

Pressboard and presspaper for electrical purposes —

Part 2: Methods of tests

The European Standard EN 60641-2:2004 has the status of a
British Standard

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National foreword

This British Standard is the official English language version of EN 60641-2:2004. It is identical with IEC 60641-2:2004. It supersedes BS EN 60641-2:1996 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/15, Insulating material, to Subcommittee GEL/15/3, Material specifications, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 25 and a back cover.

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English version

Pressboard and presspaper for electrical purposes
Part 2: Methods of tests
(IEC 60641-2:2004)

Carton comprimé et papier comprimé
à usages électriques
Partie 2: Méthodes d'essai
(CEI 60641-2:2004)

Tafel- und Rollenpressspan
für elektrotechnische Anwendungen
Teil 2: Prüfverfahren
(IEC 60641-2:2004)

This European Standard was approved by CENELEC on 2004-09-01. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 15C/1609/FDIS, future edition 2 of IEC 60641-2, 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 EN 60641-2 on 2004-09-01.

This European Standard supersedes EN 60641-2:1995.

The main changes with respect to EN 60641-2:1995 are listed below:

The following test methods have been cancelled:

- flexibility;
- conductivity of the organic extract;
- contamination of liquid dielectrics.

The following test methods have been rewritten:

- compressibility;
- conductivity of the aqueous extract;
- cohesion between plies.

The following test method has been introduced:

- determination of metallic particles with X-ray.

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) | 2005-06-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2007-09-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60641-2:2004 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60247	NOTE	Harmonized as EN 60247:2004 (not modified).
ISO 186	NOTE	Harmonized as EN ISO 186:2002 (not modified).

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PRESSBOARD AND PRESSPAPER FOR ELECTRICAL PURPOSES –

Part 2: Methods of tests

1 Scope

This part of IEC 60641 applies to pressboard and presspaper for electrical purposes.

The series does not apply to laminated material.

This part specifies the test methods to be used in testing pressboard and presspaper for electrical purposes to meet the requirements prescribed in the specification sheets of Part 3.

NOTE In this standard, reference is made in several places to ISO standards accompanied by a short description of the method used. It is to be understood that this short description is meant for identification purposes only and that all details should be taken from the ISO standard itself.

2 Normative references

The following referenced documents are indispensable for the application 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 60243-1:1998, *Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60296:2003, *Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear*

IEC 60554-2:2001, *Cellulosic papers for electrical purposes – Part 2: Methods of test*

ISO 287:1985, *Paper and board – Determination of moisture content – Oven-drying method*

ISO 534:1988, *Paper and board – Determination of thickness and apparent bulk density or apparent sheet density*

ISO 1924-2:1994, *Paper and board – Determination of tensile properties – Part 2: Constant rate of elongation method*

ISO 1974:1990, *Paper – Determination of tearing resistance (Elmendorf method)*

ISO 2144:1997, *Paper, board and pulps – Determination of residue (ash) on ignition at 900 degrees C*

3 Terms and definitions

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

3.1 specimen

rectangle of paper or board cut to given dimensions from sheets or reels drawn from selected units

3.2 test piece

quantity of paper or board on which each single determination is carried out in accordance with the method of test.

NOTE The test piece may be taken from a specimen; in some instances, it may be the specimen itself.

4 General notes on tests

4.1 Conditioning

a) For materials with a thickness of $<0,5$ mm

Unless otherwise specified, the specimen after being cut, shall be conditioned for not less than 16 h in an atmosphere of $23\text{ }^{\circ}\text{C} \pm 2\text{ K}$ and $(50 \pm 5)\%$ relative humidity. Test pieces shall be cut from the specimen and tested in this atmosphere.

b) For materials with a thickness of $\geq 0,5$ mm

Unless otherwise specified, the specimen after being cut, shall be conditioned for not less than 16 h in an atmosphere of $23\text{ }^{\circ}\text{C} \pm 2\text{ K}$ and $(50 \pm 5)\%$ relative humidity. Test pieces shall be cut from the specimen and tested in an atmosphere of $20\text{ }^{\circ}\text{C}$ to $30\text{ }^{\circ}\text{C}$ and 40% to 60% relative humidity.

In case of dispute, the conditioning shall be $23\text{ }^{\circ}\text{C} \pm 2\text{ K}$ and $(50 \pm 5)\%$ relative humidity until the moisture content of the specimen reaches $5,5\%$ to 8% . The conditioning shall be approached from the dry side after drying at $70\text{ }^{\circ}\text{C} \pm 5\text{ K}$ for a period sufficient to ensure that the conditioning atmosphere produces a mass increase in the specimen.

4.2 Drying

Unless otherwise specified, the following drying procedure shall be used.

Dry the test pieces in a ventilated oven at $105\text{ }^{\circ}\text{C} \pm 5\text{ K}$.

The minimum drying time as a function of the thickness s expressed in millimetres shall be as follows:

Nominal thickness s (mm)	$\leq 0,5$	$0,5 < s \leq 1,5$	$1,5 < s \leq 5$	> 5
Time (h)	12	24	48	72

4.3 Tolerances

When tolerances are not specified for the dimensions of the test piece, it is understood that these dimensions are taken to the nearest millimetre.

4.4 Results

As a general rule, the central value is reported as the result. When agreed between parties, the mean value may be reported. This must be noted in the test report.

5 Thickness

For material with a grammage of less than 224 g/m², use the procedure as described in ISO 534. For materials with a grammage of 224 g/m² or more, use the following test:

5.1 Test apparatus

One of the test apparatus described below shall be used.

NOTE In case of dispute, the test apparatus should be the one described in 5.1.2.

5.1.1 Screw type micrometer

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 0,01 mm, enabling readings to be estimated to 0,002 mm. The pressure exerted on the test piece shall be 0,1 MPa to 0,3 MPa.

NOTE For thin, soft material (for instance, board type B.5.1, 1 mm) the error due to the pressure of the micrometer can be as great as 2 % of the measured value.

5.1.2 Dead weight micrometer

A dead weight dial type micrometer having two ground and lapped measuring 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 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 frame not greater than 0,002 mm as indicated on the micrometer dial. The pressure exerted on the test piece shall be 0,1 MPa to 0,3 MPa.

5.1.3 Dial gauge micrometer

As an alternative to 5.1.2, a "Dial gauge type micrometer" with the following characteristics may be used:

Diameter of the upper measuring surface: $(14,3 \pm 0,5)$ mm.

Diameter of the lower measuring surface: bigger than the upper one.

Pressure exerted on the test piece: $(0,055 \pm 0,005)$ MPa.

The two measuring surfaces shall be parallel to within 0,005 mm or 1 %.

NOTE The values recorded with this apparatus could be significantly different from the ones recorded with the two other types.

5.2 Setting gauge

The setting gauge used to check the instruments shall be accurate to within $\pm 0,001$ mm of nominal thickness. The thickness indicated by the instruments shall not differ by more than 0,005 mm from the gauge block.