INTERNATIONAL STANDARD

ISO 17707

First edition
2005-07-01

Footwear — Test methods for outsoles — Flex resistance

Chaussures — Méthodes d'essai applicables aux semelles d'usure — Résistance à la flexion

Reference number
ISO 17707:2005(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

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.org
Web www.iso.org

Published 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 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 17707 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 216, *Footwear*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

Contents page

Foreword

This European Standard (EN ISO 17707:2005) has been prepared by Technical Committee CEN /TC 309 "Footwear", the secretariat of which is held by AENOR, in collaboration with Technical Committee ISO/TC 216 "Footwear".

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 January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006.

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.

1 Scope

This European Standard specifies a method for determining the flex resistance of outsoles. This method is intended to assess the effect of sole materials and surface patterns on cut growth. This method is applied to outsoles that, in accordance with the test mentioned in Clause 6, have a maximum longitudinal rigidity of 30 N.

NOTE The method described in this standard is based on the method for the determination of the flex resistance for outsoles described in EN ISO 20344.

2 Normative references

The following referenced documents are indispensable for the application 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.

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

EN ISO 534, *Paper and board - Determination of thickness, density and specific volume (ISO 534:2005)*

3 Terms and definitions

For the purposes of this European Standard, the following term and definition apply.

3.1
flex resistance
number of flexes that cause cut growth and/or initiation of cracks in the outsoles

4 Apparatus and material

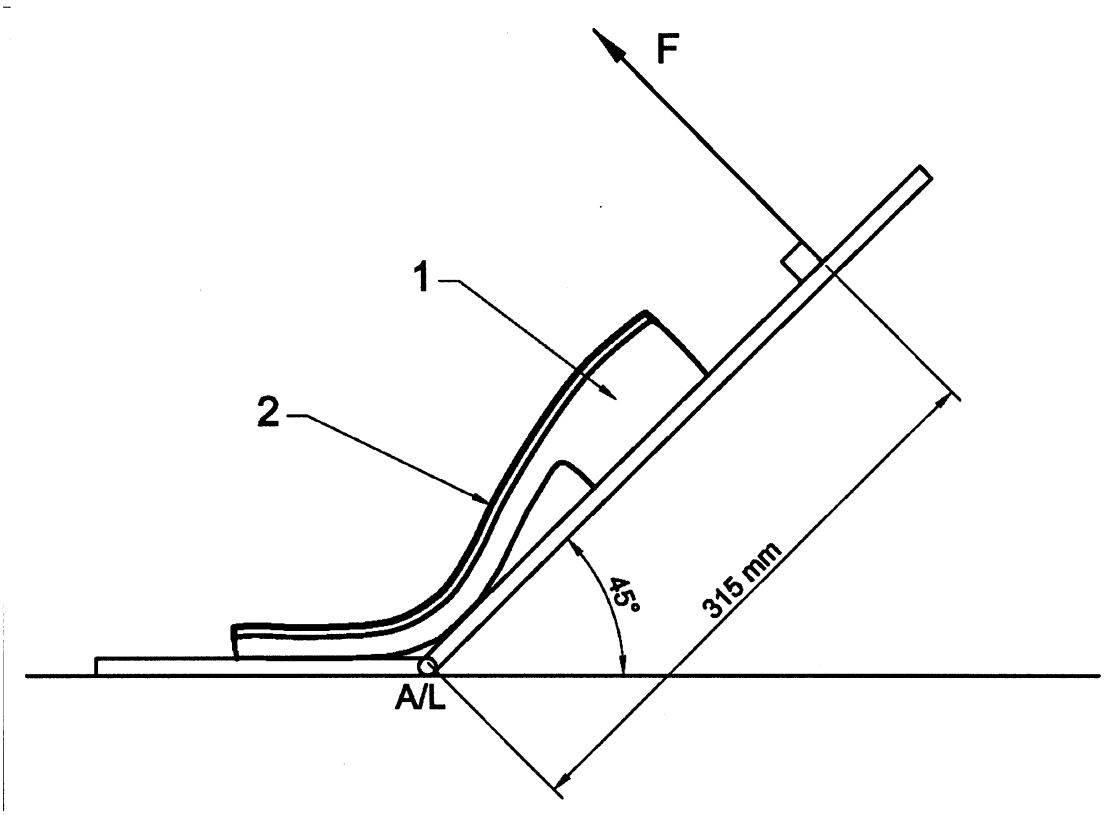
4.1 The following apparatus shall be used:

4.2 Device for the measurement of the longitudinal rigidity of outsoles (See Figure 1)

4.2.1 **Smooth metal hinged plate**, fixed to a rigid base with provision to reduce the friction between the heel of the outsole and the hinged plate.

4.2.2 **Clamping device**, to fix the forepart of the outsole to be tested to the rigid base.

4.2.3 **Sensor**, capable of measuring forces from 0 N to 50 N, to a tolerance of 1 %, fixed to the hinged plate (4.2.1) at a distance of 315 mm from the hinge. **3.1**



Key

1 Outsole
2 Standard insole
A/L Hinge axis of the base plate
F Force applied

Figure 1 - Device for the measurement of the longitudinal rigidity of outsoles

4.3 Device for the measurement of the flex resistance of outsoles (See figure 2)

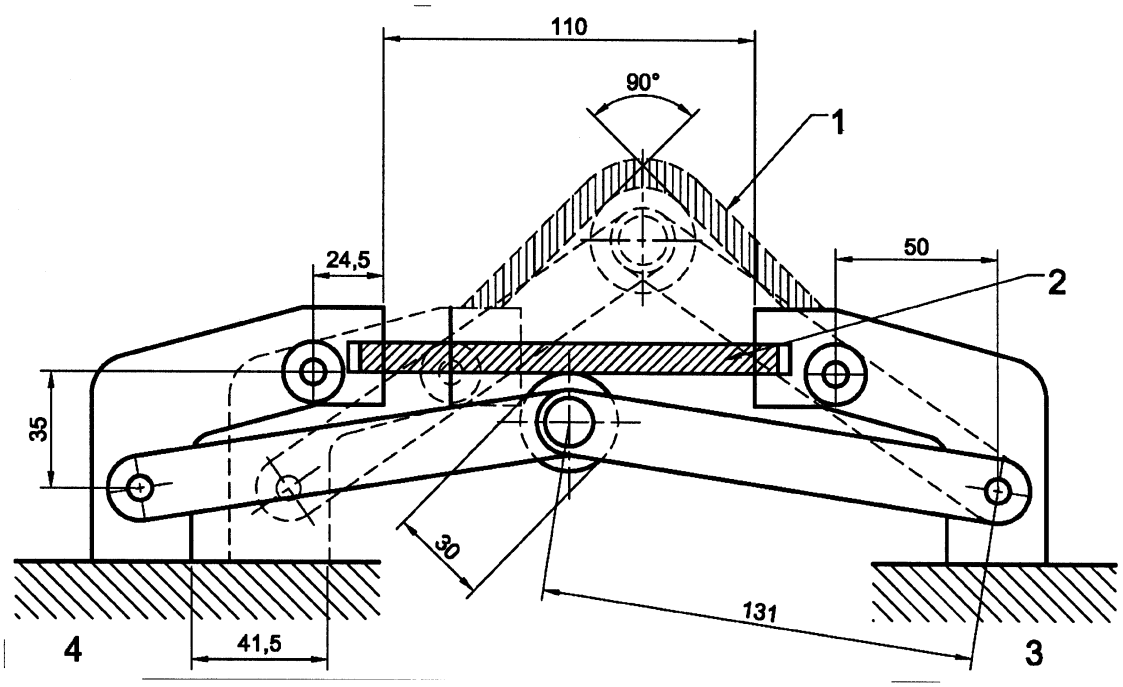
4.3.1 A **mandrel** of diameter (30 ± 0,1) mm around which the outsole is flexed.

4.3.2 A **means of firmly clamping** the outsoles at both ends so that the flexing line is aligned with the axis of the mandrel.

4.3.3 A **means of flexing** the outsoles at a constant rate between 135 cycles per minute and 150 cycles per minute through an angle of (90 ± 2) ° about the axis of the mandrel.

4.3.4 A **means of counting** the total number of flexing cycles.

Dimensions in mm



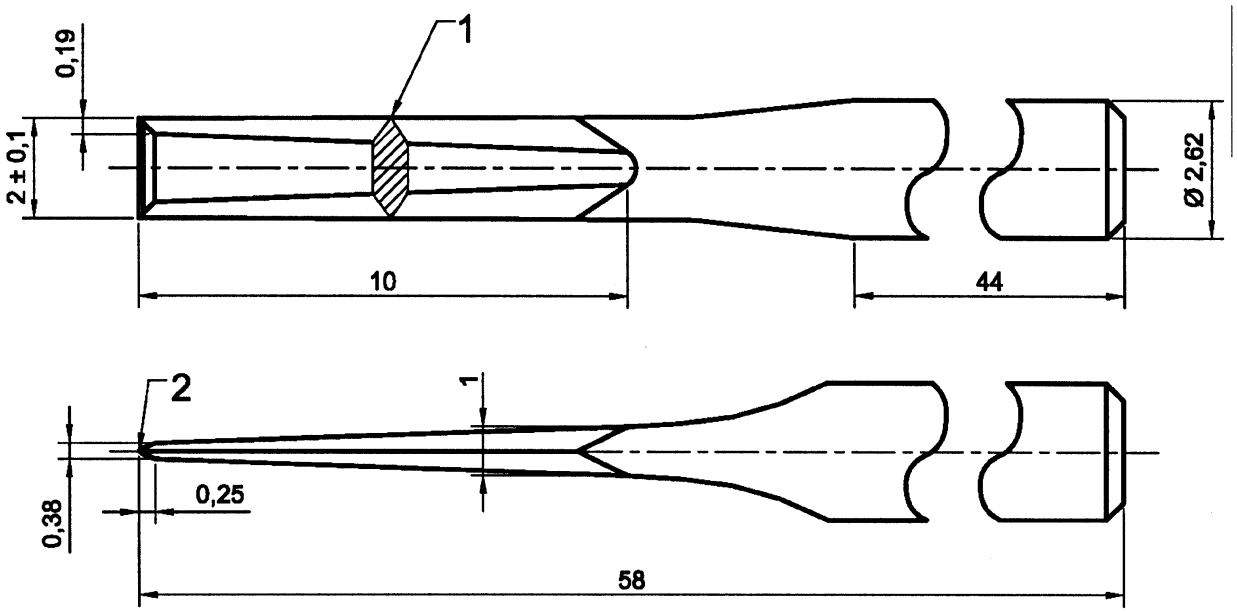
Key
1 Test piece at maximum flex position
2 Test piece at null flex position
3 Fixed bearing
4 Moveable bearing

Figure 2 - Device for the measurement of the flex resistance of outsoles

4.4 Chisel (or **cutting tool**), to pierce the outsole, the dimensions of which are defined in Figure 3.

NOTE A means of firmly clamping the outsole in a jig is advisable to minimise the risk of breaking the chisel as it is withdrawn from the outsole.

Dimensions in mm



Key
1 Right-angled sharp edge on both sides of blade from taper to point
2 Sharp edge

Figure 3 – Chisel

4.5 Device for the measurement of the cut length, in millimetres, to an accuracy of 0,1 mm. Either a graduated optical magnifier, a travelling microscope or graduated probe and optical magnifier is recommended.

NOTE A graduated optical magnifier is seldom of much use in measuring cut lengths when the sole unit has heavy cleating.

5 Sampling and conditioning

5.1 If the test piece to be tested is taken from a complete item of footwear:

5.1.1 Carefully cut the upper of the shoe or boot from the outsole, but leaving any insole and lasted margin attached.

5.1.2 If the outsole has raised edge to its upper surface such as a lip or an imitation welt, this should be carefully scoured off the forepart area down to, but not beyond the insole surface.

