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**Footwear — Test method for insoles  
and insocks — Dimensional change  
after cycle of wetting and drying**

*Chaussures — Méthode d'essai relative aux premières de montage et  
de propreté — Variations dimensionnelles après un cycle de mouillage  
et de séchage*

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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.

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](http://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](http://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 of the voluntary nature of standards, 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 216, *Footwear*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Footwear — Test method for insoles and insocks — Dimensional change after cycle of wetting and drying

## 1 Scope

This document specifies a method for determining the dimensional change of footwear insoles and insocks after cycle wetting and drying regardless of the material.

## 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 105-E04:2013, *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration*

ISO 17709, *Footwear — Sampling location, preparation and duration of conditioning of samples and test pieces*

ISO 18454, *Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear*

ISO 19952, *Footwear — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19952 and the following apply.

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

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

### 3.1

#### **thickness change**

gain or loss in thickness, after leaving the test piece immersed in water or artificial perspiration solution and then keeping in an oven for a specified time, expressed as a percentage of the initial thickness

### 3.2

#### **length/width change**

increase or decrease in distance between two reference points on a test piece after leaving the test piece immersed in water or artificial perspiration solution and then keeping in an oven for a specified time, expressed as a percentage of the initial distance

### 3.3

#### **insole**

component used to form the base of the shoe to which the upper is usually attached during lasting

[SOURCE: ISO 19952:2005, 92]

Note 1 to entry: Insole conforming to the shape of the bottom of the last to which the upper and the bottom are attached to make the shoe. In most constructions, therefore, it forms the foundation of the shoe. It is made of leather, leatherboard or fibreboard and needs to be flexible and able to absorb moisture. In many cases, it is covered by an insock after making to cover any nails, stitches, etc., which may protrude.

## 4 Apparatus

- 4.1 Dial micrometer gauge**, accurate to within 0,01 mm, standing on a firm base and loaded with a dead mass such that the presser foot applies a pressure of  $(50 \pm 5)$  kPa. The presser foot of the gauge should be flat and circular, and  $(10,0 \pm 0,1)$  mm in diameter.
- 4.2 Measuring device**, stainless steel ruler or similar, capable of measuring to an accuracy of 0,1 mm.
- 4.3 Glass or flat bottomed container of suitable size**, such that the test piece can be placed at the bottom.
- 4.4 Oven**, for heating the test piece to  $(40 \pm 2)$  °C.
- 4.5 Cutting device**, to cut square test pieces with dimensions  $(50 \pm 2)$  mm.
- 4.6 Volumetric flask**, 1 000 ml.
- 4.7 pH-meter**.
- 4.8 Weight, cage or any appropriate device**, to ensure the test pieces are maintained totally immersed in liquids.

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## 5 Reagents

Unless otherwise specified, only use analytical grade reagents.

- 5.1 Acid artificial perspiration solution**, in accordance with ISO 105-E04:2013, 4.4.
- 5.2 Alkaline artificial perspiration solution**, in accordance with ISO 105-E04:2013, 4.3.
- 5.3 Water**, distilled water.

## 6 Sampling and conditioning

Cut two square test pieces of  $(50 \pm 2)$  mm  $\times$   $(50 \pm 2)$  mm from insoles or insocks using a cutting device (4.5). If insock is assembled out of different materials at ball part and heel part, take each material separately.

It may not be possible to cut a test piece of sufficient size from certain types of footwear, especially children's. The test piece size should not be reduced. If it is not possible to cut the correct size test piece from the footwear, the materials themselves shall be tested.

Condition the two test pieces in accordance with ISO 18454, for a minimum of 24 h.

## 7 Test method

### 7.1 Measurement method

All the measurements shall be made on the face side of test pieces which are designed to contact foot. Mark the lengthwise direction as "X" and widthwise direction as "Y" in accordance with the ISO 17709 reference system. During the test, remove wrinkles (if any) without stretching the test piece. Place the measuring device (4.2) on the test piece, taking care to avoid any distortion.

