

Materials for printed boards and other interconnecting structures —

Part 2-4: Reinforced base materials, clad and unclad — Polyester non-woven/woven fibreglass laminated sheet of defined flammability (vertical burning test), copper-clad

The European Standard EN 61249-2-4:2002 has the status of a British Standard

ICS 31.180

National foreword

This British Standard is the official English language version of EN 61249-2-4:2002. It is identical with IEC 61249-2-4:2001.

The UK participation in its preparation was entrusted to Technical Committee EPL/501, Electronic assembly technology, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 8 May 2002

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 20, an inside back cover and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

© BSI 8 May 2002

ISBN 0 580 39606 1

Materials for printed boards and other interconnecting structures
Part 2-4: Reinforced base materials, clad and unclad –
Polyester non-woven/woven fibreglass laminated sheet
of defined flammability (vertical burning test), copper-clad
(IEC 61249-2-4:2001)

Matériaux pour circuits imprimés et autres structures d'interconnexion
Partie 2-4: Matériaux de base renforcés, plaqués et non plaqués –
Feuille stratifiée en fibres de verre non tissées/tissées polyester, d'inflammabilité définie (essai de combustion verticale), plaquée cuivre
(CEI 61249-2-4:2001)

Materialien für Leiterplatten und andere Verbindungsstrukturen
Teil 2-4: Kaschierte und unkaschierte verstärkte Basismaterialien - Kupferkaschierte mit Glaswirrfaser-Innenlagen/Glasgewebe-Deckenlagen verstärkte Polyesterharz-Laminattafeln mit definierter Brennbarkeit (Brennprüfung mit vertikaler Prüflingslage)
(IEC 61249-2-4:2001)

This European Standard was approved by CENELEC on 2002-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 91/267/FDIS, future edition 1 of IEC 61249-2-4, prepared by IEC TC 91, Electronics assembly technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61249-2-4 on 2002-03-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2002-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-03-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annex A is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61249-2-4:2001 was approved by CENELEC as a European Standard without any modification.

CONTENTS

1	Scope	4
2	Normative references.....	4
3	Materials and construction	4
3.1	Insulating base	4
3.2	Metal foil.....	5
3.3	Reinforcement	5
4	Internal marking.....	5
5	Electrical properties	5
6	Non-electrical properties of the copper-clad laminate	5
6.1	Appearance of the copper-clad sheet	5
6.2	Appearance of the unclad face.....	7
6.3	Laminate thickness	7
6.4	Bow and twist	7
6.5	Properties related to the copper foil bond	7
6.6	Punching and machining	8
6.7	Dimensional stability	8
6.8	Sheet sizes	9
6.9	Cut panels	9
7	Non-electrical properties of the base material after removal of the copper foil.....	10
7.1	Appearance of the dielectric base material	10
7.2	Flexural strength.....	10
7.3	Flammability	11
7.4	Water absorption	11
7.5	Measling	11
7.6	Glass transition temperature and cure factor	12
7.7	Thermal coefficient of expansion.....	12
8	Quality assurance	12
8.1	Quality system	12
8.2	Responsibility for inspection.....	12
8.3	Qualification inspection	12
8.4	Quality conformance inspection	12
8.5	Certificate of conformance	13
8.6	Safety data sheet.....	13
9	Packaging and marking.....	13
10	Ordering information	13
11	Acceptance testing.....	14
	Annex A (informative) Conversion table for test method numbers.....	15
	Annex ZA (normative) Normative references to international publications with their corresponding European publications	20

MATERIALS FOR PRINTED BOARDS AND OTHER INTERCONNECTING STRUCTURES –

Part 2-4: Reinforced base materials, clad and unclad – Polyester non-woven/woven fibreglass laminated sheet of defined flammability (vertical burning test), copper-clad

1 Scope

This standard gives requirements for properties of polyester woven fibreglass reinforced surface/non-woven fibreglass reinforced core copper-clad laminated sheet, of defined flammability, in thicknesses of 0,80 mm to 1,60 mm.

