
Materials for interconnection structures - Part 5: Sectional specification set for conductive foils and films with and without coatings - Section 1: Copper foils (for the manufacture of copper-clad base materials)

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Materialien für Verbindungsstrukturen -- Teil 5: Rahmenspezifikation für leitfähige Folien und Filme mit und ohne Beschichtungen - Hauptabschnitt 1: Kupferfolien (zur Herstellung von kupferkaschierten Basismaterialien)

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Matériaux pour les structures d'interconnexion -- Partie 5: Collection de spécifications intermédiaires pour feuilles et films conducteurs avec ou sans revêtement - Section 1: Feuilles de cuivre (pour la fabrication de matériaux de base plaqués cuivre)

Ta slovenski standard je istoveten z: EN 61249-5-1:1996

ICS:

31.180 Tiskana vezja (TIV) in tiskane Printed circuits and boards
plošč e

SIST EN 61249-5-1:2001

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61249-5-1

January 1996

ICS 31.180

Descriptors: Printed circuits, interconnection structures, conductive foils and films, coatings, copper-clad base materials, flexible materials

English version

Materials for interconnection structures
Part 5: Sectional specification set for conductive foils
and films with and without coatings
Section 1: Copper foils (for the manufacture of
copper-clad base materials)
(IEC 1249-5-1:1995)

Matériaux pour les structures
d'interconnexion
Partie 5: Collection de spécifications
intermédiaires pour feuilles et films
conducteurs avec ou sans revêtement
Section 1: Feuilles de cuivre
(pour la fabrication de matériaux de
base plaqués cuivre)
(CEI 1249-5-1:1995)

Materialien für Verbindungsstrukturen
Teil 5: Rahmenspezifikation für
leitfähige Folien und Filme mit und
ohne Beschichtungen
Hauptabschnitt 1: Kupferfolien
(zur Herstellung von kupferkaschierten
Basismaterialien)
(IEC 1249-5-1:1995)

<https://standards.iteh.ai/catalog/standards/sist/134a2fa1-83d6-481e-aa66-ee324a0a760b/sist-en-61249-5-1-2001>

This European Standard was approved by CENELEC on 1995-11-28. 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.

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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 52/544/DIS, future edition 1 of IEC 1249-5-1, prepared by IEC TC 52, Printed circuits, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61249-5-1 on 1995-11-28.

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) 1996-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 1996-09-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex A is normative and annex B is informative.

The following publication is quoted in this standard:

ISO 4287-1:1984 - Surface roughness - Terminology - Part 1: Surface and its parameters.

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The text of the International Standard IEC 1249-5-1:1995 was approved by CENELEC as a European Standard without any modification.

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**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC
1249-5-1**

Première édition
First edition
1995-11

Matériaux pour les structures d'interconnexion –

Partie 5:

Collection de spécifications intermédiaires
pour feuilles et films conducteurs avec
ou sans revêtement –

Section 1: Feuilles de cuivre (pour la fabrication
de matériaux de base plaqués cuivre)

[SIST EN 61249-5-1:2001](https://standards.iteh.ai/catalog/standards/sist/134a2fa1-83d6-481e-aa66-)

<https://standards.iteh.ai/catalog/standards/sist/134a2fa1-83d6-481e-aa66->

Materials for interconnection structures –

Part 5:

Sectional specification set for conductive foils
and films with and without coatings –

Section 1: Copper foils (for the manufacture
of copper-clad base materials)

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MATERIALS FOR INTERCONNECTION STRUCTURES –

Part 5: Sectional specification set for conductive foils and films
with and without coatings –Section 1: Copper foils
(for the manufacture of copper-clad base materials)

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters, express as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 1249-5-1 has been prepared by IEC technical committee 52: Printed circuits.

It cancels and replaces the IEC 249-3A, published in 1976. The IEC 1249 series will gradually replace the IEC 249 series, with the exception of IEC 249-1, which will be replaced by the future IEC 1189-2.

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

DIS	Report on voting
52/544/DIS	52/606/RVD

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

Annex A forms an integral part of this standard.

Annex B is for information only.

MATERIALS FOR INTERCONNECTION STRUCTURES –

Part 5: Sectional specification set for conductive foils and films with and without coatings –

Section 1: Copper foils (for the manufacture of copper-clad base materials)

1 Scope

This specification gives requirements for properties of copper foil intended for use in the manufacture of copper-clad laminated sheets and of copper-clad flexible materials, used in the manufacture of printed boards.