## 7.2 Preparation of the test piece and test procedure

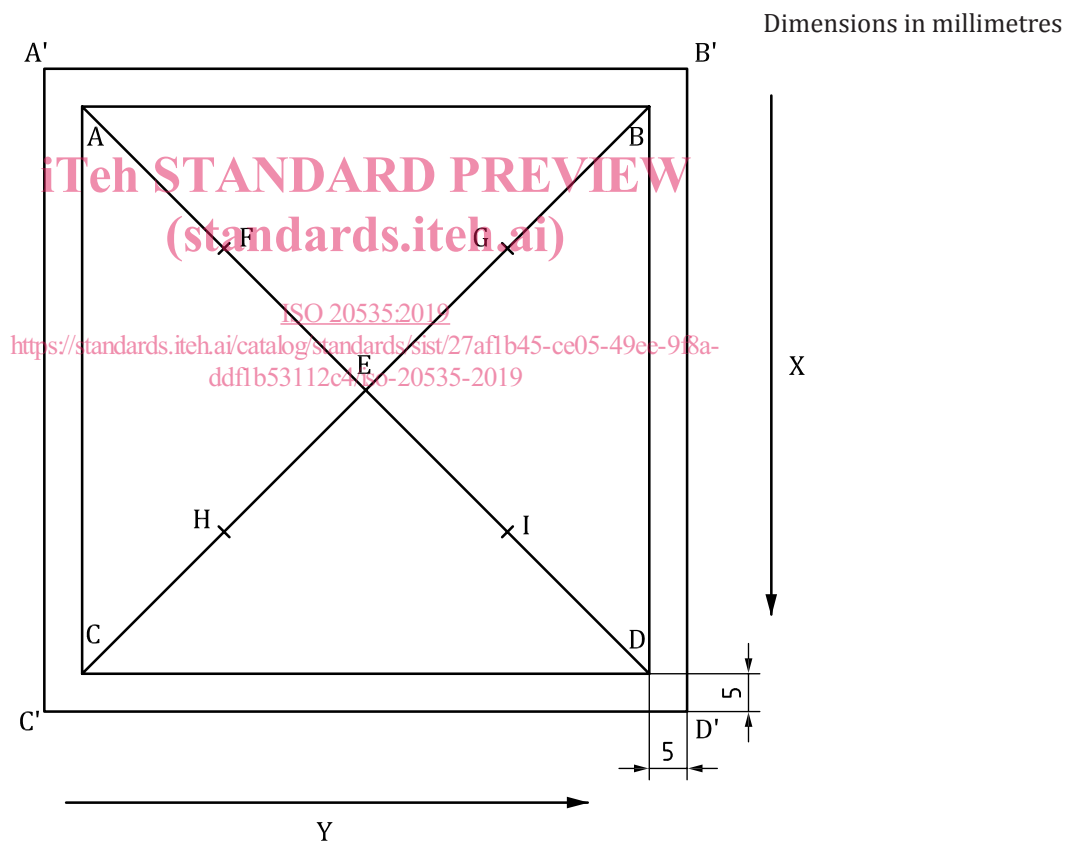
**7.2.1** On the conditioned test piece, draw parallel lines 5 mm away from each edge. Label the corners of the square as A, B, C and D (see [Figure 1](#)). Trace diagonals AD and BC. Mark the centre as E and the midpoints of AE, BE, CE and DE as F, G, H and I (see [Figure 1](#)).

**7.2.2** Measure the distances between the points AB, CD, AC and BD with the measuring device ([4.2](#)), record the measured values.

**7.2.3** Measure the thickness at points E, F, G, H and I with the dial micrometer gauge ([4.1](#)), record the measured values.

**7.2.4** Immerse fully the test pieces in distilled water or artificial perspiration solution (see [Clause 5](#)) for 6 h by use of appropriate device (see [4.8](#)).

**7.2.5** Take the test pieces ([7.2.4](#)) out of the water or artificial perspiration solution (see [Clause 5](#)) and wipe off surface water using absorbent paper.



**Figure 1 — Marking of the test piece**

**7.2.6** Place the test pieces ([7.2.5](#)) in the oven ([4.4](#)) for 24 h.

**7.2.7** Measure the distances AB, CD, AC and BD ([7.2.2](#)) again and the thickness of E, F, G, H and I ([7.2.3](#)) again.

## 8 Expression of results

### 8.1 Thickness change

Thickness change,  $H$ , is calculated as a percentage (%) from [Formula \(1\)](#):

$$H = \frac{e_1 - e_0}{e_0} \times 100 \quad (1)$$

where

$e_0$  is the initial average thickness of test piece ([7.2.3](#)), in mm;

$e_1$  is the average thickness of test piece after the test ([7.2.7](#)), in mm.

### 8.2 Length/width change

**8.2.1** Length change,  $X_a$ , is calculated as a percentage (%) from [Formula \(2\)](#):

$$X_a = \frac{X_1 - X_0}{X_0} \times 100 \quad (2)$$

where

$X_0$  is the initial average distances AC and BD ([7.2.2](#)), in mm;

$X_1$  is the average of the same distances measured after the test ([7.2.7](#)), in mm.

**8.2.2** Width change,  $Y_a$ , is calculated as a percentage (%) from [Formula \(3\)](#):

$$Y_a = \frac{Y_1 - Y_0}{Y_0} \times 100 \quad (3)$$

where

$Y_0$  is the initial average distances AB and CD ([7.2.2](#)), in mm;

$Y_1$  is the average of the same distances measured after the test ([7.2.7](#)), in mm.

**8.2.3** The final result is the average values of two test pieces.

**8.2.4** Express all the results to the nearest 0,1 %.

### 8.3 Visual examination

Report any changes in aspect of the test piece in detail, such as unevenness, delamination, colour or print change.

## 9 Test report

The test report shall include the following information:

- a) a reference to this document, i.e. ISO 20535;
- b) the full description of the samples tested including commercial styles codes, colours, nature, etc.;



- c) the liquid used for immersing test pieces, i.e. distilled water and/or artificial perspiration;
- d) the results for thickness change and length/width change, expressed according to [8.1](#), [8.2](#);
- e) the description of any changes in the aspect of the test piece, according to [8.3](#);
- f) the description of the sampling procedure, where relevant;
- g) the details of any deviation from the standard test procedure;
- h) the date of testing.

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