SLOVENSKI STANDARD
SIST EN 60641-2:1998

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Specification for pressboard and presspaper for electrical purposes - Part 2: Methods of test (IEC 60641-2:1979 + corrigendum October 1994 + IEC 60641-2:1979/A1:1993)

Specification for pressboard and presspaper for electrical purposes -- Part 2: Methods of test

Bestimmung für Tafel- und Rollenpreßspan für elektrotechnische Anwendungen -- Teil 2: Prüfverfahren

Spécifications pour le carton comprimé et le papier comprimé à usages électriques -- Partie 2: Méthodes d'essai

Ta slovenski standard je istoveten z: **EN 60641-2:1995**

ICS:

29.035.10	Papirni in kartonski izolacijski materiali	Paper and board insulating materials

SIST EN 60641-2:1998 **en**

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Descriptors: Pressboard, presspaper, requirements, sampling and testing

English version

Specification for pressboard and presspaper for electrical purposes
Part 2: Methods of test
(IEC 641-2:1979 + corrigendum 1994 + A1:1993)

Spécifications pour le carton comprimé et le papier comprimé à usages électriques
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Bestimmung für Tafel- und Rollenpreßspan für elektrotechnische Anwendungen
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(IEC 641-2:1979 + Corrigendum 1994 + A1:1993)

This European Standard was approved by CENELEC on 1995-09-20. 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.

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.

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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 the International Standard IEC 641-2:1979 with its corrigendum October 1994 and its amendment 1:1993, prepared by SC 15C, Specifications, of IEC TC 15, Insulating materials, was approved by CENELEC as HD 410.2 S1 on 1980-12-11.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60641-2 on 1995-09-20.

The following date was 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) 1996-03-01

Endorsement notice

The text of the International Standard IEC 641-2:1979 with its corrigendum October 1994 and its amendment 1:1993 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding 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 (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 243-1 (mod)	1988	Methods of test for electric strength of solid insulating materials Part 1: Tests at power frequencies	HD 559.1 S1	1991
IEC 247	1978	Measurement of relative permittivity, dielectric dissipation factor and d.c. resistivity of insulating liquids	-	-
IEC 250	1969	Recommended methods for the determination of the permittivity and dielectric dissipation factor of electrical insulating materials at power, audio and radio frequencies including metre wavelengths	-	-
IEC 296	1969	Specification for new insulating oils for transformers and switchgear	-	-
IEC 641	series	Specification for pressboard and presspaper for electrical purposes	EN 60641	series
ISO 287	-	Paper and board Determination of moisture content - Oven-drying method	-	-
ISO 534	-	Paper and board Determination of thickness and apparent bulk density or apparent sheet density	-	-
ISO 1924	1976	Paper and board Determination of tensile properties	-	-
ISO 1974	-	Paper Determination of tearing resistance (Elmendorf method)	-	-
ISO 2144	-	Paper and board Determination of ash	-	-

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Descripteurs: carton comprimé, papier comprimé, exigences, échantillonnage et essais.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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.

PREFACE

This standard has been prepared by Sub-Committee 15C, Specifications, of IEC Technical Committee No. 15, Insulating Materials.

A first draft was discussed at the meeting held in The Hague in 1975. As a result of this meeting, a draft, Document 15C(Central Office)56, was submitted to the National Committees for appproval under the Six Months' Rule in May 1975.

Amendments, Document 15C(Central Office)67, were submitted to the National Committees for approval under the Two Months' Procedure in August 1977.

The following countries voted explicitly in favour of publication:

Australia
Austria
Belgium
Brazil
Canada
Czechoslovakia
Denmark
Egypt
Finland
France
Germany
Israel
Japan
Korea (Democratic People's Republic of)
Poland
Portugal
South Africa (Republic of)
Switzerland
Turkey
Union of Soviet Socialist Republics
United Kingdom
United States of America
Yugoslavia

Other IEC publications quoted in this standard:

Publications Nos. 243: Recommended Methods of Test for Electric Strength of Solid Insulating Materials at Power Frequencies.
247: Recommended Test Cells for Measuring the Resistivity of Insulating Liquids and Methods of Cleaning the Cells.
250: Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies Including Metre Wavelengths.
296: Specification for New Insulating Oils for Transformers and Switchgear.

SPECIFICATION FOR PRESSBOARD AND PRESSPAPER FOR ELECTRICAL PURPOSES

Part 2: Methods of test

INTRODUCTION

This standard is one of a series which deals with solid pressboard and presspaper, dyed or natural coloured, having a calendered or non-calendered finish and supplied in an unimpregnated condition.

Pre-compressed pressboard is included.

The series does not deal with strawboard or laminated material (made by combining two or more thicknesses of material with an adhesive).

