

Specification for

Metal-clad base materials for printed circuits —

Part 15: Adhesive coated polymeric
films: PETP-F-15 and PI-F-15

Cooperating organizations

The Electronic Components Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following Government department and scientific and industrial organizations:

- British Electrical and Allied Manufacturers' Association (BEAMA)
- Electrical Supply Industry in England and Wales*
- Electronic Components Industry Federation*
- Electronic Engineering Association*
- Institution of Electronic and Radio Engineers
- Ministry of Defence*
- National Supervising Inspectorate
- Post Office*
- Society of British Aerospace Companies Limited*
- Telecommunication Engineering and Manufacturing Association (TEMA)*
- Trades Union Congress

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- Association of Circuit Technologists
- British Plastics Federation
- British Radio Equipment Manufacturers' Association
- Electrical Research Association
- Institute of Metal Finishing
- Institution of Production Engineers
- Scientific Instrument Manufacturers' Association

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Foreword

This British Standard has been prepared under the direction of the Electronic Components Standards Committee and is Part 15 of BS 4584.

BS 4584 deals with base materials for printed circuits, and is published in a number of separate Parts. Part 1 deals with general methods of test and the remaining Parts contain the requirements for individual types of base material. This Part of BS 4584 deals with materials designated PETP-F-15 and PI-F-15. The letters PETP denote polyester (polyethylene terephthalate), PI denotes polyimide, F denotes flexible and 15 is a serial number.

The materials specified in this Part of the standard are for use in conjunction with the flexible copper-clad films specified in Parts 9 and 10.

IEC Publication 249 is similar to, but not identical with, BS 4584. Part 1 deals with methods of test and is similar to BS 4584-1. Part 2 contains specifications for separate metal-clad base materials, some of which are similar to parts of BS 4584. Part 3 contains specifications for special materials used in connection with printed circuits, but does not include materials equivalent to PETP-F-15 and PI-F-15.

Some of the methods of test referred to in this specification are given in BS 4584-1, and the remainder are given in clauses 8 to 17 in this Part of the standard.

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.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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 Part of this British Standard specifies the requirements for properties of adhesive coated polymeric films of polyester (polyethylene terephthalate)¹⁾ designated PETP-F-15 and polyimide designated PI-F-15.

The application of these materials is their lamination under heat and pressure to flexible printed circuits as cover sheets, mainly for the encapsulation of circuits but also to provide local support in areas subject to mechanical stress.

This standard includes optional requirements which do not form a mandatory part of the standard. Adhesive coated films complying with all the requirements not marked “optional” shall be deemed to comply with the requirements of this British Standard.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Materials and construction

3.1 General. The materials consist of flexible polymeric films of polyester (3.2) and polyimide (3.3) coated with an adhesive on one or both sides.

3.2 Polyester film. The preferred nominal thicknesses are given in Table 1. The thickness of the film at any point, when measured by the method specified in clause 8 shall not deviate from the nominal thickness by more than the value shown in Table 1.

NOTE Other thicknesses may be used.

Table 1 — Preferred thicknesses and permitted deviations of polyester film

Nominal thickness	Maximum permitted deviation at any point
μm	%
12	} ± 15
23	
36	
50	
75	
100	
125	

3.2.1 Adhesive for use with polyester film. The adhesive may be thermoplastic or thermosetting and it shall be compatible with the materials that comply with the requirements of BS 4584-9 with which the adhesive is used. The type and thickness of adhesive used are not specified in this standard.

3.3 Polyimide film. The preferred nominal thicknesses are given in Table 2. The thickness of the film at any point, when measured by the method specified in clause 8 shall not deviate from the nominal thickness by more than the value shown in Table 2.

NOTE Other thicknesses may be used. Where the nominal thickness is not one of the preferred values, then the deviation for the next higher preferred nominal thickness applies.

Table 2 — Preferred thicknesses and permitted deviations of polyimide film

Nominal thickness	Maximum permitted deviation at any point
μm	%
12.5	± 30
25	± 20
50	± 15
75	± 10
125	± 10

3.3.1 Adhesive for use with polyimide film. The adhesive may be thermoplastic or thermosetting and it shall be compatible with the materials that comply with the requirements of BS 4584-10 with which the adhesive is to be used. The type and thickness of adhesive used are not specified in this standard.