It applies to copper foil supplied in rolls, sheets or cut panels.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this section of IEC 1249-5. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 1249-5 are encouraged to investigate the possibilities of applying the most recent edition of the normative document indicated below. Members of IEC and ISO maintain registers of currently valid international standards.

<https://standards.iteh.ai/catalog/standards/sist/134a2fa1-83d6-481e-aa66-e3324a673607/iec-1249-5-1-2001>

ISO 4287-1: 1984, *Surface roughness – Terminology – Part 1: Surface and its parameters*

3 Designation

3.1 Types of copper foil

Copper foil for the uses considered in this specification includes the following two types:

E = electrodeposited copper foil;

R = rolled copper foil,

with the grades given in table 1.

Table 1 – Types and grades of copper foil

Type designation	
E1	Standard electrodeposited
E2	High ductility electrodeposited
E3	High temperature elongation electrodeposited
R1	As rolled wrought
R2	Light cold rolled wrought
R3	Annealed wrought

3.2 Types of surface profile

In consideration of the processes used in the manufacturing of both electrodeposited and rolled copper, three designations for rough side profile are given in table 2.

Table 2 – Types of profile

Type designation	Grade	Ten point average maximum height of profile (R_z) μm
S	Standard	14*
L	Low profile	10
V	Very low profile	5

* For copper foil thicknesses up to 105 μm only.

The ten points average height of irregularities corresponds to the term R_z of ISO 4287-1 and is measured by the test method for R_z described in future IEC 1189-2 ¹⁾.

3.3 Bond enhancing treatment and passivation

A chemical or electrochemical surface treatment shall be applied to the copper foil to increase the bonding strength to the substrate. Such treatment may be applied to one or both sides.

In case of one side treatment on electrodeposited copper foil it shall be applied to the rough side of the foil.

A chemical passivation shall be applied to both sides of the foil to increase its shelf life.

3.4 Complete designation

For the designation of copper foils according to this specification the following code shall be used:

¹⁾ At present at the stage of document 52/518/CDV (in preparation, see annex B).

Example:

	CU - IEC 1249 - 5 - 1- 35 - E2 - S 1
Thickness of foil in μm	
Foil type	
Profile type	
Treatment on one side (2 = on both sides)	

If there is no risk of confusion, the designation may be abbreviated to read:

CU-IEC-35-E2-S1.

4 Mass per unit area and thickness

The primary measure of quantity of copper foil shall be the mass per unit area, together with applicable tolerances.

Thicknesses of copper foil corresponding to specified values of mass per unit area shall be regarded as given for information only.

Table 3 – Mass per unit area and thickness

Requirements		For information only
Nominal mass per unit area	Tolerance of nominal mass per unit area	Nominal thickness
g/m^2	%	μm
45	10*	5
76	10*	9
107	10*	12
152	10*	18
230	10	25
305	10	35
445	10	50
610	10	70
915	10	105
1220	10	140
1525	10	175
1830	10	210
* These specification shall not be applied to type R copper foil.		

Mass per unit area shall be determined by the test method given in A.2.1. Direct thickness measurements on microsections result in incorrect values due to the irregularities caused by the treatment roughness.

5 Copper purity

Copper foils without treatment shall have the following minimum purity (with silver content regarded as copper):

Type E: 99,8 mass % copper;

Type R: 99,9 mass % copper.

The copper content shall be determined after removal of the surface treatment or contamination by the test method given in A.2.2.

6 Electrical properties

The minimum conductivity of copper foils is a percentage of that of the International Annealed Copper Standard (IACS) at 20 °C as given in table 4 and 5; 100 % corresponds to $0,5800 \times 10^8 \Omega^{-1} \text{ m}^{-1}$ minimum electrical conductivity or $1,7241 \times 10^{-8} \Omega \text{ m}$ maximum resistivity.

The maximum specimen resistance of type E copper foils of different mass per unit area, when measured in accordance with the test method No. 2E12 described in future IEC 1189-2 ²⁾, shall have the values given in table 4.

Table 4 – Electrical conductivity and specimen resistance of type E copper foils

Mass per unit area g/m ²	Minimum IACS conductivity %	Maximum specimen resistance mΩ
45	88,5	25,0
76	90,5	15,0
107	92,14	10,4
152	94,12	7,1
230	95,05	4,7
305	96,60	3,5
445	96,60	2,4
610	96,60	1,7
915	96,60	1,2
1220	96,60	0,87
1525	96,60	0,70
1830	96,60	0,58

The maximum specimen resistance of type R copper foils of different mass per unit area, when measured in accordance with the test method No. 2E12 described in future IEC 1189-2 ²⁾, shall have the values given in table 5.

²⁾ See annex B.