5.2 If the test pieces are outsoles units, they should be bounded before testing the rigidity and flex resistance with a standard insole of correct size and shape, attaching this with adhesive and allowing it to dry for 24 h. Minimum three outsoles (covering if it is possible the full size range) should be tested.

The characteristics of the insole for the preparation of the test piece are:

Material:	Cellulose board
Thickness:	(2 ± 0,1) mm
Apparent bulk density:	(0,55 ± 0,05) g/cm^3

All the test pieces shall be conditioned for 24 h according to EN 12222.

Thickness and apparent bulk according to EN ISO 534.

6 Rigidity test method

6.1 Preparation of the test pieces

Mark the longitudinal axis of the outsole, XY, as it is shown in Figure 4.

The flexing line is defined as the line at 90° to the longitudinal axis passing through it at one third of the distance XY from the toe at X. The flexing line is AC (See Figure 4).

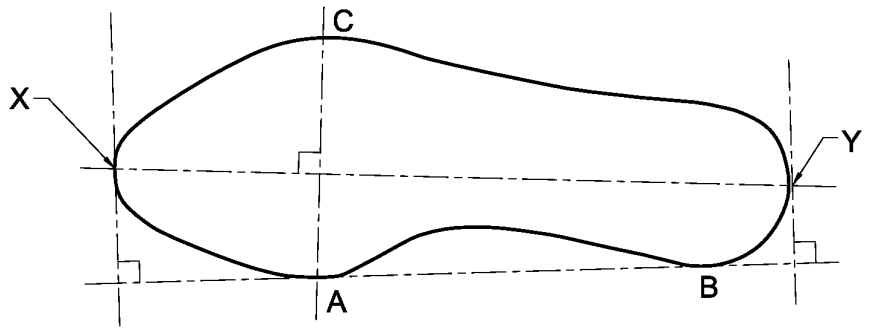
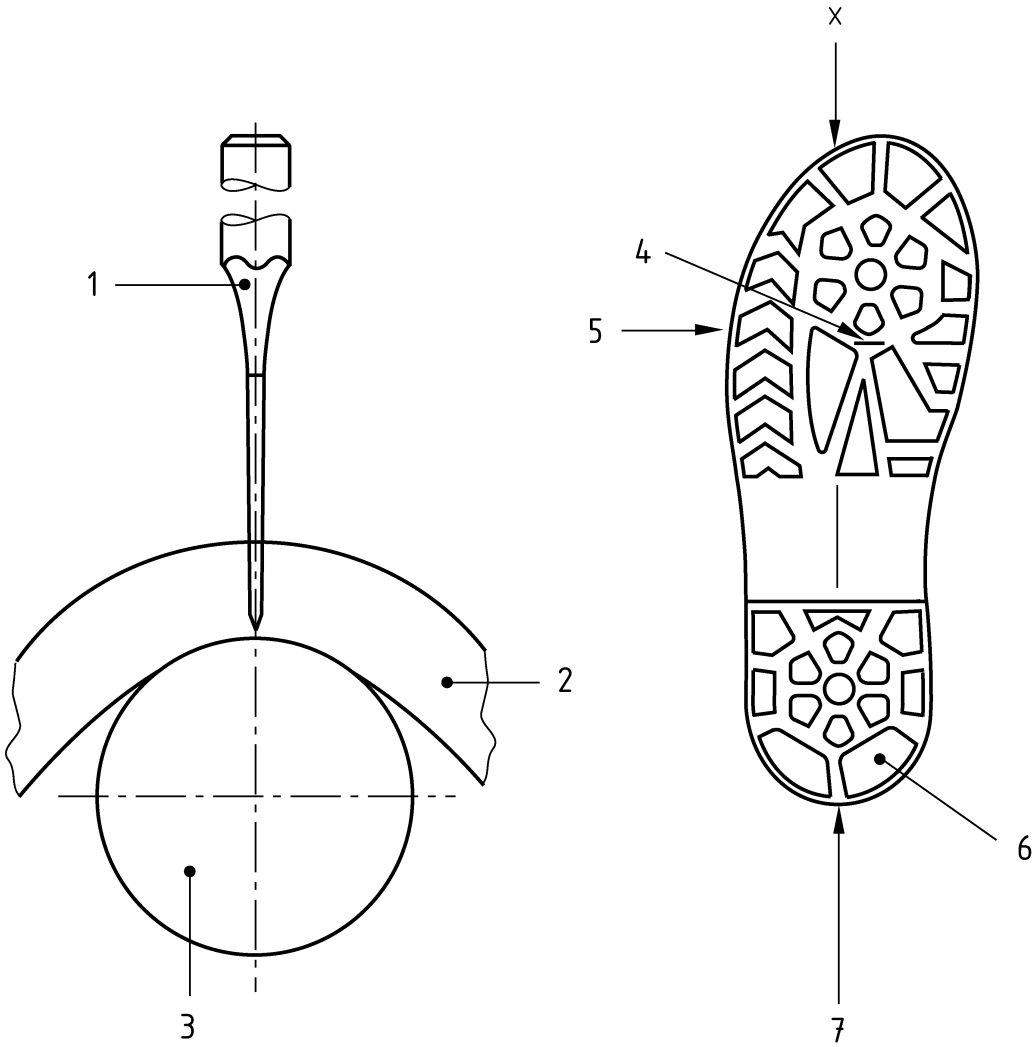


