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# IPC-4101

## Specification for Base Materials for Rigid and Multilayer Printed Boards

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# Specification for Base Materials for Rigid and Multilayer Printed Boards

## 1.0 GENERAL

**1.1 Scope** This specification covers the requirements for base materials, herein referred to as laminate or prepreg, to be used primarily for rigid or multilayer printed boards for electrical and electronic circuits.

**1.2 Classification** The system shown below identifies clad and unclad laminate or prepreg base materials. A cross-reference list, which connects the outlined call-out system in this document to previously used systems is shown in the specification sheet section.

Example for laminate base materials where IPC-4101 is referenced:

<b>L</b>	<b>25</b>	<b>1500</b>
Material Designator (see 1.2.1)	Specification Sheet Number (see 1.2.1)	Nominal Laminate Thickness (see 1.2.2)
<b>C1/C1</b>	<b>A</b>	<b>A</b>
Metal Cladding Type and Nominal Weight/Thickness (see 1.2.3)	Thickness Tolerance Class (see 1.2.4)	Surface Quality Class (see 1.2.5)

Example for prepreg base materials where IPC-4101 is referenced:

<b>P</b>	<b>25</b>	<b>E7628</b>
Material Designator (see 1.2.1)	Specification Sheet Number (see 1.2.1)	Reinforcement Style (see 1.2.6)
<b>TW</b>	<b>RE</b>	<b>VC</b>
Resin Content Method - Column A (see 1.2.7)	Flow Parameter Method - Column B (see 1.2.7)	Optional Prepreg Method - Column C (see 1.2.7)

**1.2.1 Specification Sheet Description** At the end of this document is a series of specification sheets. Each sheet outlines requirements for both laminate and prepreg for each product grade. The specification sheets are organized by a specific reinforcement type, resin system, and/or construction and are provided with a Specification Sheet Number for ordering purposes. The laminate and prepreg requirements for materials of the like composition are on the same specification sheet for convenience. Material Designator "L" indicates laminate material and Material Designator "P" indicates prepreg material as shown in the above designation examples.

**1.2.2 Nominal Laminate Thickness** The nominal thickness is identified by four digits. For all substrates covered

by this document, thicknesses may be specified or measured either over the cladding or over the dielectric (see 1.2.4 and 3.8.4.2). For metric specification, the first digit represents whole millimeters, the second represents tenths of millimeters, etc. For orders requiring English units, the four digits indicate the thickness in ten-thousandths of an inch (tenths of mils). In the example shown in 1.2, 1500 is designated for the English usage of 0590.

**1.2.3 Metal Cladding Type Nominal Weight/Thickness**

The type and nominal weight or thickness of the metallic cladding for laminate base material is identified by five designators, with the first and fourth designators indicating type of cladding, the third designator being a slash mark to differentiate sides of the base material, and the second and fifth designators indicating the nominal weight or thickness of the metallic cladding.

**1.2.3.1** The types of metallic cladding and the designators representing them are shown in Table 1. This table is provided as a reference only. The referee document is the latest version of IPC-CF-148, IPC-MF-150, or IPC-CF-152 as appropriate. Cladding types C and R, and H and S, respectively, may be used interchangeably as agreed upon between user and supplier.

**Table 1 Metal Cladding Types**

A – Copper, wrought, rolled (IPC-MF-150, grade 5)
B – Copper, rolled (treated)
C – Copper, electrodeposited (IPC-MF-150, grade 1)
D – Copper, electrodeposited, double treat (IPC-MF-150, grade 1)
G – Copper, electrodeposited, high ductility (IPC-MF-150, grade 2)
H – Copper, electrodeposited, high temperature elongation (IPC-MF-150, grade 3)
J – Copper, electrodeposited, annealed (IPC-MF-150, grade 4)
K – Copper, wrought, light cold rolled (IPC-MF-150, grade 6)
L – Copper, wrought, annealed (IPC-MF-150, grade 7)
M – Copper, wrought, rolled, low temperature annealable (IPC-MF-150, grade 8)
P – Copper, electrodeposited, high temperature elongation, double treat (IPC-MF-150, grade 3)
R – Copper, reverse treated electrodeposited (IPC-MF-150, grade 1)
S – Copper, reverse treated electrodeposited, high temperature elongation (IPC-MF-150)
T – Copper, copper foil parameters as dictated by contract or purchase order
U – Aluminum
Y – Copper invar copper
N – Nickel
O – Unclad
X – Other, as agreed between user and supplier