SLOVENSKI STANDARD
SIST EN 60674-2:2002/A1:2004

01-januar-2004

Specifikacija za plastične folije za električne namene - 2. del: Metode preskušanja - Dopolnilo A1 (IEC 60674-2:1988/A1:2001)

Specification for plastic films for electrical purposes - Part 2: Methods of test (IEC 60674-2:1988/A1:2001)

Bestimmung für Isolierfolien für elektrotechnische Zwecke - Teil 2: Prüfverfahren (IEC 60674-2:1988/A1:2001)

Spécification pour les films en matière plastique à usages électriques - Partie 2: Méthodes d'essai (CEI 60674-2:1988/A1:2001)

Ta slovenski standard je istoveten z: **EN 60674-2:1998/A1:2001**

ICS:

29.035.20	Plastični in gumeni izolacijski materiali	Plastics and rubber insulating materials

SIST EN 60674-2:2002/A1:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60674-2/A1

December 2001

ICS 17.220.99;29.035.20

English version

Specification for plastic films for electrical purposes
Part 2: Methods of test
(IEC 60674-2:1988/A1:2001)

Spécification pour les films en matière plastique à usages électriques
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Bestimmung für Isolierfolien für elektrotechnische Zwecke
Teil 2: Prüfverfahren
(IEC 60674-2:1988/A1:2001)

This amendment A1 modifies the European Standard EN 60674-2:1998; it was approved by CENELEC on 2001-12-01. 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, Malta, 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

Ref. No. EN 60674-2:1998/A1:2001 E

Foreword

The text of document 15C/1263/FDIS, future amendment 1 to IEC 60674-2:1988, prepared by SC 15C, Specifications, of IEC TC 15, Insulating materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60674-2:1998 on 2001-12-01.

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) 2002-09-01

– latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2004-12-01

Endorsement notice

The text of amendment 1:2001 to the International Standard IEC 60674-2:1988 was approved by CENELEC as an amendment to the European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

Add:

Publication	Year	Title	EN/HD	Year
IEC 60260	1968	Test enclosures of non-injection type for constant relative humidity	HD 98 S1	1977

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60674-2

1988

AMENDEMENT 1
AMENDMENT 1
2001-10

Amendement 1

Spécification pour les films en matière plastique à usages électriques –

Partie 2: Méthodes d'essai

Amendment 1

Specification for plastic films for electrical purposes –

Part 2: Methods of test

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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 subcommittee 15C: Specifications, of IEC technical committee 15: Insulating materials

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

FDIS	Report on Voting
15C/1263/FDIS	15C/1310/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.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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Add to the list of IEC publications the following new reference:

IEC 60260:1968, *Test enclosures of non-injection type for constant relative humidity*

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16 Dissipation factor and permittivity

Replace the existing text with the following:

A frequency range of 50 Hz to 100 MHz is covered and two methods are available.

16.1 Method 1

The test shall be made on a flat specimen in accordance with IEC 60250, modified by the instructions of this clause, at a frequency to be agreed between purchaser and supplier and at a temperature of 23 °C ± 2 K unless otherwise specified in the relevant material specification of IEC 60674-3.

At low frequencies and for thick films, it is usual to make the measurements on specimens made from one layer of film. However, it has been found that at a frequency higher than 1 MHz very thin films may be measured more conveniently and accurately by using a large number of layers (sheets) of the material being measured. Air shall be excluded from this stack of sheets by pressing. The average specimen thickness is determined from the density of the material, the area of the stack and the mass of the stack.

16.1.1 Sample and specimen handling

Sampling shall be carried out in accordance with the material specification. The state and condition of the material shall not be altered.

The samples and test specimens shall be handled with care to avoid contamination, scratches and finger-prints.

A minimum number of three test specimens shall be used unless otherwise specified in the material specification.

16.1.2 Sample conditioning prior to measurement

Any conditioning prior to measurement shall be in accordance with the material specification, or otherwise agreed between purchaser and supplier.

NOTE 1 The properties of film materials may be substantially affected by moisture. Standard conditions for use prior to, and during, the testing of solid electrical insulating materials are given in IEC 60212. The relative humidities associated with various salt solutions are given in IEC 60260.

NOTE 2 The properties of film materials may also be substantially affected by heat, mechanical stress, nuclear radiation, X-rays, etc. The methods described may be used to assess the magnitude of these effects.

NOTE 3 It is recommended that specimens be measured in the 'as received' state and after conditioning in a dry atmosphere.

Samples with painted, evaporated or sputtered electrodes shall be conditioned after the electrodes have been applied, as painting and vacuum treatment will greatly influence the moisture content of the material. Electrodes of these types are somewhat permeable to moisture, but, if such electrodes are used, checks should be made to see that the specimens have reached substantial equilibrium with the conditioning atmosphere within the time laid down in the relevant material specification.

NOTE 4 This may be achieved by a series of comparative measurements made after further periods of conditioning.

16.1.3 Measurements with contacting electrodes

For measurement of thin films with frequencies up to approximately 50 kHz, a three-terminal electrode arrangement shall be used. A typical example is given in figure 7.

For measurements at higher frequencies, a two-terminal system shall be used (figure 8).

The intimate electrodes shall be composed of a material that allows good contact with the specimen surface and introduces no appreciable error because of electrode resistance or contamination of the specimen.

NOTE Dissipation factor measurements at high frequencies may be more accurately made using non-contacting electrode methods because the errors arising from dielectric loss in intimate electrodes increase with frequency.

The electrode material should be corrosion resistant under the conditions of the test. They shall be used with suitable backing electrodes.

If very thin films (2 μm or less) are to be measured, the backing electrode may be lined with an aluminum foil in order to avoid damage to the sample during positioning of the backing electrode.

It should be determined whether the electrode influences the results. This can be achieved by comparison of the results of tests made using two different types of electrodes.

16.1.3.1 Electrode materials

16.1.3.1.1 Evaporated or sputtered metal

The most recommended types of electrodes are of evaporated or sputtered metals as long as the sample material is not significantly affected by vacuum treatment or ion bombardment. Aluminum, silver or gold may be used as electrode materials. Metal films of about 150 nm in thickness show the best results in view of electrical properties and lowest stress to the sample material during metal deposition. The use of masks produces electrodes with highly defined edges and reproducible area.

Before evaporation, the vacuum in the chamber should be 0,05 μbar or better. During evaporation, the rate of film growth should be about 1 nm/s. The electrode deposition via vaporization of the electrode supply material, aided by the capacitor discharge going through it, is normally of an uncontrolled, short duration.

The stress on the sample during sputtering, quality, and properties of sputtered electrodes depend on the choice of gas, gas pressure inside the reaction chamber, voltage used and position of the sample inside the reaction chamber. Conditions shall be optimized according to the selected sputter equipment.

Where metallized specimens cannot be measured immediately after metallizing, for example because of exposure to a conditioning atmosphere for a period of time, care shall be taken to minimize the effects of electrode corrosion. In this instance, evaporated gold electrodes are recommended. This is particularly important for materials with a low dissipation factor such as polypropylene.

16.1.3.1.2 Conductive silver paint

Commercially available high-conductivity silver paints may be used as electrodes, but it should be established that the solvent in the paint does not affect the properties of the sample. The use of masks give electrodes of reproducible areas.

16.1.3.1.3 Metal foil

Electrodes of thin metal foil can be made from lead, tin, aluminium, silver or gold. They can be attached to the sample surface by a small quantity of petroleum or silicone grease.

NOTE Silicone greases are not recommended for measurements on materials with low dissipation factors because they exhibit a very high dissipation factor at some frequencies and temperatures. Their major use is at elevated temperatures where petroleum has too low a viscosity. Higher molecular weight, low-loss olefinic greases have been found to be more suitable.

The electrodes shall be applied with a smooth pressure to eliminate all air and wrinkles. Excess grease may be wiped off with a tissue. The film of grease shall be as thin as possible and its thickness shall be insignificant compared to the sample thickness.

16.1.4 Measurements with non-contacting electrodes

For measurements made close to ambient temperature, specimens that are very thin or low-loss, or measured at high frequencies are more accurately measured with either fixed or micrometer controlled non-contacting electrodes.

a) In air

Measure according to IEC 60250, 4.1.2.2.1, for dissipation factor at room temperature. Specimen electrodes are not required.

b) Fluid displacement

Measure according to IEC 60250, 4.1.2.2.2, for permittivity at room temperature.

16.1.5 Test procedure

a) Apply electrodes where relevant and condition the specimen prior to measurement as specified in 16.1.2.

b) The measurement of permittivity and dielectric dissipation factor shall be made in accordance with the material specification and the specification of the measuring method used.

c) The specimen shall be measured inside a screened enclosure.

d) Calculations of the dielectric permittivity and dissipation factor shall be made according to the specification of the measuring method used.

e) Preferred test frequencies are 48-62 Hz; 1 kHz; 10 kHz; 1 MHz.

f) Calculate the mean value of the test measurements as the result.

16.1.6 Report

The report shall include the following information:

a) the manufacturer's description and identification of the material, including details of any surface treatment;

b) thickness of samples;

c) type of electrodes;

d) details of any conditioning prior to measurement, including any cleaning procedures;

e) test conditions, i.e. temperature and relative humidity;

f) applied voltage;

g) frequency;

h) permittivity;

i) dissipation factor.