

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Materials for printed boards and other interconnecting structures –
Part 2-51: Reinforced base materials, clad and unclad – Base materials for
integrated circuit card carrier tape, unclad**

**Matériaux pour circuits imprimés et autres structures d'interconnexion –
Partie 2-51: Matériaux de base renforcés, plaqués et non plaqués – Matériaux de
base pour bande support de carte à circuit intégré, non plaqués**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MATERIALS FOR PRINTED BOARDS AND
OTHER INTERCONNECTING STRUCTURES –**
**Part 2-51: Reinforced base materials clad and unclad – Base
materials for integrated circuit card carrier tape, unclad**

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The text of this International Standard is based on the following documents:

Draft	Report on voting
91/1847/FDIS	91/1865/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61249 series, published under the general title *Materials for printed boards and other interconnecting structures*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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MATERIALS FOR PRINTED BOARDS AND OTHER INTERCONNECTING STRUCTURES –

Part 2-51: Reinforced base materials clad and unclad – Base materials for integrated circuit card carrier tape, unclad

1 Scope

This part of IEC 61249 specifies the construction, materials, property requirements, quality assurance, packaging, marking, storage of base materials for integrated circuit card carrier tape, unclad (hereinafter referred to as IC carrier tape base materials).

This document is applicable to IC carrier tape base materials, which is a glue-coated material, one side is woven E-glass reinforced epoxy underlayer, and the other side is coated with adhesive and protected by release film.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61189-2:2006, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 2: Test methods for materials and other interconnection structures*

IEC PAS 61249-6-3, *Specification for finished fabric woven from "E" glass for printed boards*

ISO 2813, *Paints and varnishes – Determination of gloss value at 20°, 60° and 85°*

ISO 8296, *Plastics – Film and sheeting – Determination of wetting tension*

ISO 11014:2009, *Safety data sheet for chemical products – Content and order of sections*

ISO 21920-2, *Geometrical product specifications (GPS) – Surface texture: Profile – Part 2: Terms, definitions and surface texture parameters*

ASTM D882, *Standard Test Method for Tensile Properties of Thin Plastic Sheeting*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

IC carrier tape base materials

base materials to manufacture the integrated circuit card carrier tape

4 Construction and materials

4.1 Construction

The construction of IC carrier tape base materials is as follows:

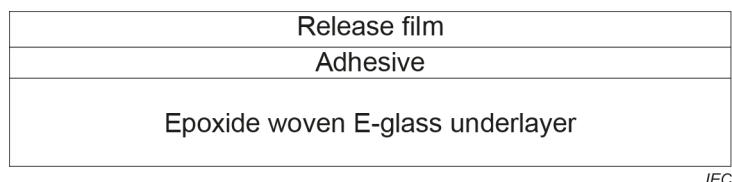


Figure 1 – Construction of IC carrier tape base materials

4.2 Epoxide woven E-glass underlayer

The epoxide woven E-glass underlayer (hereinafter referred to as underlayer) is E-glass reinforcement. The underlayer is fully cured, and the glass transition temperature of the underlayer shall be 150 °C minimum.

The woven E-glass used in underlayer shall meet the requirements specified in IEC PAS 61249-6-3.

4.3 Adhesive

Adhesive can be epoxy adhesive or acrylic adhesive, epoxy is preferred. The peel strength should meet the requirements in 6.8.

4.4 Release film

Release film is used to protect the adhesive, it can be released easily before use, and does not destroy the adhesive.

5 Electrical properties

The electrical properties requirements are shown in Table 1. The requirements for the preparation of samples shall be in accordance with Annex A.

Table 1 – Electrical properties

Performance items	Units	Test method	Requirement
Surface resistivity after damp heat while in the humidity chamber	MΩ	IEC 61189-2 2E04	≥10 ⁵
Volume resistivity after damp heat while in the humidity chamber	MΩ·m	IEC 61189-2 2E04	≥10 ⁶
Surface resistivity after E-24/125 while in the chamber	MΩ	IEC 61189-2 2E04	≥10 ⁴
Volume resistivity after E-24/125 while in the chamber	MΩ·m	IEC 61189-2 2E04	≥10 ⁵
Electric strength	kV/mm	IEC 61189-2 2E02	≥20

6 Non-electrical properties

6.1 Appearance of the IC carrier tape base materials

6.1.1 Delamination

The adhesive should not be separated from the underlayer.

6.1.2 Colloidal particles and metallic particles in underlayer

The plan view size of colloidal particles in underlayer shall be not greater than 2,0 mm. The plan view size greater than 0,5 mm and less than or equal to 2,0 mm shall be no more than 4 per 30 cm roll length. The plan view size less than or equal to 0,5 mm shall not be counted. Encapsulated metallic particles are not allowed.

6.1.3 Colloidal particles in adhesive layer

The plan view size of colloidal particles in adhesive layer shall not greater than 2,0 mm, the plan view size greater than 0,5 mm and less than or equal to 2,0 mm shall no more than 4 per 30 cm roll length, the plan view size less than or equal to 0,5 mm shall not be counted.

6.1.4 Scratches of adhesive

The adhesive layer should not be scratched.

6.1.5 Bubbles in underlayer

The bubbles in underlayer shall be less than or equal to 200 µm in length and shall not occur in bubble clusters any more than three bubbles in a 3,2 mm diameter circle.

6.1.6 Breakages and exposures of reinforcement fibre in underlayer

There are no breakages and exposures of reinforcement fibre in underlayer.

6.2 Dimensional of IC carrier tape base materials

6.2.1 Length and width

The length and the width of the sheet shall be as agreed between user and supplier (AABUS). The tolerance of length shall be within ${}^{+5}_0$ m and the tolerance of width shall be within $\pm 0,1$ mm.

6.2.2 Thickness of underlayer

The nominal thickness of underlayer shall be AABUS, the tolerance shall be within ± 10 % of the value specified.

6.2.3 Thickness of adhesive layer

The nominal thickness of adhesive layer shall be AABUS, the tolerance shall be within ± 10 % of the value specified.

6.3 Splices

The number of splices (including splicing tape and marking, the same below) is less than or equal to 2 per 160 m, and the splices gap is less than or equal to 50 µm.

Splicing tape should be evenly pasted on both sides of the IC carrier tape base materials, and should be pasted extend to the edge of the IC carrier tape base materials and ensure that the edge is orderliness, and should not be folded.

6.4 Glass transition temperature

The requirements of glass transition temperature for the underlayer of the IC carrier tape base materials shall be as shown in Table 2.

Table 2 – Glass transition temperature of underlayer

Performance items	Units	Test method	Requirement
Glass transition temperature (T_g)	°C	IEC 61189-2 2M10	≥150

6.5 Surface properties of the underlayer side

The surface properties of the underlayer side include roughness, glossiness (60°) and surface energy, and the requirements shall be as shown in Table 3.

Table 3 – roughness, glossiness(60°) and surface energy

Performance items	Test methods	Requirements
Roughness	ISO 21920-2	$3 \mu\text{m} \leq R_z \leq 15 \mu\text{m}$
Glossiness(60°)	ISO 2813	< 5,0 GU
Surface energy	ISO 8296	72 mN/m Ink tested qualified

6.6 Tensile strength and elongation at break

When the IC carrier tape base materials are tested in accordance with test method ASTM D882, the requirements of tensile strength and elongation at break shall be as shown in Table 4, applicable to underlayer of IC carrier tape base materials with a thickness greater than or equal to 90 μm . The requirements for the preparation of samples shall be in accordance with Annex A.

Table 4 – Tensile strength and elongation at break

Performance items	Units	Test method	Requirement
Tensile strength	Mpa	ASTM D882	≥200 (Length) ≥150 (Cross)
Elongation at break	%	ASTM D882	≥1,5 (Length) ≥1,0 (Cross)

6.7 Water absorption

When the IC carrier tape base materials is tested in accordance with test method 2N02 of IEC 61189-2, the maximum water absorption shall be as shown in Table 5. The requirements for the preparation of samples shall be in accordance with Annex A.

Table 5 – Water absorption

Performance items	Units	Test method	Requirement
Water absorption	%	IEC 61189-2 2N02	≤1,0

6.8 Peel strength

The samples are prepared as follows: Sticking the matte side of 35 µm electrodeposited copper foil on the adhesive side of IC carrier tape base materials after release film removal. Then totally cured by heating (laminated 5 s ± 1 s at 180 °C ± 2 °C temperature and 0,5 MPa pressure, then baking 60 min ± 1 min at 160 °C ± 2 °C in oven), After removal from the oven, the samples shall be cooled to room temperature in a desiccator or a drying cabinet before making specimens, then prepare specimens in accordance with IEC 61189-2 2M13. The requirements of peel strength shall be as shown in Table 6.

Table 6 – Peel strength

Performance items	Test methods	Requirements
Peel strength as received	IEC 61189-2 2M13	≥ 1 N/mm
Peel strength after 103,4 kPa pressure vessel conditioning, 24 h	IEC 61189-2 2M13	≥ 20% of Peel strength as received

6.9 Resin flow

The requirements of Resin flow shall be as shown in Table 7.

Table 7 – Resin flow

Performance items	Test methods	Requirements
Resin flow	Laminate method ^a	< 0,2 mm
^a Laminate method to measure resin flow procedure is as follows: <ul style="list-style-type: none"> – punch several holes (one hole of a diameter of 6,4 mm and two holes of a diameter of 4,8 mm, 3,2 mm and 1,6 mm) on the IC carrier tape base materials; – remove the release film; – laminate the adhesive side with cathode side of copper foil (pre-laminate 10 s ± 2 s and laminate 60 s ± 5 s at 180 °C ± 2 °C temperature and 9,8 MPa ± 0,2 MPa pressure); – cool the specimens to room temperature; – measure the length of squeeze-out on the holes. One specimen 50 mm × 25 mm is needed.		

7 Quality assurance

7.1 Quality system

The supplier shall operate a quality system, ISO 9000 or similar, to support quality conformance inspection.

The supplier shall operate a Management System for Environmental Control, ISO 14001 or similar, to support environmental considerations.

7.2 Responsibility for inspection

The supplier is responsible for all inspections of the manufactured material. The purchaser or an appointed third party may audit this inspection.

7.3 Positions of specimens on the sample

All the positions of specimens on the sample are randomly.