INTERNATIONAL STANDARD

ISO 22654

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Footwear — Test methods for outsoles — Tensile strength and elongation

Chaussures — Méthodes d'essai applicables aux semelles d'usure — Résistance à la traction et à l'allongement

Reference number
ISO 22654:2002(E)

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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.

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 22654 was prepared by CEN (as EN 12803:2000) 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 12803 has been added as Annex ZZ.

The version of EN 12803 reproduced in this International Standard incorporates the corrigendum EN 12803:2000/AC:2002.

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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 the determination of the tensile strength and elongation of outsoles.

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 10002-2	*Metallic materials – Tensile testing – Part 2: Verification of the force measuring system of the tensile testing machines.*
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.*
ISO 4661-1	*Rubber, vulcanized or thermoplastic – Preparation of samples and test pieces – Part 1: Physical tests.*

3 Definitions

For the purposes of this standard the following definitions apply:

3.1
tensile strength
the tensile stress at maximum force

3.2
elongation at break
the relative increase in length when subjected to the tension just required to rupture it

3.3
stress at a given elongation
the tensile stress in the test length required to produce a given elongation

4 Apparatus and material

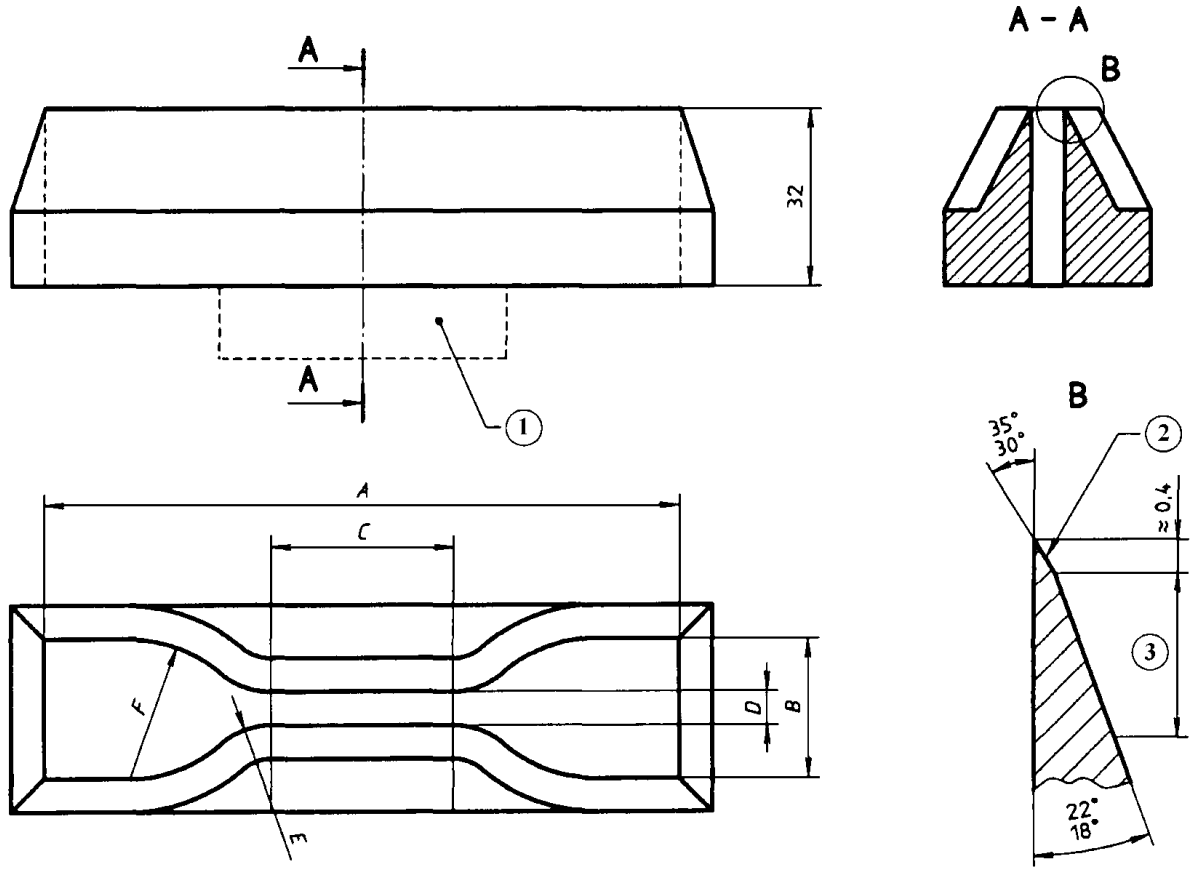
The following apparatus and material shall be used:

4.1 Dies and cutters

All dies and cutters used shall be in accordance with ISO 4661-1.

