

Printed wiring boards —

Part 24: Guide for the production of artwork

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Components Standards Policy Committee (ECL/-) to Technical Committee ECL/19, upon which the following bodies were represented:

- British Telecommunications plc
- ERA Technology Ltd.
- Electrical and Electronic Insulation Association (BEAMA Ltd.)
- Electronic Components Industry Federation
- Electronic Engineering Association
- GAMBICA (BEAMA Ltd.)
- Institute of Circuit Technology
- Institute of Metal Finishing
- Institution of Production Engineers
- Ministry of Defence
- National Supervising Inspectorate
- Printed Circuit Association
- Telecommunication Engineering and Manufacturing Association (TEMA)

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National foreword

This Part of BS 6221 has been prepared under the direction of the Electronic Components Standards Policy Committee. It is identical with IEC 321-3:1990 “*Auxiliary printed board information, Part 3 Guidelines for artwork*”, published by the International Electrotechnical Commission (IEC).

This Part is one of a series of specifications for printed wiring boards.

Cross-references

International standard	Corresponding British Standard
IEC 68-1:1988	BS 2011 Environmental testing Part 1.1:1989 General and guidance (Identical)
IEC 194:1988	BS 4727 Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms Part 1 Terms common to power, telecommunications and electronics Group 11:1991 Printed circuits (Identical)

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This International Standard defines the information necessary to describe the conductive and the non-conductive patterns of a printed board, particularly where artwork masters or original production masters are prepared by the customer and used by a manufacturer in the fabrication of printed boards. This standard applies to the method of preparation of the artwork master or the original production master, irrespective of the method of fabrication of the printed board.

This standard establishes uniform requirements for the quality of artwork masters and of original production masters. In addition, it defines the attributes to be assessed and the test methods to be used in judging this quality.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

68-1:1988, *Environmental testing — Part 1: General and guidance*.

194:1988, *Terms and definitions for printed circuits*.

3 General

When ordering printed boards, the customer has to give sufficient information to the manufacturer on the desired conductive and non-conductive (for example solder mask, legend) pattern(s). This information may be given, for example, as follows:

- a) diagram of the electrical circuit;
- b) layout sketch;
- c) artwork master;
- d) original production master;
- e) production master;
- f) multiple image production master;
- g) data medium (for example punched or magnetic tape).

The kind of presentation depends on the facilities of both manufacturer and customer and shall, of course, be carefully agreed upon.

4 Artwork

4.1 Electrical diagram, layout sketch, requirement for non-conductive patterns

Where a diagram of the electrical circuit or a layout sketch or requirement for non-conductive pattern is given to the manufacturer, all relevant artwork steps are made by the manufacturer and the responsibility for suitability and accuracy of the artwork is with the manufacturer.

Normally the customer will judge and approve the first printed board prior to total production being started. However, since requirements specified by the customer and production facilities vary so widely, consultation between customer and manufacturer will always be necessary and all details should be carefully agreed upon.

4.2 Artwork master

The artwork master is a primary tool from which the original production master (intermediate tool) and/or the single or multiple image production masters (production tools) are directly copied. Therefore, the artwork master has to be as accurate as necessary for the accuracy desired for the printed board and it has to take into account process aspects as necessary, for example allowance to compensate the influence of the process used. See 5.5.3.

Since customer requirements and production facilities vary so widely, close cooperation and consultation between customer and manufacturer is advisable. Where the artwork master is prepared by the customer, the manufacturer will judge and approve the artwork master. The customer may judge and approve the original production master or the first printed boards prior to total production being started. All details should be carefully agreed upon.

4.3 Original production master

The original production master is a master tool from which the single or multiple image production masters, i.e. the production tools, are directly copied. Therefore, the original production master has to be as accurate as necessary for the accuracy desired for the printed board and it has to take into account process aspects as necessary, for example allowance to compensate the influence of the process used (see 5.5.3).

Since customer requirements and production facilities vary so widely, close cooperation and consultation between customer and manufacturer is advisable. Where the original production master is prepared by the customer, the manufacturer will judge and approve the original production master. The customer may judge and approve the manufacturer's copy of the original production master or the first printed boards prior to total production being started. All details should be carefully agreed upon.

NOTE In some cases, the original production master is used as production master, for example where the number of printed boards to be made is very small or prototype printed boards are urgently needed. In this case, all details should be carefully agreed upon.

4.4 Production master

The single image or multiple image production master is a tool generally prepared by the manufacturer. Consequently, it is not a subject of special agreements between customer and manufacturer.

4.5 Data medium

The use of data media, for example punched or magnetic tapes, depends on the facilities of both manufacturer and customer. No general rules can be given. All technical and procedural details have to be carefully agreed upon between manufacturer and customer.

5 Characteristics and requirements of original production master and artwork master when these are supplied by the customer to the manufacturer of the printed boards

5.1 General

There shall be at least one original production master for each conductive pattern and for each non-conductive pattern (for example solder mask, legend) that has to be applied. The pattern may be positive or negative (see IEC 194, terms 04-03 through 04-06). The presentation may be right reading emulsion up or right reading emulsion down.

It shall be agreed upon between customer and manufacturer whether the original production master shall be positive or negative. It shall be stated whether the right reading is seen on the emulsion side or on the carrier side of the original production master.

illustrates an example.

5.2 Materials

The carrier material of the original production master may be glass or safety film with a minimum thickness of 0,18 mm. The material shall have good dimensional stability, i.e., dimensional changes due to changes in ambient temperature and/or humidity shall be very small. For details, see Annex B.

The photographic emulsion used shall have high contrast (steep gradation curve), good definition (sharply delineated contour lines) and high resolution (see also 5.5.4).

NOTE Litho-type and line-type emulsions are often used for all types of artwork, while diazo emulsion is acceptable for production masters only.

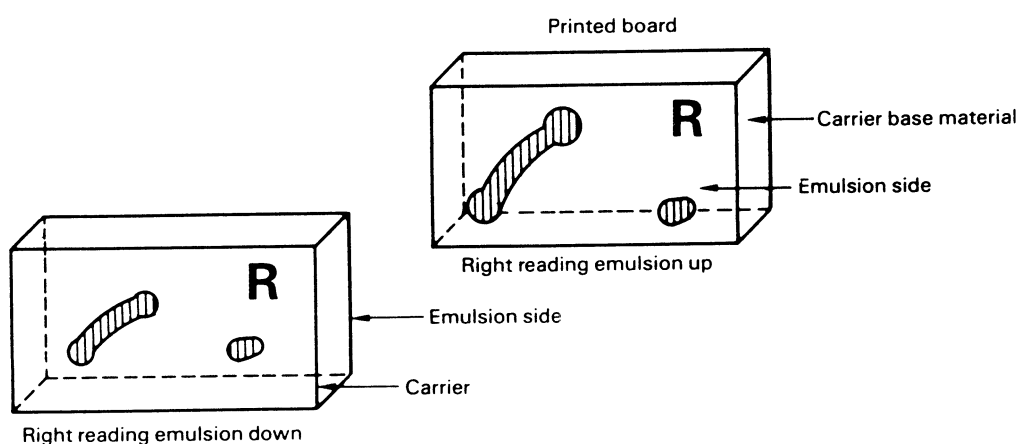


Figure 1 — Emulsion readings