The series will have three parts describing:

1. Definitions and general requirements.
2. Methods of test.
3. Specifications for individual materials.

1. General notes on tests

Unless otherwise specified, the test specimens, after being cut, shall be conditioned in an atmosphere of 23 ± 2 °C and 50% r.h. and then tested in this atmosphere. Unless otherwise specified, the tolerance in the r.h. shall be ± 5% and the conditioning period shall be not less than 16 h. In case of dispute, the conditioning shall be approached from the dry side after drying at 70 °C for a period sufficient to ensure that the conditioning atmosphere produces a weight increase in the test specimen; the duration of the conditioning in relation to the nominal thickness shall be:

nominal thickness (mm)	⩽0.5	⩽1.0	⩽2.0	⩽3	>3
time (h)	48	72	96	120	240

2. Thickness

2.1 *Test apparatus*

2.1.1 An external screw type micrometer having measuring faces of 6 mm to 8 mm diameter. The measuring faces shall be flat to within 0.001 mm and parallel to within 0.003 mm. The pitch of the screw shall be 0.5 mm and the graduations shall be 50 divisions of 0.01 mm, enabling readings to be estimated to 0.002 mm. The pressure exerted on the specimens shall be 0.1 MPa to 0.2 MPa (10 N/cm² to 20 N/cm²).

2.1.2 A dead weight dial-type micrometer having two ground and lapped concentric circular surfaces flat to within 0.001 mm and parallel to within 0.003 mm. The upper surface shall be 6 mm to 8 mm in diameter. The lower surface shall be larger than the upper surface. The upper surface shall move on the axis perpendicular to the surfaces. The dial shall be graduated to read directly to 0.002 mm. The frame of the micrometer shall be of such rigidity that a force of 15 N applied to the dial housing, out of contact with either the weight or the presser foot spindle, will produce a deflection of the frame not greater than 0.002 mm as indicated on the micrometer dial. The pressure exerted on the specimen shall be 0.1 MPa (10 N/cm²).

2.1.3 The setting gauge used to check the instruments shall be accurate to within ± 0.001 mm of nominal size. The thickness indicated by the instruments shall not differ by more than 0.005 mm from the gauge block.

2.2 *Procedure*

Measure the thickness of the pressboard or the presspaper in the as received condition using one of the instruments described in Sub-clause 2.1 at points not less than 20 mm from the edges.

For boards, the number of measurements shall be eight, two along each edge. For presspaper in rolls, ISO Recommendation R 534 may be followed. When measuring across the width, the number of measurements shall be five per metre width.

In case of dispute, cut a strip 40 mm wide across the full width of the material and, from this strip, at eight equally spaced positions, cut eight test specimens, each not less than 40 mm long. Condition the test specimens in accordance with Clause 4 and measure the thickness of each specimen at a point near the centre of each test specimen using the instrument described in Sub-clause 2.1.2.

2.3 *Results*

Report the central value of the measurements and the minimum and maximum values obtained.

3. Apparent density

The test shall be carried out on three conditioned specimens; one determination is made on each of the three specimens.

Use rectangular specimens of area not less than 100 cm² and determine the mass of each to an accuracy of 1 mg. Calculate the area of each test piece from two measurements of length and two of width taken at points at least 12 mm from the corners.

Determine the thickness by making eight measurements with one of the instruments described in Sub-clause 2.1 at points equally spaced round the sides and at least 20 mm from the edges and calculate the mean value.

Express the apparent density (the mass/volume ratio) as grams per cubic centimetre.

The central value is taken as the result; the other two are reported.

4. Tensile strength and elongation

Principle

Measurement of the tensile force required under standardized test conditions to cause failure of specimens 15 mm by 250 mm cut from both directions of the material.

The tensile strength in newtons per square millimetre is calculated by the formula:

$$\sigma = \frac{F}{w \cdot a}$$

where:

F = force in newtons

w = width of the specimen in millimetres

a = thickness of the specimen in millimetres

4.1 *Determination with unfolded specimens*

Tensile strength and elongation shall be measured according to the method described in ISO Standard 1924.

Deviations from ISO Standard 1924:

— Nine measurements are made on test pieces cut in the machine direction and in the cross machine direction.

— The central values are taken as the results, the highest and lowest values are reported.

4.2 *Determination with folded specimens*

The specimens are bent over by hand in the middle of their length and at right angles to the longitudinal edge of the specimen as shown in Figure 1a, page 39. They are then fed through the rollers of the folding apparatus illustrated in Figure 2, page 39, with the longitudinal edge of the specimen lying against the guide. Following this, the folded specimen is bent by hand as shown in Figure 1b, page 39, and again passed through the rollers of the folding apparatus. For this purpose, the rollers should grip the specimen about 20 mm in front of the fold. After unfolding, the specimen is tested according to Sub-clause 4.1.

5. Internal tearing resistance

Internal tearing resistance shall be measured according to the method described in ISO Standard 1974.

A single tear tester shall be used.

Deviations from ISO Standard 1974:

— Nine specimens are taken from each direction.

— The central values are taken as results, the highest and lowest values are reported.