Australian Standard®

PRINTED BOARDS

Part 3—DESIGN AND USE

This Australian Standard was prepared by Committee TE/6, Printed Circuits. It was approved on behalf of the Council of the Standards Association of Australia on 30 March 1988 and published on 15 July 1988.

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Confederation of Australian Industry
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PREFACE

This Standard was prepared by the Association's Committee on Printed Circuits and is applicable to printed boards, irrespective of their method of manufacture, prepared for the mounting of the components. It forms Part 3 of AS 2546 in a series on printed boards.

It is based on a revision of IEC 326-3.* Part of the 1980 edition of IEC 326-3 has been used already in AS 2546.1, to provide guidance for the designer, but this Standard provides further information.

This Standard contains fundamental information on the design and the application of printed boards, their technical limitations and the features which are expected and can normally be obtained. It is intended to provide guidance to both the designer and the user of printed boards and printed board assemblies.

Forms of printed board covered by the Standard include:

(a) Rigid or semi-rigid single-sided board.

(b) Rigid or semi-rigid double-sided board with or without interconnection through the board.

(c) Rigid or semi-rigid multilayer board; interconnections between layers made by plated-through holes.

(d) Printed wiring on a flexible base material as individual flexible wiring or in conjunction with (a), (b), or (c) above.

The Standard begins with the selection of a suitable base material, discussing also the process to be used and whether surface finishes are required. After briefly discussing connections, dimensions are discussed in some detail. Guidance is given on electrical characteristics and important mechanical characteristics such as adhesion of the printed pattern to the board. Finally packaging of boards is detailed to provide for preservation of the solderability of the board and to protect it against degradation from humidity, contamination due to handling, dust and atmospheric materials such as ozone, sulphur dioxide or other corrosive industrial gases.

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* IEC 326-3, *Printed boards,* Part 3: *Design and use of printed boards.*

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
PRINTED BOARDS

PART 3: DESIGN AND USE

1 SCOPE. This Standard relates to all types of printed boards irrespective of the method of manufacture, to provide guidance to both the designer and the user of printed boards on matters relating to specification, design and application.

2 REFERENCED DOCUMENTS. The following Standards are referred to in this Standard:

AS
1521 Grid system for printed circuits
1560 Recommendations for the design and use of components intended for mounting on printed circuit boards
2420 Fire test methods for solid insulating materials and non-metallic enclosures used in electrical equipment
2546 Printed boards
Part 0: Terms and definitions
Part 1: General requirements and test methods
3250 Approval and test specification—Mains operated electronic and related equipment for household and similar general use
3508 Printed board assemblies
Part 4: Acceptability of solder joints—Pictorial representation (AS 3508.4)

IEC
216 Guide for the determination of thermal endurance properties of electrical insulating materials
249 Base materials for printed circuits
Part 1: Test methods
Part 2: Specifications

ANSI/UL94 Tests for flammability of plastic materials for parts in devices and appliances

3 DEFINITIONS. For the purpose of this Standard the definitions of AS 2546.0 apply.

4 MATERIALS AND SURFACE FINISHES.

4.1 Materials.

4.1.1 *General.* The engineer concerned with the design of a printed board should choose suitable materials taking into consideration the following matters.

(a) Process to be used (subtractive, additive, semi-additive).
(b) Type of board (single-sided, double-sided, multilayer, flexible).
(c) Electrical properties.
(d) Mechanical properties.
(e) Special properties, e.g. flammability and combustion characteristics, machinability, flexibility.

The process to be used determines whether a metal-clad base material (subtractive process) or an unclad base material (additive or semi-additive process) must be chosen.

Consequently, the material for printed boards will be either—

(a) copper-clad synthetic resin bonded sheet or copper-clad polymeric film, where the conductive patterns are obtained by selective removal of the unwanted portions of the conductive foil; or
(b) unclad synthetic resin bonded sheet or polymeric film, where the conductive patterns are obtained by selective deposition of conductive materials on unclad base material.

In Table 1 qualitative criteria are given for choosing materials for printed boards. Table 1 does not cover all materials but only those in general use.

Preferably the materials standardized by IEC should be used, e.g. IEC 249-2 contains specifications for rigid and flexible copper-clad base materials and for bonding sheet materials for use in manufacture of multilayer printed boards.

If there is no recognized specification available for the required materials, a suitable Standard detailing its properties should be prepared.

This should be done—

(a) by using the methods of test in IEC 249-1;
(b) by following the layout and format of IEC 249-2; or
(c) in conjunction with the material supplier.

Where special properties are essential, they should be defined and specified in conjunction with the material supplier.

4.1.2 *Description of materials for printed boards.*

4.1.2.1 *General.* Where maximum operating temperatures are quoted in the following descriptions, they are intended only for guidance, and do not imply that abrupt changes in performance or in rates of ageing will occur if they are exceeded.

Furthermore, it should be noted that certain material properties may be influenced by factors, such as the design of the printed board (e.g. board thickness, amount and distribution of metal, number of layers, solder resist) and production processes (e.g. laminating process for multilayer printed boards) to such an extent that the readily processed printed boards exhibit properties which differ considerably from the original material properties.

For a precise definition of the thermal characteristics of materials, see IEC 216.