



SLOVENSKI STANDARD
SIST EN ISO 15496:2004

01-julij-2004

Tekstilije - Merjenje prepustnosti tekstilij za vodno paro pri kontroli kakovosti (ISO 15496:2004)

Textiles - Measurement of water vapour permeability of textiles for the purpose of quality control (ISO 15496:2004)

Textilien - Messung der Wasserdampfdurchlässigkeit von Textilien als Qualitätskontrolle (ISO 15496:2004)

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Textiles - Mesurage de la perméabilité a la vapeur d'eau des textiles dans le but du contrôle qualité (ISO 15496:2004)

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59.080.01 Tekstilije na splošno Textiles in general

SIST EN ISO 15496:2004 **en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 15496

May 2004

ICS 59.080.01

English version

**Textiles - Measurement of water vapour permeability of textiles
for the purpose of quality control (ISO 15496:2004)**

Textiles - Mesurage de la perméabilité à la vapeur d'eau
des textiles dans le but du contrôle qualité (ISO
15496:2004)

Textilien - Messung der Wasserdampfdurchlässigkeit von
Textilien als Qualitätskontrolle (ISO 15496:2004)

This European Standard was approved by CEN on 23 April 2004.

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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

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EN ISO 15496:2004 (E)

Foreword

This document (EN ISO 15496:2004) has been prepared by Technical Committee ISO/TC 38 "Textiles" in collaboration with Technical Committee CEN/TC 248 "Textiles and textile products", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by November 2004, and conflicting national standards shall be withdrawn at the latest by November 2004.

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 15496:2004 has been approved by CEN as EN ISO 15496:2004 without any modifications.

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INTERNATIONAL STANDARD

ISO
15496

First edition
2004-05-01

Textiles — Measurement of water vapour permeability of textiles for the purpose of quality control

*Textiles — Mesurage de la perméabilité à la vapeur d'eau des textiles
dans le but du contrôle qualité*

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ISO 15496:2004(E)**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 15496 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 2, *Cleansing, finishing and water resistance tests*.

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Textiles — Measurement of water vapour permeability of textiles for the purpose of quality control

1 Scope

This International Standard describes a comparatively simple method for testing the water vapour permeability of textiles that will provide the manufacturer with a clearly recognized method for quality control within the plant.

The simple test method described in this International Standard is not applicable for classifying the water vapour resistance of textiles against values relating to physiological effects specified in product standards, and particularly not those relating to personal protective equipment.

2 Terms and definitions

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

3.1

water vapour permeability WVP

characteristic of a textile material describing the amount of water vapour diffusing through the textile per square metre, per hour and per unit difference of water vapour pressure across the textile

3 Symbols and units

Symbol	Description	Unit
a	Area of the measuring cup opening	m ²
Δt	Measuring time	h
Δm	Change in mass of the measuring cup during the period Δt	g
Δm_{app}	Change in mass of the measuring cup on the specimen holder with only membrane during the period Δt	g
Δp	Partial water vapour pressure difference across the specimen	Pa
p_{sa}	Saturated water vapour pressure at the test room temperature T_a	Pa
p_{sb}	Saturated water vapour pressure at the water bath temperature T_b	Pa
RH	Relative humidity in equilibrium with saturated potassium acetate solution	%
T_a	Temperature in the test room	°C
T_b	Temperature of the water bath	°C
WVP	Water vapour permeability of the specimen	g/m ² ·Pa·h
WVP_{app}	Apparatus water vapour permeability	g/m ² ·Pa·h

ISO 15496:2004(E)**4 Principle**

The specimen to be tested is placed, together with a waterproof but highly water-vapour-permeable, hydrophobic, microporous membrane (henceforth referred to as “membrane”), on a ring holder and then put in a water bath so that the membrane is in contact with the water. This is then left for 15 min. A cup containing saturated potassium acetate solution, creating a relative humidity of about 23 % at the specimen’s upper face, and covered with a second piece of the same membrane, is weighed and then inverted above the specimen in the ring holder, so that the membrane is in contact with the specimen. There will be a net transfer of water vapour through the specimen from the water side to the cup (see Figure 1). After 15 min the cup is taken off and re-weighed. At the same time a control test without a specimen is carried out to determine the water vapour permeability of the two membranes, the apparatus water vapour permeability. The water vapour permeability of the specimen can then be calculated, correcting for the influence of the two membranes.

5 Apparatus

The schematics of the test set-up are shown in Figure 1.

5.1 Membrane

Any membrane used shall be waterproof, microporous and hydrophobic¹⁾. It shall have a high water vapour permeability, so that two layers of the membrane have a water vapour permeability of more than 1,2 g/m²·Pa·h when measured according to this International Standard.

5.2 Specimen holder

The specimen holder shall be a metal or plastic ring with a milled groove onto which the specimen in conjunction with the membrane is secured, using a rubber ring that fits into the groove, as shown in Figure 2. The rubber ring shall fit tightly so that the specimen and membrane are held under tension. The bottom outside edge of the specimen holder should be radiused.

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5.3 Support frame for specimen holders

The support frame should consist of two plates, separated by spacers, that support the specimen holders in the water (see Figure 3). Both plates should have at least six holes cut out, those in the top plate being large enough to allow the holder with specimen and membrane to pass through. The holes in the lower plate are smaller than the specimen holder, but larger than the cup opening, and they are centred to the holes in the top plate. The support frame is fitted with four vertically adjustable screws so that the specimen holder can be immersed to a depth of (5 ± 2) mm in the water.

The holes in the support frame should be sequentially numbered.

5.4 Water bath

The water bath shall consist of a transparent glass or plastic tank, large enough to accommodate the support frame, containing distilled water maintained at $(23,0 \pm 0,1)$ °C by means of an immersion thermostat with a circulation pump. The water temperature shall be measured in at least four positions simultaneously, adjacent to the four corners of the support frame. In order to obtain a uniform temperature distribution in the water, the inlet or outlet pipe of the thermostat circulation pump shall be extended by means of a hose to the tank end opposite the thermostat. Care should be taken to prevent air bubble formation by either boiling the distilled water prior to use and/or reducing the speed of the thermostat agitator.

1) This product is commercially available from, among others: W. L. Gore & Associates GmbH, PO Box 1149, D-85636 Putzbrunn, Germany; Goodfellow Cambridge Ltd., Ermine Business Park, Huntingdon, PE 29 6WR, UK; Goodfellow Corp., 800 Lancaster Av., Berwyn, PA 19312-1780, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of these products.

5.5 Measuring cup, made from transparent plastic and having an internal diameter of between 85 mm and 95 mm, with a tolerance of ± 1 mm, and a volume of at least 250 ml.

5.6 Potassium acetate solution

Saturated potassium acetate solution shall be made by thoroughly mixing dry potassium acetate (p.a. grade) with distilled water in the ratio of 100 g potassium acetate to 31 g of water. The mixture shall be homogeneous and free of lumps; it shall be allowed to equilibrate at a temperature of (23 ± 3) °C for a period of not less than 12 h. It shall be fluid enough to cover the membrane when the cup is inverted prior to testing. The solution shall remain saturated (indicated by its white or opaque appearance) throughout the test.

5.7 Balance, capable of determining a mass of approximately 150 g with a precision of ± 1 mg.

5.8 Test room, maintained at (23 ± 3) °C.

6 Preparation

6.1 Specimens

Cut three circular specimens of the textile with diameter of approximately 180 mm. The membrane used as the specimen cover in the specimen holder should have a diameter of approximately 200 mm.

When the specimen is fitted onto the specimen holder, the side that during use would face the body shall be, unless otherwise requested, in contact with the specimen holder's membrane. Specimen and membrane shall be secured without creases or distortion on the specimen holder by means of a rubber ring. There shall be no air gaps between the specimen and membrane. Prepare a control specimen holder with membrane only, so that the apparatus water vapour permeability can be measured.

6.2 Measuring cups

Fill each measuring cup with approximately 120 g of the saturated potassium acetate solution and then seal with a circular piece of membrane. For this purpose, briefly roll the edges of the measuring cup against a hot iron or soldering iron, whilst keeping the membrane taut, e.g. by using a rubber band. Excess membrane should be trimmed in order that the contents of the cup can be seen. The cup seal should be tested for leaks prior to each measurement by inverting the cup over absorbent paper for about 3 min, which shall not become wet. The potassium acetate solution shall always be saturated (opaque or white) during the test.

7 Test procedure

7.1 Inserting the specimen and equilibration

Insert those specimen holders with textile and membrane, and the one with membrane only, into the support frame at (30 ± 5) s intervals in sequential order of the holes. Verify that there are no air bubbles between the membrane and water surface. After (10 ± 1) min, check the specimens for wrinkles and, if necessary, adjust without removal from the water bath. The specimen holders shall be left on the bath for a total of $15 \text{ min} \pm 10 \text{ s}$ before the measuring cup is placed on the specimen.

7.2 Placing the measuring cups on the bath

Weigh (m_0) the measuring cups, invert and gently shake them to spread the potassium acetate solution evenly over the membrane, then centre them on the specimen surface at time intervals of (30 ± 5) s, in the same order as the specimen holders were inserted into the support frame. Centre one cup on the control specimen holder with membrane only. Remove each cup $15 \text{ min} \pm 10 \text{ s}$ after having placed it on the specimen, and re-weigh (m_{15}) it.