Figure 4 - Position of the flexing line

Mark a point, for the later insertion of a cut as follows:

Find the centre of line AC; this is the point where the cut is made. For cleated roles identify two adjacent cleats that are as close as possible to the centre of the line AC. Mark the sole midway between these cleats (see Figure 5).



Key

1 Cutting tool
2 Test piece
3 Mandrel of the test machine
4 Single incision parallel to the line of maximum stress
5 Line of maximum stress (deformation) AC
6 Cleats
7 Longitudinal axis XY

Figure 5 – Sole incision

6.2 Test procedure

Clamp (4.2.2) the forepart of the outsole to the rigid base in such a way that the flexing line AC is aligned with the hinge axis of the base plate (4.2.1).

Flex the outsole at a bending rate of (100 ± 10) mm/min until an angle of 45° has been reached and record the force in N ± 1 N.

It is possible to add a lubricant under the heel to facilitate the test.

6.3 Selection criteria

Outsoles requiring a force greater than 30 N to reach an angle of 45° are not subjected to flexing.

7 Flex resistance test method

7.1 Remove the heel from the outsole, if necessary, leaving sufficient of the forepart and waist to clamp it in the flexing machine (4.3) with the flexing line of the outsole AC located over the centre of the flexing mandrel in the maximum flexion (see Figure 5).

7.2 Adjust the testing device so that the outsole is fully flexed. Re-check the alignment in the position of maximum flexion. Manipulate the machine until the outsole is in the maximum flexed extended or stretched state.

7.3 Lubricate the chisel (4.4) with soap and water. Push the chisel through the full thickness of the clamped outsole at the centre of the point marked in 6.1. The cut made by the chisel should be parallel to the flexing line.

7.4 With the outsole still in its fully flexed position, measure the length of the cut using the measuring device (4.5). Record this length as *L*(o) to the nearest 0,1 mm.

7.5 Switch on the device and subject the outsole to 30 000 flexes. At the completion of 30 000 cycles, the testing device should not be left in the fully flexed position.

7.6 Adjust the device so that the outsole is fully flexed and measure again the length of the cut using the measuring device. Record this length as *L*(f) to the nearest 0,1 mm.

7.7 Calculate the amount of the cut growth as *L*(f)-*L*(o).

7.8 With the outsole still fully flexed examine its surface for any other cracks that have developed. Record their number and the length (to the nearest 0,5 mm) of the longest crack. Check also for any spontaneous cracks and record the longest one.

8 Test report

The test report shall include the following information:

a) results, expressed in accordance with Clause 7;

b) full identification of the samples tested, including commercial style codes, colour, nature, etc.;

c) reference to this method of test;

d) date of testing;

e) any deviation from this test method.

Bibliography

[1] EN ISO 20344:2004, *Personal protective equipment - Test methods for footwear (ISO 20344:2004).*

ICS 61.060

Price based on 8 pages