

PURPOSE: To set forth the procurement requirements for Copper Clad Laminates (C-stage) and Prepregs (B stage) used by Price Circuits in the manufacture of Printed Circuit Boards.

SCOPE: This specification applies to all manufacturers and suppliers of laminates and prepregs for Price Circuits. It also is a reference for acceptance of materials at Receiving Inspection.

1.0 APPLICABLE DOCUMENTS: Current revision levels apply to all documents listed.

- 1.1 Dimensional Drawing for Prepreg Pre-Punched Hole Locations (Q702-1)
- 1.2 Base Materials Specification for Rigid and Multilayer Printed boards (IPC-4101)
- 1.3 Metal Foil for Printed Wiring Applications (IPC-4562)
- 1.4 Performance Specification for Rigid PWB's (IPC-600, IPC-6012)

2.0 PERSONNEL RESPONSIBLE FOR IMPLEMENTATION:

- 2.1 It is the responsibility of the Manufacturer/Distributor of laminates and prepregs to meet the requirements of IPC-4101 and this specification.
- 2.2 It is the responsibility of Purchaser to inspect the materials upon receipt to ascertain acceptability of the products shipped.

3.0 TERMS AND DEFINITIONS:

- 3.1 Copper-clad laminate: base material (C-staged resin) covered with copper foil on one or both sides.
- 3.2 Base material: The insulating material (rigid or flexible) upon which the conductor pattern may be formed. This base is made from sheets of fiberglass cloth, pre-impregnated with a resin in its final state of cure (C-staged resin)
- 3.3 Grain Direction: Strong cloth or machine direction. A term used in weaving and cloth making that indicates the long threads that are stationary on a loom, with the woof or fill threads being woven in and around them.
- 3.4 Prepreg (B-stage): Sheets of fiberglass cloth impregnated with a resin and cured to an intermediate stage.

4.0 QUALITY ASSURANCE PROVISIONS:

- 4.1 It is the responsibility of the Manufacturer to comply with all inspections in accordance with IPC-4101 and applicable slash sheets to ensure that all products meet the requirements of IPC-4101 and the purchase order. Price Circuits reserves the right to perform any inspection in accordance with IPC-4101 as an incoming quality check.
- 4.2 Materials certification shall consist of a Certificate of Conformance along with Test data/Lab report for each Manufacturer's lot number shipped.
 - 4.2.1 All laminates shall be shipped with a Certificate of Conformance, as well as a test report with test results conforming to the values listed in Table I of this document.
 - 4.2.2 All prepregs shall be shipped with a Certificate of Conformance, as well as a test report with test results conforming to the values listed in Table II of this document.

4.3 Order of Precedence:

4.3.1 Unless stated otherwise on the purchase order, the following shall apply:

1st- Price Circuits Purchase Order

2nd- Price Circuits Procurement Specification (WI-####)

3rd- IPC-4101

4th- Customer Specifications or documents

4.4 Materials Requirements:

4.4.1 Copper Cladding:

4.4.1.1 Copper will be HTE on all laminates with a core thickness of 0.0100" or Laminates with a core thickness of 0.011 0" and thicker DO NOT require HTE copper, unless noted on the purchase order

4.4.1.1.1 In some instances THE copper may not be available, in these cases the vendor is required to notify Price Circuits LLC in writing/ email or by FAX.

4.4.1.2 Cladding surface to be free of resin spots and resin dust.

4.4.1.3 Oxidation or corrosion inhibitor on the copper surface shall not interfere with proper photo resist adhesion or chemical etching to form circuits.

4.4.2 Laminate Core:

4.4.2.1 There shall be no evidence of measling or resin starvation when visually inspecting etched laminate cores.

4.4.2.2 There shall be no foreign inclusions in the laminate core when viewed at 4X with referee magnification at 1 OX.

4.4.2.3 All laminate grain direction will be noted on the purchase order.

4.4.2.3.1 The Production Engineer is allowed to waive the grain direction in writing on the original purchase order.

4.4.2.4 All core laminates shall be fully cured in the press prior to shipping.

4.4.2.5 Laminates shall meet an UL-94-VO flammability rating, with the exception of Isola P95 polyimide, which is UL-94-HB.

