SLOVENSKI STANDARD
SIST EN 60249-2-9:1997

01-avgust-1997

Base materials for printed circuits - Part 2: Specifications - Specification No.9: Epoxide cellulose paper core, epoxide glass cloth surfaces copper-clad laminated sheet of defined flammability (vertical burning test) (IEC 249-2-9:1987 + A1:1989 + A2:1990)

Base materials for printed circuits -- Part 2: Specifications -- Specification No. 9: Epoxide cellulose paper core, epoxide glass cloth surfaces copper-clad laminated sheet of defined flammability (vertical burning test)

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Basismaterialien für gedruckte Schaltungen -- Teil 2: Einzelbestimmungen -- Einzelbestimmung Nr. 9: Kupferkaschierte Schichtpreßstofftafeln mit Epoxidharz-Papierkern und Epoxidharz-Glasgewebedecklagen definierter Brennbarkeit (Brennprüfung mit vertikaler Probenlage)

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Matériaux de base pour circuits imprimés -- Partie 2: Spécifications -- Spécification n° 9: Feuille de stratifié recouverte de cuivre avec couches centrales en papier cellulose époxyde et couches superficielles en tissu de verre époxyde, d'inflammabilité définie (essai de combustion verticale)

Ta slovenski standard je istoveten z: **EN 60249-2-9:1994**

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 60249-2-9:1997 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD EN 60249-2-9

NORME EUROPEENNE

EUROPÄISCHE NORM February 1994

UDC 621.3.049.75-035.4 Supersedes HD 313.2.9 S3:1991

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

ENGLISH VERSION

Base materials for printed circuits
Part 2: Specifications
Specification No. 9: Epoxide cellulose paper core, epoxide glass cloth surfaces copper-clad laminated sheet of defined flammability (vertical burning test)
(IEC 249-2-9:1987 + A1:1989 + A2:1990)

Matériaux de base pour circuits imprimés
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Basismaterialien für gedruckte Schaltungen
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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

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FOREWORD

At the request of CENELEC 74th Technical Board, HD 313.2.9 S3:1991 (IEC 249-2-9:1987 + A1:1989 + A2:1990) was submitted to the CENELEC voting procedure for conversion into a European Standard.

The text of the International Standard was approved by CENELEC as EN 60249-2-9 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)	-

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

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ENDORSEMENT NOTICE

The text of the International Standard IEC 249-2-9:1987 and its amendments 1:1989 and 2:1990 was approved by CENELEC as a European Standard without any modification.

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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	-	-

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

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13

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Première édition
First edition
1987

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Международная Электротехническая Комиссия

Matériaux de base pour circuits imprimés

Deuxième partie: Spécifications

Spécification n° 9: Feuille de stratifié recouverte de cuivre avec couches centrales en papier cellulose époxyde et couches superficielles en tissu de verre époxyde, d'inflammabilité définie (essai de combustion verticale)

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Base materials for printed circuits

Part 2: Specifications

Specification No. 9: Epoxide cellulose paper core, epoxide glass cloth surfaces copper-clad laminated sheet of defined flammability (vertical burning test)

Publication
249-2-9: 1987

SIST EN 60249-2-9:1997

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

BASE MATERIALS FOR PRINTED CIRCUITS

Part 2: Specifications

Specification No. 9: Epoxide cellulose paper core, epoxide glass cloth surfaces 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.

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PREFACE

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

This standard forms Specification No. 9 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
[illegible]	52(CO)276	52(CO)258	52(CO)286

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.

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BASE MATERIALS FOR PRINTED CIRCUITS

Part 2: Specifications

Specification No. 9: Epoxide cellulose paper core, epoxide glass cloth surfaces copper-clad laminated sheet of defined flammability (vertical burning test)

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1. Scope

This specification gives requirements for properties of epoxide cellulose paper core, epoxide glass cloth surface copper-clad laminated sheet, of defined flammability, in thicknesses of 0.7 mm up to 6.4 mm.

Note. — To designate this material, the reference: 249-2-9-FV 0-IEC-EP-CP+GC-Cu may be used; if there is no risk of confusion, the type designation may be abbreviated to read IEC-249-2-9-FV 0.

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2. Materials and construction

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

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2.1 *Insulating base*

Epoxide resin bonded composite laminate consisting of a cellulose paper core and glass cloth surface layers. 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.

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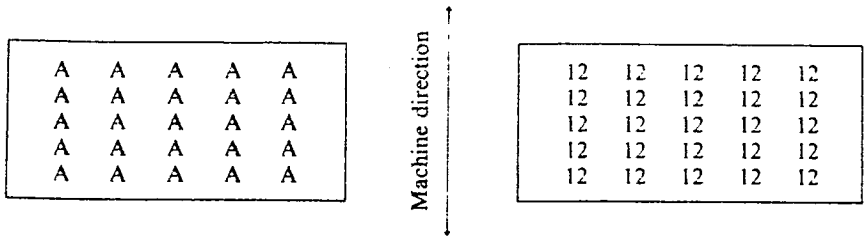
Examples:



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	3 000 MΩ min.
Surface resistance after recovery	2.2	30 000 MΩ min.
Volume resistivity while in the humidity chamber (optional)	2.3	1 000 MΩm min.
Volume resistivity after recovery	2.3	5 000 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 1.6
Relative permittivity after damp heat and recovery Nominal thickness: 0.7 mm (0.78 mm) 1.0 mm (1.05 mm) 2.0 mm (2.1 mm) For other thicknesses	2.7	The average value shall not exceed 5.4 5.2 5.0 Apply the requirement for the next smaller thickness
Dissipation factor after damp heat and recovery	2.7	The average value shall not exceed 0.045
Surface resistance at 100 °C	2.9.1	1 000 MΩ min.
Volume resistivity at 100 °C	2.9.1	100 MΩm min.

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

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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, dents and resin. Any discoloration or contamination shall be readily removable with a hydrochloric acid solution of density 1.02 g/cm³ or with a suitable organic solvent.