SLOVENSKI STANDARD

SIST EN 60249-2-5:1997

01-avgust-1997

Base materials for printed circuits - Part 2: Specifications - Specification No.5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test) (IEC 249-2-5:1987 + A2:1992)

Base materials for printed circuits -- Part 2: Specifications - Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)

Basismaterialien für gedruckte Schaltungen -- Teil 2: Einzelbestimmungen - Einzelbestimmung Nr. 5: Kupferkaschierte Epoxidharz-Glashartgewebetafeln definierter Brennbarkeit (Prüfung mit vertikaler Probenlage)

Matériaux de base pour circuits imprimés -- Partie 2: Spécifications - Spécification n° 5: Feuille de tissu de verre époxyde recouverte de cuivre, d'inflammabilité définie (essai de combustion verticale)

Ta slovenski standard je istoveten z: **EN 60249-2-5:1994**

ICS:

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
31.180	Tiskana vezja (TIV) in tiskane plošče	Printed circuits and boards

SIST EN 60249-2-5:1997 **en**

EUROPEAN STANDARD

NORME EUROPEENNE

EUROPÄISCHE NORM

EN 60249-2-5

February 1994

UDC 621.3.049.75-033.5-41

Supersedes HD 313.2.5 S2:1990

Descriptors: Printed circuit, composite materials, glass, copper, flammability

ENGLISH VERSION

Base materials for printed circuits
Part 2: Specifications
Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)
(IEC 249-2-5:1987 + A2:1992)

Matériaux de base pour circuits imprimés
Partie 2: Spécifications
Spécification n° 5: Feuille de tissu de verre époxyde recouverte de cuivre, d'inflammabilité définie (essai de combustion verticale)

(CEI 249-2-5:1987 + A2:1992)

Basismaterialien für gedruckte Schaltungen
Teil 2: Einzelbestimmungen
Einzelbestimmung Nr. 5: Kupferkaschierte Epoxidharz-Glashartgewebetafeln definierter Brennbarkeit (Prüfung mit vertikaler Probenlage)

(IEC 249-2-5:1987 + A2:1992)

This European Standard was approved by CENELEC on 1993-12-08. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, 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 the International Standard IEC 249-2-5:1987 and its amendment 2:1992 (including amendment 1:1989) was submitted to the CENELEC formal vote for acceptance as a Harmonization Document.

The draft was approved by CENELEC as HS 313.2.5 S3 on 6 July 1993 and was immediately submitted to a new vote for conversion into a European Standard.

The text of the International Standard was approved by CENELEC as EN 60249-2-5 on 8 December 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1995-03-15
- latest date of withdrawal of conflicting national standards	(dow)	1995-03-15

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 249-2-5:1987 and its amendment 2:1992 (including amendment 1:1989) was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE : When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
249-1	1982	Base materials for printed circuits Part 1: Test methods	EN 60249-1*	1993
249-3A	1976	Part 3: Special materials used in connection with printed circuits First supplement: Specification No. 2: Specification for copper foil for use in the manufacture of copper-clad base materials	-	-

---

* EN 60249-1 includes A1:1984 + A2:1989 + A3:1991 to IEC 249-1

A

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
249-2-5

Deuxième édition
Second edition
1987

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

Matériaux de base pour circuits imprimés

Deuxième partie: Spécifications
Spécification n° 5: Feuille de tissu de verre époxyde recouverte de cuivre, d'inflammabilité définie (essai de combustion verticale)

Base materials for printed circuits

Part 2: Specifications
Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)

Publication
249-2-5: 1987

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

BASE MATERIALS FOR PRINTED CIRCUITS

Part 2: Specifications
Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

PREFACE

This standard has been prepared by IEC Technical Committee No. 52: Printed Circuits.

This second edition replaces the first edition of Specification No. 5 which was included in IEC Publication 249-2.

This standard forms Specification No. 5 of a publication series which will replace the specifications originally included in IEC Publication 249-2 and will also include new specifications.

The text of this standard is based on the following documents:

Six Months' Rule	Report on Voting	Two Months' Procedure	Report on Voting
52(CO)240	52(CO)269	52(CO)255	52(CO)283

Further information can be found in the relevant Reports on Voting indicated in the table above.

The following IEC publications are quoted in this standard:

Publications Nos. 249-1 (1982): Base Materials for Printed Circuits, Part 1: Test Methods.
249-3A (1976): Part 3: Special Materials Used in Connection with Printed Circuits. First Supplement: Specification No. 2: Specification for Copper Foil for Use in the Manufacture of Copper-clad Base Materials.

BASE MATERIALS FOR PRINTED CIRCUITS

Part 2: Specifications

Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)

---

1. Scope

This specification gives requirements for properties of epoxide woven glass fabric copper-clad laminated sheet, of defined flammability, in thicknesses of 0.5 mm up to 6.4 mm.

Note. — To designate this material, the reference: 249-2-5-FV*-IEC-EP-GC-Cu may be used; if there is no risk of confusion, the type designation may be abbreviated to read IEC-249-2-5-FV*.

2. Materials and construction

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

2.1 *Insulating base*

Epoxide resin bonded woven glass fabric laminate. Its flame resistance is defined in terms of the flammability requirements of Sub-clause 6.3.

2.2 *Metal foil*

Copper as specified in IEC Publication 249-3A: First Supplement to Publication 249-3: Base Materials for Printed Circuits, Part 3: Special Materials Used in Connection with Printed Circuits — Specification No. 2: Specification for Copper Foil for Use in the Manufacture of Copper-clad Base Materials.

The preferred foils are Type A (electro-deposited copper) of standard ductility.

3. Internal marking

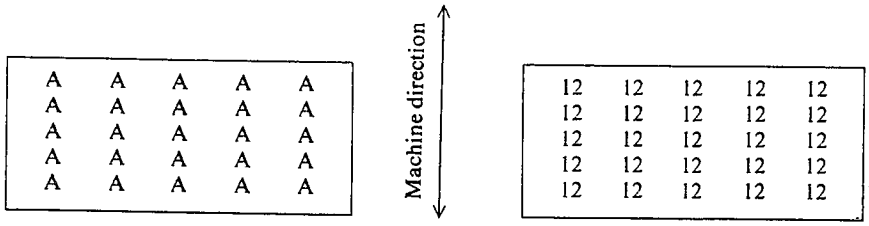
Each sheet should bear a manufacturer's identification mark that is:

a) in red, to indicate that the material is of defined flammability;

b) repeated at intervals so that no part of the sheet is further than 75 mm (3 in) from the furthest point of the nearest mark;

c) printed so as to indicate the machine direction of the filling material; if letters or numbers are used, these shall be upright in the machine direction.

Examples:



---

* 0 or 1, see Sub-clause 6.3.

4. Electrical properties

TABLE I

Property	Test method (Sub-clause of IEC Publication 249-1)*	Requirement
Resistance of foil	2.1	As specified in IEC Publication 249-3A
Surface resistance while in the humidity chamber (optional)	2.2	10 000 MΩ min.
Surface resistance after recovery	2.2	50 000 MΩ min.
Volume resistivity while in the humidity chamber (optional)	2.3	5 000 MΩm min.
Volume resistivity after recovery	2.3	10 000 MΩm min.
Surface corrosion	2.4	No visible corrosion products in the gap
Corrosion at the edge	2.5	Positive pole: not worse than A/B Negative pole: not worse than 1.4
Relative permittivity after damp heat and recovery	2.7	The average value shall not exceed 5.5
Dielectric dissipation factor after damp heat and recovery	2.7	The average value shall not exceed 0.035
Surface resistance at 125 °C	2.9.1	1 000 MΩ min.
Volume resistivity at 125 °C	2.9.1	1 000 MΩm min.

* Base Materials for Printed Circuits, Part 1: Test Methods.

5. Non-electrical properties of the copper-clad sheet

5.1 *Appearance of the copper-clad face*

5.1.1 *Normal surface finish*

The copper-clad face shall be substantially free from blisters, wrinkles, pinholes, deep scratches, pits and resin. Any discoloration or contamination shall be readily removable with a hydrochlorid acid solution of density 1.02 g/cm^3 or with a suitable organic solvent.

5.1.2 *High-quality surface finish (optional)*

If a surface of high quality is essential for precious metal plating or fine line etching and is ordered by the purchaser, the following requirements shall apply in addition to those of Sub-clause 5.1.1 when inspected in accordance with Sub-clause 3.9 of IEC Publication 249-1.

The surface finish of the copper-clad face shall be such as not to conceal imperfections.

The surface of the copper foil shall be free from scratches of depth greater than 0.010 mm (0.0004 in), or ⅕ of the nominal thickness of the copper foil, whichever is the lower.