INTERNATIONAL STANDARD

ISO 18896

First edition
2006-03-15

Footwear — Test methods for shanks — Longitudinal stiffness

Chaussures — Méthodes d'essai pour cambrions — Rigidité longitudinale

Reference number
ISO 18896:2006(E)

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Published in Switzerland

Foreword

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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 18896 was prepared by CEN (as EN 12959) 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.

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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of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.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 assessing the stiffness in the longitudinal direction of steel shanks used for the reinforcement of the waist region of women's shoes and of some men's and children's shoes.

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 in 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.*

3 Definitions

For the purposes of this standard the following definition applies:

3.1
longitudinal stiffness
the stiffness in the longitudinal direction of shanks as determined by measuring the deflection of the shank under specified conditions when loaded with a specified force

4 Apparatus and materials

The following apparatus and material shall be used:

4.1 A suitable test machine for the determination of the stiffness in the longitudinal direction of steel shanks with:

a) A heel end clamp capable of clamping a fluted shank securely without crushing the flute and of dimensions such that 32 mm ± 1 mm of the shank are clamped. The angle of the clamp shall be capable of adjustment to ensure that the portion of shank to which a force is applied lies horizontal.

b) A means of applying a downward force to the forward end of the shank of 2 N, 4 N, 6 N and 8 N with a tolerance of ± 5 %.

c) A means of measuring the vertical deflection of the shank at the point where the force is applied to an accuracy of ± 0,025 mm.

4.2 A laboratory timer or similar with an accuracy of ± 0,1 s.

4.3 Callipers and/or a stainless steel rule with an accuracy of ± 0,5 mm.

5 Sampling and conditioning

The test specimen shall be a complete shank.

At least three specimens of each type of shank shall be tested.

Test specimens shall be conditioned for 48 h in a controlled atmosphere in accordance with EN 12222 prior to testing.

Tests shall be carried out in a suitable conditioned atmosphere in accordance with EN 12222. Where this is not possible tests shall be carried out within 15 min of removing the test specimen from the conditioned atmosphere.

6 Test method

6.1 The shank is clamped at its heel end and bent as a cantilever beam by masses added at its forward end. The amount of bending is measured and used to calculate the flexural rigidity of the shank, a quantity which is a measure of stiffness and which is dependent on the metal of the shank and its cross section but not on its length.

6.2 With the underside of the shank uppermost (normally the fluted side), insert the heel end centrally in its clamp (see 4.1a) so that 32 mm of shank are clamped, with the end of the shank flush with the back of the clamp and the longitudinal axis of the shank perpendicular to the clamp edge. Tighten the clamp firmly to securely hold the shank.

6.3 Adjust the angle of the clamp so that the point of loading at the forward end of the shank is horizontal.

6.4 Place the displacement measuring device (see 4.1b) in position and adjust as necessary.

6.5 Smoothly apply a downward force of 2 N to the forward end of the shank with the center of the load point being about 6 mm from the end of the shank.

NOTE For shanks for high heeled shoes a point about 11 mm from the end of the shank may be used.

6.6 After 5 s measure the vertical deflection of the shank (see 4.1c) at the point of loading, a_1, to the nearest 0,01 mm.

6.7 Remove the force and replace it with the force of 4 N so that the time interval between the application of the first and second force is 10 s.

6.8 After 5 s measure the deflection, a_2, as in 6.3.

6.9 Repeat the procedure in 6.7 and 6.8 for forces of 6 N and 8 N giving deflection measurements a_3 and a_4 respectively. Check the correctness of these readings by checking that $a_4 - a_3$, $a_3 - a_2$ and $a_2 - a_1$ are approximately equal.

6.10 Remove the force from the shank and measure in mm the moment length of the shank from the front edge of the clamp to the center point of the force application using the device described in 4.3.

6.11 Test two other shanks as described in 6.2 to 6.10.

7 Expression of results

7.1 The flexural rigidity, *S*, in kilonewton square millimeters ($kN \cdot mm^2$) of the shank is given by the equation:

$$S = \frac{WL^3}{3a}$$

where

W is the load (in newtons);
a is the deflection produced (in millimeters);
L is the moment length (in millimeters).

Calculate the flexural rigidity of the shank from the experimentally determined values of *W*, *a* and *L* by substitution in the above equation.

Take *W* as being 2 N and obtain the most accurate estimate of the corresponding value of *a* from the following equation:

$$a = \frac{1}{10}(3a_4 + a_3 - a_2 - 3a_1)$$

where

a is the deflection (in millimeters) produced per 2 N gravitational force;
a_4 is the deflection (in millimeters) produced by applying a 8 N force;
a_3 is the deflection (in millimeters) produced by applying a 6 N force;
a_2 is the deflection (in millimeters) produced by applying a 4 N force;
a_1 is the deflection (in millimeters) produced by applying a 2 N force.

7.2 Calculate the values for *S* (in kilonewtons per square millimeters) for the three shanks separately and take the average. Record the result to the nearest kilonewtons per square millimeters.

8 Test report

The test report shall include the following information:

a) results, expressed in accordance with clause 7;
b) reference to this test method;
c) full description of the shank samples tested including commercial styles codes, colours, nature, etc.;
d) the number of test specimens if other than three;
e) any deviations from this standard test method;
f) date of testing.

Annex A
(informative)

List of International Standards identical to the European Standards referenced in Clause 2

European Standard	International Standard
EN 12222:1997	ISO 18454:2001

ICS 61.060

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