

BS EN ISO 2420:2017



BSI Standards Publication

**Leather — Physical and
mechanical tests —
Determination of apparent
density and mass per unit area
(ISO 2420:2017)**

National foreword

This British Standard is the UK implementation of EN ISO 2420:2017. It supersedes BS EN ISO 2420:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee TCI/69, Footwear, leather and coated fabrics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017.
Published by BSI Standards Limited 2017

ISBN 978 0 580 86627 2

ICS 59.140.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2017.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

EUROPEAN STANDARD

EN ISO 2420

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2017

ICS 59.140.30

Supersedes EN ISO 2420:2002

English Version

Leather - Physical and mechanical tests - Determination of apparent density and mass per unit area (ISO 2420:2017)

Cuir - Essais physiques et mécaniques - Détermination de la masse volumique apparente et de la masse surfacique (ISO 2420:2017)

Leder - Physikalische und mechanische Prüfungen - Bestimmung der Rohdichte und der flächenbezogenen Masse (ISO 2420:2017)

This European Standard was approved by CEN on 21 December 2016.

CEN 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 CEN-CENELEC Management Centre or to any CEN 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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 2420:2017) has been prepared by Technical Committee IULTCS "International Union of Leather Technologists and Chemists Societies" in collaboration with Technical Committee CEN/TC 289 "Leather" the secretariat of which is held by UNI.

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 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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

This document supersedes EN ISO 2420:2002.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 2420:2017 has been approved by CEN as EN ISO 2420:2017 without any modification.

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Apparatus	1
6 Sampling and sample preparation	2
7 Procedure	2
7.1 Test conditions	2
7.2 Measurement of thickness	2
7.3 Measurement of dimensions	2
7.4 Measurement of mass	3
8 Expression of results	3
8.1 Apparent density	3
8.2 Mass per unit area	4
9 Test report	4

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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

ISO 2420 was prepared by the Physical Test Commission of the International Union of Leather Technologists and Chemists Societies (IUP Commission, IULTCS) in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 289, *Leather*, the secretariat of which is held by UNI, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

It is based on IUP 5 originally published in *J. Soc. Leather Trades Chemists*, **42**, p. 388, (1958), and declared an official method of the IULTCS in 1959. An updated version was published in *J. Soc. Leather Tech. Chem.*, **82**, p. 227, (1998) and a further revision was published in *J. Soc. Leather Tech. Chem.* **84**, p. 313, (2000) and reconfirmed as an official method in March 2001.

IULTCS, originally formed in 1897, is a world-wide organization of professional leather societies to further the advancement of leather science and technology. IULTCS has three Commissions, which are responsible for establishing international methods for the sampling and testing of leather. ISO recognizes IULTCS as an international standardizing body for the preparation of test methods for leather.

This third edition cancels and replaces the second edition (ISO 2420:2002), which has been technically revised with the following changes:

- the mass per unit area has been included;
- the option to use square test pieces has been included.

Leather — Physical and mechanical tests — Determination of apparent density and mass per unit area

1 Scope

This document specifies a method for determining the apparent density and the mass per unit area of leather. It is applicable to all leathers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2418, *Leather — Chemical, physical and mechanical and fastness tests — Sampling location*

ISO 2419, *Leather — Physical and mechanical tests — Sample preparation and conditioning*

ISO 2589, *Leather — Physical and mechanical tests — Determination of thickness*

EN 15987, *Leather — Terminology — Key definitions for the leather trade*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15987 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Principle

The volume of a test piece is calculated from the area and thickness, treating the test piece as a right-angled circular cylinder or cuboid with a square base. The apparent density is obtained by dividing the mass by the volume. The mass per unit area is obtained by dividing the mass by the area.

5 Apparatus

- 5.1 **Press knife**, conforming to ISO 2419, the inner wall of which is a circle, approximately 70 mm in diameter, or square, approximately (100 × 100) mm.
- 5.2 **Thickness gauge**, as specified in ISO 2589.
- 5.3 **Balance**, reading to 0,001 g.
- 5.4 **Vernier callipers**, reading to 0,01 mm.

6 Sampling and sample preparation

Sample in accordance with ISO 2418. From the sample, cut three test pieces by applying the press knife (5.1) to the grain surface and condition them in accordance with ISO 2419.

If there is a requirement for more than two hides or skins to be tested in one batch, then only one test piece needs to be taken from each hide or skin, provided that the overall total is not less than three test pieces.

7 Procedure

7.1 Test conditions

Carry out all operations in a standard atmosphere as specified in ISO 2419.

7.2 Measurement of thickness

Measure the thickness of each test piece in accordance with ISO 2589. Measure the thickness, in millimetres, at three points forming the corners of an equilateral triangle, with each situated approximately 20 mm from the centre of the test piece. Measure the thickness at the centre of the test piece. Take the arithmetic mean of the four results as the thickness of the test piece, t .

