INTERNATIONAL STANDARD

ISO 22651

First edition
2002-09-15

Footwear — Test methods for insoles — Dimensional stability

Chaussures — Méthodes d'essai relatives aux premières de montage — Stabilité dimensionnelle

Reference number
ISO 22651:2002(E)

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.ch
Web www.iso.ch

Printed in Switzerland

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22651 was prepared by CEN (as EN 12800:2000) and was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 216, *Footwear*, in parallel with its approval by the ISO member bodies.

For the purposes of international standardization, a list of corresponding International and European Standards for which equivalents are not given in EN 12800 has been added as annex ZZ.

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 309 "Footwear", the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European standard specifies a method for the determination of the dimensional stability of insoles, irrespective of the material, after immersion in water.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated into it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12222 *Footwear – Standard atmospheres for conditioning and testing of footwear and components for footwear.*

prEN 13400:1998 *Footwear – Sampling location of components for footwear.*

3 Definitions

For the purposes of this standard the following definitions apply:

3.1
swelling
gain in thickness, expressed as a percentage, after leaving the test piece of insole material submerged in water for 6 h

3.2
increase in size
increase in length and in width, expressed as a percentage, after leaving the test piece of insole material in water for 6 h

3.3
shrinkage
reduction in length and width, expressed as a percentage, of a test piece of insole material after leaving the test piece in an oven at 35 °C for 24 h

3.4
dimensional stability
the change in the distance between two reference points on a test piece before and after specified test conditions (e.g. heat, moisture) expressed as a percentage of the initial distance

4 Apparatus and material

The following apparatus and material shall be used:

4.1 Dial micrometer gauge, standing on a firm base and loaded with a dead mass such that the presser foot applies a pressure of 50 kPa ± 5 kPa[1]. The gauge has a presser foot which is flat, circular and 10,0 mm in diameter.

[1] 1 Pa = 1 N/m^2

The gauge has scale divisions of 0,01 mm.

4.2 Measuring device - Vernier calipers or similar, capable of measuring to an accuracy of 0,1 mm.

4.3 Glass or flat bottomed container of an adequate size such that the test piece can be placed in the bottom.

4.4 Oven, for heating the test piece to 35 °C and thermostatically controlled so that the test piece is kept within 1 °C of the required temperature during the heating period.

4.5 Distilled water

5 Sampling and conditioning

From the shoe insoles, cut insoles, or component as supplied, cut two square or rectangular test pieces of (60 mm ± 20 mm) x (60 mm ± 20 mm), one to determine swelling and size growth and the other to determine shrinking. According to the given dimensions, cut the test pieces as big as the sample will allow.

If the test pieces are taken from the shoes or cut component, sampling shall be done according to prEN 13400:1998.

Condition the test pieces according to EN 12222, for a minimum of 24 h.

6 Test method

6.1 Swelling and increase in size

On one of the conditioned test pieces trace parallel lines 5 mm in from each side. Label the corners of the square or rectangle formed A, B, C and D (see figure 1). Trace diagonals AD and BC. Mark the centre E and the half way points of the diagonals AE, BE, CE and ED and label them F, G, H and I.

Measure the distances between the points A-B, C-D, A-C and B-D with a measuring device.

Measure the thickness at points E, F, G, H and I with the dial micrometer gauge.

Submerge the test piece in distilled water for 6 hours.

The test piece must be fully submerged in water being loaded with a small weight

Take the test piece out of the water and eliminate superficial drops of water.

Measure the distances AB, CD, AC and BD again and the thickness at points E, F, G, H and I.

6.2 Shrinkage

On the other conditioned test piece mark parallel lines in the same way as in 6.1 (see figure 1). Measure distances A-B, C-D, A-C and B-D.

Leave the test piece in the drying oven (see 4.4) for 24 h. Then measure again the distances A-B, C-D, A-C and B-D.

7 Expression of results

7.1 Swelling

Calculate the average value of the five thicknesses e_o.

Calculate the average value of the five thicknesses after removing the test piece from the water e_f.

Swelling, *H,* is calculated as a percentage (%) from the equation:

$$H = \frac{e_f - e_o}{e_o} x100$$

Where:

e_f is the thickness of test piece when wet
e_o is the thickness of test piece when dry

Express the result to the nearest 0,5 %.

7.2 Increase in size

Calculate the average value of the initial distances A-B and C-D measured in accordance with 6.1 and call it a_1. In the same way find the average of the initial distances A-C and B-D and call it b_1.

In the same way calculate the averages of the same distances measured after taking the test pieces out of the water and call it a_2 for the distances A-B and C-D and b_2 for distances A-C and B-D.

Calculate the increase in size, *V,* expressed as a percentage, from the equations:

$$V_a = \frac{a_2 - a_1}{a_1} x100$$

(Increase in size in direction a)

$$V_b = \frac{b_2 - b_1}{b_1} x100$$

(Increase in size in direction b)

Express the result to the nearest 0,5 %.

7.3 Shrinkage

Calculate the average of the distances A-B and C-D measured in accordance with 6.2 and call it a_o.

In the same way find the average of the distances A-C and B-D and call it b_o.

Calculate the averages of the same distances measured after leaving the test piece for 24 h in the oven at 35 °C and call them a_{24} and b_{24}.

Calculate the shrinkage *S*, as a percentage, from the equations: