

**SLOVENSKI
STANDARD**

**SIST EN 60249-2-
4:1997/A5:2002**

prva izdaja
maj 2002

Amendment to clauses 4 to 8 of EN

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

SIST EN 60249-2-4:1997/A5:2002
<https://standards.iteh.ai/catalog/standards/sist/e249ea5d-bb9c-4eca-9208-b3031efd0f53/sist-en-60249-2-4-1997-a5-2002>

ICS 31.180

Referenčna številka
SIST EN 60249-2-
4:1997/A5:2002(en)

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[SIST EN 60249-2-4:1997/A5:2002](#)

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English version

**Base materials for printed circuits
Part 2: Specifications**

**Specification No. 4: Epoxide woven glass fabric copper-clad laminated
sheet, general purpose grade
(IEC 60249-2-4:1987/A5:2000)**

Matériaux de base pour circuits
imprimés
Partie 2: Spécifications
Spécification n° 4: Feuille de tissu de
verre époxyde recouverte de cuivre, de
qualité courante
(CEI 60249-2-4:1987/A5:2000)

Basismaterialien für gedrückte
Schaltungen
Teil 2: Einzelbestimmungen
Einzelbestimmung Nr. 4:
Kupferkaschierte
Epoxidharz-Glashartgewebetafeln für
allgemeine Anwendungszwecke
(IEC 60249-2-4:1987/A5:2000)

[SIST EN 60249-2-4:1997/A5:2002](https://standards.iteh.ai/catalog/standards/sist/e249ea5d-bb9c-4eca-9208-b3031efd0f53/sist-en-60249-2-4-1997-a5-2002)
<https://standards.iteh.ai/catalog/standards/sist/e249ea5d-bb9c-4eca-9208-b3031efd0f53/sist-en-60249-2-4-1997-a5-2002>

This amendment A5 modifies the European Standard EN 60249-2-4:1994; it was approved by CENELEC on 2000-04-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, 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 52/838/FDIS, future amendment 5 to IEC 60249-2-4:1987, prepared by IEC TC 52, Printed circuits, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A5 to EN 60249-2-4:1994 on 2000-04-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-01-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-04-01

Endorsement notice

The text of amendment 5:2000 to the International Standard IEC 60249-2-4:1987 was approved by CENELEC as an amendment to the European Standard without any modification.

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[SIST EN 60249-2-4:1997/A5:2002](#)
<https://standards.iteh.ai/catalog/standards/sist/e249ea5d-bb9c-4eca-9208-b3031efd0f53/sist-en-60249-2-4-1997-a5-2002>

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC

60249-2-4

1987

AMENDEMENT 5
AMENDMENT 5
2000-03

Amendment 5

Matériaux de base pour circuits imprimés –

Partie 2:

Spécifications –

iTEC STANDARD PREVIEW
Spécification n° 4: Feuille de tissu de verre
époxyde recouverte de cuivre, de qualité courante
(standards.itec.ai)

[SIST EN 60249-2-4:1997/A5:2002](#)

<https://standards.itec.ai/0g/standards/sist/e249ea5d-bb9c-4eca-9208-b3031ef0f53/sist-en-60249-2-4-1997-a5-2002>

Base materials for printed circuits –

Part 2:

Specifications –

**Specification No. 4: Epoxide woven glass fabric
copper-clad laminated sheet, general purpose grade**

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

G

*Pour prix, voir catalogue en vigueur
For price, see current catalogue*

FOREWORD

This amendment has been prepared by IEC technical committee 52: Printed circuits.

This amendment incorporates amendment 3 (1993) and amendment 4 (1994).

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

FDIS	Report on voting
52/838/FDIS	52/849/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

A vertical line in the margin indicates the text of amendment 5.

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4 Electrical properties

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In the second, third, fourth and fifth boxes, replace the present property designation by:

SIST EN 60249-2-4:1997/A5:2002
 Surface resistance after damp heat while in the humidity chamber (optional)
<https://standards.iteh.ai/catalog/standards/siste249ea5d-bb9c-4eca-9208-5303181d0153/sist-en-60249-2-4-1997-a5-2002>
 Surface resistance after damp heat and recovery
 Volume resistivity after damp heat while in the humidity chamber (optional)
 Volume resistivity after damp heat and recovery

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Add a new paragraph 5.1.3, as follows:

5.1.3 Surface waviness

When examined in accordance with test method 2M12 of IEC 61189-2, the surface waviness in both the machine and cross machine direction shall not exceed 5 µm.

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5.3 Maximum bow and twist

Replace this title by the following title:

5.3 Bow and twist

Replace table IV by the following new table:

Table IV – Maximum bow and twist

Property	Test method (IEC 61189-2)	Nominal thickness mm	Panel dimension Maximum length mm	Requirement(s) % maximum		
				Copper foil on one side	Copper foil on both sides	
Bow and twist	2M01	$\geq 0,8 \leq 1,2$	≤ 350	2,0	1,5	
			$>350 \leq 500$	1,8	1,3	
			>500	1,5	1,0	
		$>1,2 \leq 1,6$	≤ 350	1,5	1,0	
			$>350 \leq 500$	1,3	0,8	
			>500	1,0	0,5	
	2M02	$>1,6$	≤ 350	1,0	0,5	
			$>350 \leq 500$	0,8	0,4	
			>500	0,5	0,3	
Bow and twist after etching and heating	2M02		Under consideration			
NOTE The requirements for bow and twist apply only to one sided copper-clad laminates with maximum foil thickness of 105 µm (915 g/m ²) and double sided copper-clad laminates with maximum foil thickness difference of 70 µm (610 g/m ²). iTeh STANDARD PREVIEW Requirements for laminates beyond these limits shall be subject to agreement between purchaser and supplier.						

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[SIST EN 60249-2-4:1997/A5:2002](#)<https://standards.iteh.ai/catalog/standards/sist/e249ea5d-bb9c-4eca-9208-b3031efd0f53/sist-en-60249-2-4-1997-a5-2002>

Delete table V.

Replace table VI as follows:

Property	Test method (subclause of IEC 60249-1)	Requirement		
Pull-off strength	3.5	Not less than 60 N (13,4 lbf)		
		Thickness of the copper foil		
		18 µm*	35 µm*	70 µm* and 105 µm*
Peel strength after heat shock of 20 s	3.6.2.1 or 3.6.2.2 or 3.6.2.3	Not less than 1,1 N/mm (6,3 lbf/in)	Not less than 1,4 N/mm (8,0 lbf/in)	Not less than 1,8 N/mm (10,3 lbf/in)
		No blistering nor delamination		
Peel strength after dry heat at 125 °C	3.6.3	Not less than 1,1 N/mm (6,3 lbf/in)	Not less than 1,4 N/mm (8,0 lbf/in)	Not less than 1,8 N/mm (10,3 lbf/in)
		No blistering nor delamination		
Peel strength after exposure to solvent vapour. Solvents as agreed upon between purchaser and supplier	3.6.4	Not less than 1,1 N/mm (6,3 lbf/in)	Not less than 1,4 N/mm (8,0 lbf/in)	Not less than 1,8 N/mm (10,3 lbf/in)
		No blistering nor delamination		
Peel strength after simulated plating	3.6.5	Not less than 0,9 N/mm (5,1 lbf/in)	Not less than 1,1 N/mm (6,3 lbf/in)	Not less than 1,4 N/mm (8,0 lbf/in)
Peel strength at high temperature	3.6.7	SIST EN 60249-2-4:1997/A5:2002 https://standards.iteh.ai/catalog/standards/1/itc/60249-2-4:1997/A5:2002		
Temperature 260 °C (optional)		Not less than 0,06 N/mm (0,34 lbf/in)	Not less than 0,075 N/mm (0,43 lbf/in)	Not less than 0,09 N/mm (0,51 lbf/in)
Temperature 125 °C (optional)		Not less than 0,7 N/mm (4,0 lbf/in)	Not less than 0,9 N/mm (5,1 lbf/in)	Not less than 1,1 N/mm (6,3 lbf/in)
Blistering after 20 s heat shock	3.7.2.1 or 3.7.2.2 or 3.7.2.3	No blistering nor delamination		
* 18 µm (152 g/m ² , 0,5 oz/ft ²); 70 µm (610 g/m ² , 2 oz/ft ²)		35 µm (305 g/m ² , 1 oz/ft ²) 105 µm (915 g/m ² , 3 oz/ft ²)		
NOTE In case of difficulties due to breaking of foil or reading range of the force measuring device, the measurement of the peel strength at high temperature may be carried out using conductor widths larger than 3 mm.				

5.6 Solderability

Delete the title and text of this subclause.

5.7 Dimensional stability

Replace the present table VIII by the following new table.

Table VIII

Property	Test method (subclause of IEC 60249-1)	Requirement
Dimensional stability	3.11 $T = (150 \pm 2)^\circ\text{C}$	0,5 mm/m max.

5.8 Sheet sizes

5.8.1 Typical sheet sizes

Typical sheet sizes are:

1 060 mm × 1 150 mm

915 mm × 1 220 mm

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 1 000 mm × 1 000 mm
 1 000 mm × 1 200 mm
 (standards.iteh.ai)

Apart from these typical sheet sizes, fractions of the sizes and other sizes, for example larger, are available on the market. [SIST EN 60249-2-4:1997/A5:2002](#)

<https://standards.iteh.ai/catalog/standards/sist/e249ea5d-bb9c-4eca-9208-509fead53/sist-en-60249-2-4-1997-a5-2002>

The size of the sheets delivered by the supplier shall not deviate more than $^{+20}_0$ mm from the ordered size.

5.9 Cut panels

5.9.1 Cut panel sizes

Cut panel sizes shall be, when delivered, in accordance with the purchaser's specification.

5.9.2 Size tolerances for cut panels

For panels cut to size according to the purchaser's specification, the following tolerances for length and width shall apply:

Panel size mm	Tolerance \pm mm	
	Normal	Close
Up to 300		0,5
Over 300 to 600	2	0,8
Over 600		1,6
NOTE The specified tolerances include all deviations caused by cutting the panels.		