4 Marking

Each roll or package shall be marked:

- to identify the manufacturer;
- to identify the film as polyester or polyimide;
- to show the nominal thickness of the film;
- to show the type and nominal thickness of the adhesive;
- to show whether the adhesive is on one or both sides;
- to show whether the product is of defined flammability, in which case all marks shall be in red; otherwise they shall not be in red;
- to identify the batch or roll number, or both;
- to show the nominal width and effective length of material supplied in roll form after allowing for any marked defects (see 5.4); alternatively to show the number and nominal dimensions of sheets;

¹⁾ See BS 3502:1967.

- i) to show the machine direction of material supplied in sheet form.

The information required may be incorporated partly or wholly into the manufacturer's reference code.

When material is in roll form, this information shall be marked on the supporting formers.

5 Properties of the adhesive coated film

5.1 General. When material is supplied in roll form the requirements of **5.2** and **5.3** shall only apply to material which is farther than 6 mm from each edge.

5.2 Surface finish and appearance. The material shall be free from wrinkles and shall have a smooth adhesive layer. It shall also be substantially free from blisters, pinholes, deep scratches and other visible defects.

5.3 Inclusions between film and adhesive.

When the material is inspected in accordance with the requirements of **2.2.8** of BS 4584-1:1970, the requirements of Table 3 shall be complied with.

Table 3 — Sizes and permitted number of inclusions

Maximum dimension of delaminated area		Maximum permitted number of inclusions	
Above	Not above	In any area of 1 m ²	In any area* of 0.1 m ²
mm	mm		
0	0.25	Any number	Any number
0.25	0.5	150	30
0.5	1.0	30	8
1.0	2.0	10	2
2.0		0	0

5.4 Material supplied in roll form. Material supplied in roll form, which in part does not comply with the requirements of **5.2** or **5.3** may be left on the roll. However, defective lengths, which shall be considered to be not less than 0.3 m long, shall be clearly marked with a "flag" which shall be visible from the edge of the roll. In addition the defective lengths shall not be included in the statement of material length that is claimed to comply with the requirements of this standard.

5.5 Dimensional stability (optional). When tested by the method specified in clause **15**, the average dimensional change in either direction shall not exceed the following on any specimen:

PETP-F-15	Not specified
PI-F-15	3.5 mm/m

²⁾ 1 kPa = 1 kN/m²

6 Properties of the adhesive coated film after lamination as a cover sheet

The requirements of Table 4 shall be complied with after the adhesive coated film under test has been laminated to copper-clad film of the same type, as described in clause **9**.

7 Packaging and dimensions

7.1 General. Material supplied in either roll, sheet or panel form shall be adequately packed in cases or crates to avoid damage and contamination during transit and storage.

7.2 Materials supplied in roll form. Materials supplied in this form shall comply with the following requirements.

7.2.1 Material shall preferably be interleaved with a slip sheet for the entire length of the roll.

7.2.2 There shall be no more than two splices in any 100 m length of a roll.

7.2.3 The deviation in length of rolls of material shall not exceed $\pm 1\%$ of the nominal length of defect-free material (see **5.4**).

7.2.4 The deviation in width of material supplied as manufactured shall not exceed ± 25 mm.

7.2.5 The deviation in width of material slit to a specified width shall not exceed ± 1.5 mm.

7.2.6 Material shall be firmly reeled on formers of an internal diameter not less than 50 mm.

7.3 Materials supplied in sheet or panel form. Materials supplied in this form shall be packed flat and in such a manner as to avoid damage due to creasing or bending.

NOTE Each sheet or panel should preferably be interleaved with a slip sheet.

8 Determination of thickness

8.1 Apparatus. A dead-weight dial-type micrometer having two ground and lapped co-axial circular surfaces, flat within 0.001 mm and parallel to within 0.003 mm, shall be used. The upper surface, or pressure foot, shall be 6 mm to 8 mm in diameter and the lower surface shall be larger than the upper one. The upper surface shall move on the axis perpendicular to the two faces.

The dial shall be graduated to read directly to 0.002 mm. The frame of the micrometer shall be of such rigidity that a load of 15 N applied to the dial housing, in contact with neither the weight nor the pressure-foot spindle, will produce a deflection of the frame not greater than 0.003 mm as indicated on the micrometer dial. The pressure exerted on the specimen shall be 10 kPa to 20 kPa²⁾.