4.4.3 Prepreg:

4.4.3.1 Prepreg must be uniformly coated with resin. Resin starved areas and excessive weave exposure will not be acceptable.

4.4.3.2 Prepreg shall meet an UL-94-VO flammability rating, with the exception of Isola P95 polyimide which is UL-94-HB

4.4.3.3 Uncut strings of fiberglass on edges of cut-to-size prepreg sheets are not acceptable.

4.4.3.4 The grain direction will be noted on the purchase order.

4.4.3.4.1 The Production Engineer is allowed to waive the grain direction in writing on the original purchase order.

4.4.3.4.2 Prepreg shall be shipped to Price Circuits with the registration holes pre-punched.

4.4.4 Shelf Life Provisions:

4.4.4.1 Epoxy and polyimide prepregs have a shelf life of 6 months stored in the cooler. Prepreg shall not be shipped that has less than thirty days of shelf life remaining.

4.4.4.2 Any prepreg that is received at Price Circuits and has less than thirty days of shelf life remaining will be eligible for return and replacement by distributor. A corrective action will be issued for this violation.

4.4.4.3 Any waiver of the thirty-day minimum shelf life window will be made by the production Manager and/or called out on the purchase order.

5.0 PACKAGING, LABELING AND SHIPPING:

5.1 Laminates:

5.1.1 Each sheet of laminate will be marked on the short dimension edge (by impression stamp or ink-stamp) with core thickness and copper weight.

5.1.2 When laminates have uneven copper weights, the heavier copper side will be marked with the copper weight by ink stamp/impression stamp.

5.1.3 Laminates must be wrapped in packages of no more than 25 pieces up to and including .014" core material. Anything over .014" core must be wrapped in packages of 10 pcs not to exceed 15 pounds per package Several containers may be banded together on a pallet for shipment.

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5.1.4 A container shall hold material from only one (1) purchase order. DO NOT mix multiple lot numbers in the same container.

5.1.5 Each package must be labeled with:

- Manufacturer's lot number
- Quantity Shipped
- Date of Manufacture
- Grain direction
- Manufacturer's UL grade

5.2 Prepregs:

5.2.1 Materials must be vacuum bagged with a maximum number of pieces per bag:

Cloth Style	Max. Pcs. per Bag
0106/1080	200
2113	200
2116	200
7628	100

5.2.2 Each bag must be labeled with:

- Manufacturer's lot number
- Quantity Shipped
- Ship date

- Grain direction
- Manufacturer's UL grade

5.2.2.1 Labels must be placed on short dimension edge. Each bag is to hold one (1) manufacturers lot number only.

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**LAMINATE TEST REPORT
REQUIREMENTS**

TABLE 1

1. Price Circuits Purchase Order Number
2. Part Number Description
3. Statement that materials listed meet the requirements of IPC-4101.
4. Manufacturer's lot number
5. Date of manufacture
6. Quantity (Total# of pieces shipped)
7. Vendor's material description (Manufacturer's grade as certified by U.L.)
8. Length and width
9. Strong cloth (grain) direction
10. Construction
- 11 . Peel Strength (inch/inch)

**PREPREG TEST REPORT
REQUIREMENTS**

TABLE 2

1. Price Circuits Purchase Order Number
2. Part Number Description
3. Statement that materials listed meet the requirements of IPC-4101.
4. Manufacturer's lot number
5. Date of manufacture and/or expiration date
6. Quantity (Total# of pieces shipped)
7. Vendor's material description (Manufacturer's grade as certified by U.L.)
8. Length and width
9. Strong cloth (grain) direction
10. Cloth style
- 1.0 11. Resin content %