NOTE The centre of the test piece and the other points for measurement are estimated by eye.

7.3 Measurement of dimensions

For circular test pieces, measure the diameter using Vernier callipers (5.4) to the nearest 0,05 mm in two directions at right angles to each other on the grain surface and two directions at right angles on the flesh surface. Take the arithmetic mean of the four results as the mean diameter of the test piece, d . Reject any test piece where the diameters on either the grain surface or the flesh surface differ by more than 0,5 mm.

For square test pieces, measure the distances AC and BD, where A, B, C and D are the midpoints of each side to within 0,5 mm, using Vernier callipers (5.4) to the nearest 0,05 mm as shown in Figure 1. Measure the distances on both the grain surface and on the flesh surface. Take the arithmetic mean of the results for the two results of AC, a , and BD, b , respectively. Reject any test piece where the distance measured on the grain surface differs more than 0,5 mm from the distance measured on the flesh surface.

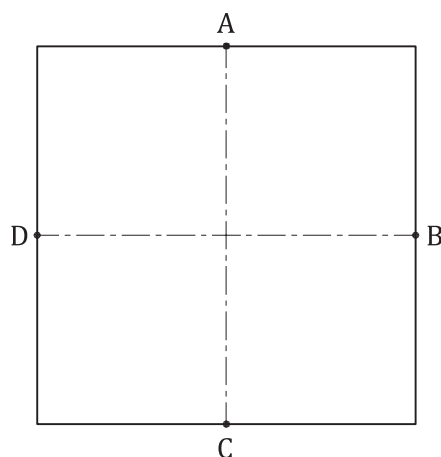


Figure 1 — Measurement of distances on square test pieces

7.4 Measurement of mass

Measure the mass of the test piece, m , in grams to the nearest 0,001 g.

8 Expression of results

8.1 Apparent density

For cylindrical test pieces, the apparent density, D_a , in kilograms per cubic metre shall be calculated using [Formula \(1\)](#):

$$D_a = \frac{1,273 \times 10^6 \times m}{t \times d^2} \quad (1)$$

where

t is the mean thickness of the test piece in millimetres (as obtained in [7.2](#));

d is the mean diameter of the test piece in millimetres (as obtained in [7.3](#));

m is the mass of the test piece in grams (as obtained in [7.4](#)).

NOTE 1 [Formula \(1\)](#) assumes that the sample is a circular cylinder whose volume, V , in cubic millimetres is given by:

$$V = \frac{\pi \times d^2 \times t}{4} \text{ which is simplified to } \frac{d^2 \times t}{1,273}$$

The factor 1,273 continues through to the final calculation.

For cuboid test pieces with a square base, the apparent density, D_a , in kilograms per cubic metre shall be calculated using [Formula \(2\)](#):

$$D_a = \frac{10^6 \times m}{t \times a \times b} \quad (2)$$

where

t is the mean thickness of the test piece in millimetres (as obtained in [7.2](#));

a is the mean distance AC of the test piece in millimetres (as obtained in [7.3](#));

b is the mean distance BD of the test piece in millimetres (as obtained in [7.3](#));

m is the mass of the test piece in grams (as obtained in [7.4](#)).

NOTE 2 The apparent density of leather is often expressed in g/cm³. If it is necessary to express it in these units, then 1 g/cm³ = 1 000 kg/m³.

8.2 Mass per unit area

For cylindrical test pieces, the mass per unit area, m_a , in grams per square metre shall be calculated using [Formula \(3\)](#):

$$m_a = \frac{1,273 \times 10^6 \times m}{d^2} \quad (3)$$

where

d is the mean diameter of the test piece in millimetres (as obtained in [7.3](#));

m is the mass of the test piece in grams (as obtained in [7.4](#)).

For cuboid test pieces with a square base, the mass per unit area, m_a , in grams per square metre shall be calculated using [Formula \(4\)](#):

$$m_a = \frac{10^6 \times m}{a \times b} \quad (4)$$

where

a is the mean distance AC of the test piece in millimetres (as obtained in [7.3](#));

b is the mean distance BD of the test piece in millimetres (as obtained in [7.3](#));

m is the mass of the test piece in grams (as obtained in [7.4](#)).

9 Test report

The test report shall include at least the following:

- a) a reference to this document, i.e. ISO 2420:2017;
- b) the mean apparent density, D_a , in kilograms per cubic metre expressed to three significant figures;
- c) the mean mass per unit area, m_a , in grams per square metre expressed to three significant figures;
- d) the standard atmosphere used for conditioning and testing as given in ISO 2419;
- e) any deviations from the method specified in this document;
- f) full details for identification of the sample and any deviations from ISO 2418 with respect to sampling.

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit, or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than 1 copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright & Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email subscriptions@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services

Tel: +44 345 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 345 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK