
Tissue paper and tissue products —
Part 3:
Determination of thickness, bulking
thickness and apparent bulk density
and bulk

iTeh STANDARD PREVIEW
Papier tissue et produits tissue —
Partie 3: Détermination de l'épaisseur, de l'épaisseur moyenne d'une
feuille en liasse et de la masse volumique moyenne et de la main

[ISO 12625-3:2014](https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014)

<https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 12625-3:2014](https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014)

<https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
5 Apparatus	2
5.1 Precision dead-weight micrometer.....	2
5.2 Gauge blocks.....	3
5.3 Balance and attachments.....	3
6 Conditioning	3
7 Preparation of test pieces	3
7.1 General.....	3
7.2 Single-ply thickness.....	3
7.3 Single-ply sheet thickness.....	3
7.4 Bulking thickness.....	3
8 Procedure	4
9 Calculation	4
9.1 Single-ply thickness.....	4
9.2 Single sheet thickness.....	4
9.3 Bulking thickness.....	4
9.4 Apparent bulk density.....	4
9.5 Bulk (apparent specific bulk volume).....	5
10 Test report	5
Annex A (informative) Precision	6
Annex B (normative) Measurement conditions	8
Annex C (informative) Foot pressure	10
Bibliography	11

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

ISO 12625-3 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 172, *Pulp, paper and board* in collaboration with Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 12625-3:2005), which has been technically revised.

With regard to ISO 12625-3:2005, the following minor changes have been made:

- a) title changed; "bulk" added;
- b) the accuracy data in [Annex A](#) were adjusted to the existing equipment capabilities and calibration procedures;
- c) preparation of test pieces more precisely described, [7.1](#) and [7.4](#) reformulated;
- d) editorial updating.

ISO 12625 consists of the following parts, under the general title *Tissue paper and tissue products*

- *Part 1: General guidance on terms;*
- *Part 3: Determination of thickness, bulking thickness, apparent bulk density and bulk*
- *Part 4: Determination of tensile strength, stretch at break and tensile energy absorption;*
- *Part 5: Determination of wet tensile strength;*
- *Part 6: Determination of grammage;*
- *Part 7: Determination of optical properties — Measurement of brightness and colour with D65/10° (outdoor daylight);*
- *Part 8: Water-absorption time and water-absorption capacity; basket-immersion test method;*

- *Part 9: Determination of ball burst strength;*
- *Part 11: Determination of wet ball burst strength;*
- *Part 12: Determination of tensile strength of perforated lines — Calculation of perforation efficiency;*
- *Part 15 Determination of optical properties — Measurement of brightness and colour with C/2° (indoor daylight) illuminant;*
- *Part 16 Determination of optical properties — Opacity (paper backing) — Diffuse reflectance method*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 12625-3:2014](https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014)

<https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014>

Introduction

Thickness is an important property of tissue paper and tissue products.

In the tissue industry, thickness-related parameters, such as the roll diameter of rolled products (kitchen towel) or the stack height of folded products (paper towels) are often measured. However, the fact that not only end-use tissue products, but also the base tissue paper from which these products are made, is the subject of trade between companies and countries, means that there is a genuine need for a consistent measure of thickness that can be applied to tissue products at any stage of their manufacture.

The thickness of tissue paper and tissue products is known to be dependent on the pressure applied to the material at the time of measurement. Several different loading pressures, pressure-foot diameters and loading speeds have been used within the tissue industry. This part of ISO 12625 has been prepared by harmonizing those standards applicable to tissue and tissue products currently in use. It specifies a single loading pressure, foot diameter and loading speed to be used for all thickness measurements of tissue and tissue products.

It is expressly stated that the detection of impurities and contraries in tissue paper and tissue products should be applied according to ISO 15755.

For the determination of moisture content in tissue paper and tissue products, ISO 287 or ISO 638 should be applied.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 12625-3:2014](https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014)

<https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014>

Tissue paper and tissue products —

Part 3:

Determination of thickness, bulking thickness and apparent bulk density and bulk

1 Scope

This part of ISO 12625 specifies a test method for the determination of thickness and bulking thickness and the calculation of apparent bulk density and bulk of tissue papers and tissue products under a pressure of 2,0 kPa.

NOTE This part of ISO 12625 has been developed to provide a consistent test method for the determination of thickness and density of tissue paper and tissue products. Corresponding test methods for paper and board in general are covered in ISO 534.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 12625-1, *Tissue paper and tissue products — Part 1: General guidance on terms*

ISO 12625-6, *Tissue paper and tissue products — Part 6: Determination of grammage*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12625-1 and the following apply.

3.1

single-ply thickness

distance between the two principal surfaces of a single ply of tissue paper measured under the applied static load specified in this part of ISO 12625

Note 1 to entry: A 'ply' of tissue is an unlaminated tissue, like that made directly from a tissue machine.

