of this standard are encouraged to participate in the  
development of future revisions.

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

## 1 SCOPE

This standard establishes the classification system, the qualification and quality conformance requirements for flexible metal-clad dielectric materials to be used for the fabrication of flexible printed circuitry and flexible flat cable.

This specification supersedes IPC-FC-241C and the requirements herein meet or exceed the requirements for Class 3 in this superseded document. Note that conformance to Class 3 met or exceeded conformance to Classes 1 and 2. IPC-4204 no longer utilizes the 3-class system.

**1.1 Classification System** The system described in 1.1.1 through 1.1.2.7 identifies flexible metal-clad dielectrics.

**1.1.1 Nonspecific Designation** A nonspecific designation is intended for use by designers on master drawings to designate their material choice. Further specification details may be indicated by using the specific designation in drawing notes and purchase documents. At the end of this standard is a series of material specification sheets designated by individual nonspecific designators. Each sheet outlines engineering and performance data for a flexible metal-clad dielectric, indicating base material type, adhesive type and method of reinforcement. The sheets are provided with a number for ordering purposes. For example, if a user wishes to order from specification sheet number 1, the number “1” would be substituted for the “S” in the designation example (i.e., IPC-4204/1).

Example of nonspecific designation:

**IPC-4204/S**

Where *S* is specification sheet number

**1.1.2 Specific Designation** The specific designation **shall** be in the following form and is intended for use on purchase orders (see 6.1). The specific designation **shall** not be used by designers on master drawings to indicate their material selection. Master drawings **shall** indicate the material design by the nonspecific designation, supplemented in notes with the material specification details as defined by the specific designation. This procedure is necessary because the specific designation is normally lengthy and will not fit the field for most computer cataloging.

Example of specific designation:

**IPC-4204/S – C1E2M3/3 CU-W7-1P/IP**

Where:

**IPC-4204/S** – Nonspecific Designation (see 1.1.1)

**C** – Base Dielectric Type Designation (see 1.1.2.1)

**1** – Reinforcement Method Designation (see 1.1.2.2)

**E** – Reinforcement Type Designation (see 1.1.2.3)

**2** – Base Dielectric Thickness Designation (see 1.1.2.4)

**M** – Adhesive Type Designation (see 1.1.2.5)

**3/3** – Adhesive Thickness Designation (see 1.1.2.6)

**CU-W7-1P/IP** – Metal Cladding Designation (see 1.1.2.7)

**Note:** The letter “X” **shall** be entered into the designation where an item is not specified (e.g., dielectric thickness).

**1.1.2.1 Base Material Type** The type of dielectric material **shall** be specified per Table 1-1.

**Table 1-1 Base Dielectric Type Designation**

Designation	Base Dielectric Type
A	Polyvinylfluoride (PVF)
B	Polyethylene Terephthalate Polyester (PET)
C	Fluorinated Ethylene-Propylene Copolymer (FEP)
D	Polytetrafluorethylene (PTFE)
E	Polyimide
F	Aramid
G	Polyamide-imide
H	Epoxy
J	Polyetherimide
K	Polysulfone
L	Polyethylene Naphthalate (PEN)
M	Thermotropic Liquid Crystal Polymer

**1.1.2.2 Reinforcement Method** The reinforcement method **shall** be specified per Table 1-2.

**Table 1-2 Reinforcement Method Designation**

Designation	Reinforcement Method
1	Non-reinforced
2	Nonwoven reinforcement
3	Woven reinforcement
4	Combination woven and nonwoven reinforcement

**1.1.2.3 Reinforcement Type** The reinforcement type **shall** be specified per Table 1-3.

**1.1.2.4 Base Material Thickness** The base material thickness is expressed by a designator (see Table 1-4).

**1.1.2.5 Adhesive Type** The adhesive **shall** be specified per Table 1-5.