



SLOVENSKI STANDARD

SIST EN ISO 534:2005

01-maj-2005

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SIST EN 20534:2000

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Paper and board - Determination of thickness, density and specific volume (ISO 534:2005)

Papier und Pappe - Bestimmung der Dicke, der Dichte und des spezifischen Volumens (ISO 534:2005)

Papier et carton - Détermination de l'épaisseur, de la masse volumique et du volume spécifique (ISO 534:2005)

Ta slovenski standard je istoveten z: EN ISO 534:2005

ICS:

85.060 Papir, karton in lepenka Paper and board

SIST EN ISO 534:2005 en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 534

February 2005

ICS 85.060

Supersedes EN 20534:1993

English version

**Paper and board - Determination of thickness, density and
specific volume (ISO 534:2005)**

Papier et carton - Détermination de l'épaisseur, de la
masse volumique et du volume spécifique (ISO 534:2005)

Papier und Pappe - Bestimmung der Dicke, der Dichte und
des spezifischen Volumens (ISO 534:2005)

This European Standard was approved by CEN on 17 January 2005.

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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 CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 534:2005 (E)**Foreword**

This document (EN ISO 534:2005) has been prepared by Technical Committee ISO/TC 6 "Paper, board and pulps" in collaboration with Technical Committee CEN/TC 172 "Pulp, paper and board", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2005, and conflicting national standards shall be withdrawn at the latest by August 2005.

This document supersedes EN 20534:1993.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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.

Endorsement notice

The text of ISO 534:2005 has been approved by CEN as EN ISO 534:2005 without any modifications.

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INTERNATIONAL STANDARD

**ISO
534**

Third edition
2005-02-01

Paper and board — Determination of thickness, density and specific volume

*Papier et carton — Détermination de l'épaisseur, de la masse
volumique et du volume spécifique*

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Reference number
ISO 534:2005(E)

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 534 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

This third edition cancels and replaces the second edition (ISO 534:1988), which has been technically revised and where the major revision is the introduction of the concept of specific volume.

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Paper and board — Determination of thickness, density and specific volume

1 Scope

This International Standard specifies two methods for measuring the thickness of paper and board:

- a) the measurement of a single sheet of paper or board as a single sheet thickness;
- b) the measurement of a pack of sheets of paper as a bulking thickness.

It also specifies calculation methods

- for the apparent sheet density and for the apparent bulk density, and
- for the apparent specific sheet volume and for the apparent specific bulk volume

from the thickness determinations.

This International Standard is not applicable to corrugated fibreboard. In addition, method a) is not suitable for materials with a grammage higher than 225 g/m².

NOTE 1 The two methods generally lead to different results.

NOTE 2 For tissue paper and tissue products, ISO 12625-3 should be used.

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.

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 536, *Paper and board — Determination of grammage*

3 Terms and definitions

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

3.1

single sheet thickness

distance between one surface of a paper or board and the other, measured under an applied static load, using the standard test method

3.2

bulking thickness

thickness of a single sheet of paper, calculated from the thickness of several superimposed sheets in a pack, and measured under an applied static load, using the standard test method

3.3

apparent sheet density

mass per unit volume, expressed in grams per cubic centimetre, and calculated from the **single sheet thickness** (3.1)

NOTE This term is normally applicable to paper or board.

3.4

apparent bulk density

mass per unit volume, expressed in grams per cubic centimetre, and calculated from the **bulking thickness** (3.2)

NOTE This term is normally applicable to paper.

3.5

apparent specific sheet volume

volume per unit mass, expressed in cubic centimetres per gram, and calculated from the **single sheet thickness** (3.1)

NOTE This term is normally applicable to paper or board.

3.6

apparent specific bulk volume

volume per unit mass, expressed in cubic centimetres per gram, and calculated from the **bulking thickness** (3.2)

NOTE This term is normally applicable to paper.

4 Principle

4.1 Measurement of the **single sheet thickness** (3.1) or of the **bulking thickness** (3.2), according to the test requirements, by means of a high-precision micrometer.

4.2 Calculation of the **apparent sheet density** (3.3) or **apparent bulk density** (3.4) of the paper or board, from a knowledge of its grammage and thickness.

4.3 Calculation of the **apparent specific sheet volume** (3.5) or **apparent specific bulk volume** (3.6) of the paper or board, from a knowledge of its grammage and thickness.

5 Apparatus

5.1 Dead-weight micrometer, provided with two plane, parallel, circular pressure faces, between which the paper or board is placed for measurement.

The preferred pressure exerted between the pressure faces during the thickness measurement shall be (100 ± 10) kPa. As an alternative pressure, (50 ± 5) kPa is also permitted.

The two pressure faces shall form an integral part of the micrometer, such that one face is fixed (the anvil) and the other is movable in a direction perpendicular to the plane of the fixed face.

One face shall be $(16,0 \pm 0,5)$ mm in diameter and the second face shall be of such a size that it is in contact with the whole area of the other face when the micrometer reads zero. Thus, a circular region of a test piece, nominally 200 mm² in area, is subjected during the thickness measurement to the pressure exerted between the faces.

The performance requirements of the micrometer shall be such that, when calibrated according to the method given in Annex A, the micrometer complies with the required pressure of (100 ± 10) kPa, alternatively (50 ± 5) kPa, and the performance requirements as shown in Table 1 (see also 9.1).

Table 1 — Micrometer performance requirements

Micrometer characteristics	Maximum permitted value ^a
Indication error	$\pm 2,5 \mu\text{m}$ or $\pm 0,5 \%$ of the reading
Error of parallelism between pressure faces	$5 \mu\text{m}$ or 1%
Repeatability of measurement (as standard deviation)	$1,2 \mu\text{m}$ or $0,5 \%$
NOTE Where a tolerance is expressed in the form of a percentage, it is based upon the thickness of the test piece under test. Thus, it is possible for a given micrometer to comply with the requirements of this table for some materials, but not for others.	
^a The maximum permitted value of a micrometer characteristic is the greater of the two values.	

5.2 Thickness gauges, corresponding to approximately 10 %, 30 %, 50 %, 70 % and 90 % of the full-scale reading of the micrometer. The thickness of each gauge shall be known to an accuracy of $0,3 \mu\text{m}$.

6 Sampling

If the tests are made to evaluate a lot, select the sample in accordance with ISO 186. If the tests are made on another type of sample, make sure that the test pieces taken are representative of the sample received.

7 Conditioning

Condition the sample in accordance with ISO 187.

8 Preparations of test pieces

8.1 General

Prepare the test pieces in the same standard atmospheric conditions as used to condition the sample. Avoid areas with folds, creases, cracks or other defects which could influence the results.