3.2

single sheet thickness

distance between the two principal surfaces of a single sheet of tissue product measured under the applied static load specified in this part of ISO 12625

Note 1 to entry: A 'sheet' of tissue is a laminated or unlaminated tissue like that present in the finished tissue product.

3.3

bulking thickness

thickness of a single sheet of tissue paper or tissue product, calculated from the thickness of several superimposed sheets, measured under the applied static load specified in this part of ISO 12625

3.4

apparent bulk density

mass per unit volume of tissue paper or tissue product, calculated from its grammage and bulking thickness

Note 1 to entry: The apparent bulk density is expressed in grams per cubic centimetre.

3.5

bulk

apparent specific bulk volume

inverse of density

Note 1 to entry: The bulk is expressed in cubic centimetres per gram.

3.6

grammage

mass of a unit area of tissue paper or tissue product as determined by the procedure in ISO 12625-6

Note 1 to entry: to entry The grammage is expressed in grams per square metre (g/m²).

4 Principle

iTeh STANDARD PREVIEW

(standards.iteh.ai)

Measurement of the thickness of a test piece of tissue paper sampled during the manufacturing process or of a tissue product supplied as a finished article. The measurement being made as the distance between a fixed reference plate on which the sample rests and a parallel pressure-foot that exerts a specified load on the area under test.

<https://standards.iteh.ai/catalog/standards/sist/10268d27-0e65-4a0f-b9fe-672fb774c94e/iso-12625-3-2014>

5 Apparatus

5.1 Precision dead-weight micrometer

This has two parallel, horizontal faces, flat to within 0,003 mm, between which the test piece is placed. The lower face shall be fixed and the upper face (pressure-foot) moveable in a direction perpendicular to the plane of the fixed face.

The upper, circular, pressure-foot shall have a diameter of $(35,7 \pm 0,1)$ mm giving a nominal area of 10,0 cm² and shall be parallel to the lower face within limits defined in Annex B.3.

The lower face shall be constructed to support the test piece such that the test piece lies flat while under test. In practice, the lower face should have minimum dimensions 20 % larger than the diameter of the pressure-foot. The pressure between the two faces shall be $(2,0 \pm 0,1)$ kPa (see Annex C).

The measuring speed shall be $(2,0 \pm 0,2)$ mm/s.

The instrument read-out/scale shall be graduated in increments of 0,001 mm.

The opening between the pressure-foot and the lower face is set by agreement between the instrument supplier and the customer. For most thickness measurements, instruments with an opening of 10 mm or 12 mm will normally be suitable. When only single sheet or single-ply measurement is required, an opening of 2 mm to 3 mm is sufficient.

5.2 Gauge blocks

These are used for calibrating the micrometer, corresponding to approximately 10 %, 30 %, 50 %, 70 % and 90 % of the full-scale reading of the micrometer. The thickness of each gauge at 23 °C shall be known to an accuracy of 0,001 mm or better.

5.3 Balance and attachments

A suitable balance and attachments or calibrated load cell capable of measuring up to 300 g with an accuracy of 0,01 g to be used for calibration of the pressure-foot load.

6 Conditioning

Condition the samples according to ISO 187. The sample shall remain in the standard atmosphere throughout the testing.

7 Preparation of test pieces

7.1 General

If the tests are being made to evaluate a lot, the sample shall be selected in accordance with ISO 186.

If the tests are being made on another type of sample make sure the specimens taken are representative of the sample.

Each test piece shall be free from perforations and faults not normally inherent in the tissue.

Test piece dimensions are not critical, but they shall allow measurements to be performed with a minimum spacing of 50 mm between each measurement area and 10 mm to the edges of the test piece.

Large specimens may be cut to a reasonable size. When cutting, the test piece shall not be subjected to pressure that could alter the thickness.

7.2 Single-ply thickness

Prepare 10 test pieces sampled either directly from the tissue machine, or, in case of single-ply finished product, during or after the converting process. Single-ply thickness shall not be performed on separated plies of a multi-ply product.

Do not attempt to separate plies that are bonded with adhesive or significant pressure.

Plies from different positions in a multi-ply product shall not be assumed to be the same.

7.3 Single-ply sheet thickness

Prepare 10 test pieces of single or multi-ply product sampled during or after the converting process.

7.4 Bulking thickness

Multi-ply sheets shall not be separated into individual plies. Stacks shall normally contain 12 plies. In case of products for which the number of plies do not divide 12, a number of plies as close as possible of 12 has to be considered. Where the stack height using 12 plies is too large for the maximum opening of the instrument in use, a lower number of plies may be used, but this should not be less than eight. In all cases, report the number of sheets and the number of plies per sheet used.

Prepare a sufficient number of stacks to be able to perform 10 separate measurements. All stacks shall comprise the same number of superimposed sheets, all oriented in the same way.