Some property requirements may have several classes of performance. The class desired must be specified on the purchase order, otherwise the default class of material will be supplied.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61189-2:1997, *Test methods for electrical materials, interconnection structures and assemblies – Part 2: Test methods for materials for interconnection structures*
Amendment 1: 2000

IEC 61249-5-1:1995, *Materials for interconnection structures – Part 5: Sectional specification set for conductive foils and films with or without coatings – Section 1: Copper Foil (for the manufacture of copper-clad base materials)*

ISO 9000:2000, *Quality management systems – Fundamentals and vocabulary*

ISO 11014-1:1994, *Safety data sheet for chemical products – Part 1: Content and order of sections*

ISO 14001:1996, *Environmental management systems – Specification with guidance for use*

3 Materials and construction

The sheet consists of an insulating base with metal-foil bonded to one side or both.

3.1 Insulating base

A laminate comprised of polyester woven fibreglass reinforced surface layers with a polyester non-woven fibreglass reinforced core. Its flame resistance is defined in terms of the flammability requirements of 7.3.

3.2 Metal foil

Copper as specified in IEC 61249-5-1, copper foil (for the manufacture of copper-clad materials). The preferred foils are electrodeposited, of defined ductility.

3.3 Reinforcement

Non-woven E-glass reinforcement: non-woven E-glass fabric (for the manufacture of copper-clad materials).

Woven E-glass reinforcement: woven E-glass fabric (for the manufacture of copper-clad materials).

4 Internal marking

None required.

5 Electrical properties

The electrical property requirements are shown in table 1.

Table 1 – Electrical properties requirements

Property	Test method (IEC 61189-2)	Requirement
Resistance of foil	2E12	As specified in IEC 61249-5-1
Surface resistance after damp heat while in the humidity chamber (optional)	2E03	$\geq 1\ 000\ \text{M}\Omega$
Surface resistance	2E03	$\geq 10\ 000\ \text{M}\Omega$
Volume resistivity after damp heat while in the humidity chamber (optional)	2E04	$\geq 1\ 000\ \text{M}\Omega\text{m}$
Volume resistivity after damp heat and recovery	2E04	$\geq 10\ 000\ \text{M}\Omega\text{m}$
Relative permittivity	2E10	$\leq 4,1$
Dissipation factor after damp heat and recovery	2E10	$\leq 0,030$
Electric strength (less than 0,5 mm thickness)	2E11	To be agreed upon between purchaser and supplier
Surface resistance at 125 °C	2E07	$\geq 500\ \text{M}\Omega$
Volume resistivity at 125 °C	2E07	$\geq 100\ \text{M}\Omega\text{m}$

6 Non-electrical properties of the copper-clad laminate

6.1 Appearance of the copper-clad sheet

The copper-clad face shall be substantially free from defects that may have an impact on the materials' fitness for use for the intended purpose.

For the following specific defects the requirements given shall apply when inspection is made in accordance with IEC 61189-2 method 2M18.

6.1.1 Indentations (pits and dents)

The size of an indentation, usually the length, shall be determined and given a point value to be used as measure of the quality.

Size mm	Point value for each indentation
0,13 – 0,25	1
0,26 – 0,50	2
0,51 – 0,75	4
0,76 – 1,00	7
over 1,00	30

The total point count for any 300 mm × 300 mm area shall be calculated to determine the class of the material.

- Class A 29 maximum
- Class B 17 maximum
- Class C 5 maximum
- Class D 0
- Class X to be agreed upon by user and supplier

The required class of material shall be specified in the purchase order. Class A applies, unless otherwise specified.

6.1.2 Wrinkles

There shall be no wrinkles in the copper surface.

6.1.3 Scratches

Scratches deeper than 20 % of the nominal thickness of the foil are not permitted. For a thick foil, the maximum scratch depth shall not exceed 10 µm.

Scratches with a depth less than 5 % of the nominal thickness of the foil shall not be counted unless this depth is 10 µm or more.

Scratches with a depth between 5 % and 20 % of the nominal thickness of the foil are permitted to a total length of 100 mm for a 300 mm × 300 mm area.

6.1.4 Raised areas

Raised areas are usually impressions in the press plates used during manufacture but may also be caused by blisters or inclusions of foreign particles under the foil.

Raised areas caused by blisters or inclusions are not permitted.

Raised areas that are impressions of defects in press plates are permitted to the following extent:

- Class A and X material: maximum height 15 µm and maximum length 15 mm
- Class B and C material: maximum height 8 µm and maximum length 15 mm
- Class D material: maximum height 5 µm and maximum length 15 mm