Dies for preparation of dumb-bells shall have the dimensions given in table 1 and figure 1. The departure from parallelism at any point along the width of the narrow portion of the die shall nowhere exceed 0,05 mm.

Dimensions in millimetres



1 Type of fixing to suit machine
2 Ground smooth
3 6 mm (ground)

NOTE For dimensions A to F, see table 1

Figure 1 – Die for dumb-bell test pieces

Table 1 – Dimensions of dies for dumb-bells test pieces

Dimensions in millimetres

Dimension	Type 1	Type 2
A Overall length (minimum)	115	75
B Width of ends	25,0 ± 1,0	12,5 ± 1,0
C Length of narrow portion	33,0 ± 2,0	25,0 ± 1,0
D Width of narrow portion	$6{,}0^{+0{,}4}_{0{,}0}$	4,0 ± 0,1
E Transition radius outside	14,0 ± 1,0	8,0 ± 0,5
F Transition radius inside	25,0 ± 2,0	12,5 ± 1,0

4.2 Thickness gauge

Thickness gauge, standing on a firm base and loaded with a dead weight such that the presser foot applies a pressure of 10 kPa ± 3 kPa.

The gauge shall have a presser foot, which is flat, circular and 10 mm ± 0,1 mm in diameter. The gauge shall have a scale division of 0,01 mm.

4.3 Tensile-testing machine

The tensile-testing machine shall comply with the requirements of EN 10002-2, to an accuracy corresponding to grade B, with a constant rate of traverse of 100 mm/min ± 10 mm/min, and should preferably be equipped with facilities for the autographic recording of stress and strain.

5 Sampling and conditioning

The test specimen to be tested are taken in accordance to prEN 13400:1998.

All test specimens shall be conditioned according to EN 12222 before testing, for a minimum of 24 h.

The thickness of the test specimen shall be:

- 2,0 mm ± 0,2 mm for polymeric and elastomeric compact outsoles;
- 4,0 mm ± 0,2 mm for semi-expanded and cellular outsoles;
- the original thickness, for leather outsoles.

The test is being performed with at least 3 specimens. Their uniform thickness (see specification above) shall be obtained by means of an appropriate splitting machine. If feasible, smooth original "skin" surfaces of the sample shall remain unchanged in the specimens. This leads to three possible types of specimen:

- Specimen with 2 original "skins" – S 2
- Specimen with 1 original "skin" – S 1
- Specimen with no original "skin" – S 0

The final result shall be based on only specimens of the same type, which shall be stated in the report.

6 Test method

6.1 Marking of test pieces

If using a non-contact extensometer, mark the test pieces with two reference marks to define the test length as specified in table 2, using a suitable marker. The test piece shall be unstrained when it is marked. The lines shall be arched on the narrow part of the test piece, as shown in figure 2, i.e., equidistant from the centre of the test piece and at right angles to its longitudinal axis.

6.2 Measurement of test pieces

Measure the thickness at the centre and at each end of the test length with the thickness gauge (see table 2). The average value of the three measurements shall be used in calculating the area of the cross-section.

6.3 Procedure

Insert the test piece into the tensile-testing machine, ensuring that the parallel-sided portions of the tab ends are gripped symmetrically so that the tension is distributed uniformly over the cross-section. If necessary, set up the extensometry device.

Start the machine and monitor continuously throughout the test the increase in distance between the two reference points (see 6.1) and the force.

NOTE In making, visual measurements, care should be taken to avoid inaccuracies due to parallax.

7 Expression of results

Calculate the tensile strength at break S_{tb} expressed in megapascal, using the equation

$$S_{tb} = \frac{F_b}{W \times t}$$

where

F_b is the force recorded at break, in newton
W is the width of the narrow portion of the die, in millimetres
t is the thickness of the test length, in millimetres

Calculate the elongation at break E_b expressed as a percentage, using the equation

$$E_b = \frac{100 (L_b - L_o)}{L_o}$$

where

L_b is the test length at break, in millimetres
L_o is the initial test length, in millimetres

Calculate the stress at a given elongation S_e expressed in megapascals, using the equation

$$S_e = \frac{F_e}{W \, x \, t}$$

where

F_e is the force noted at the given strain, in newton
W is the width of the narrow portion of the die, in millimetres
t is the thickness of the test length, in millimetres

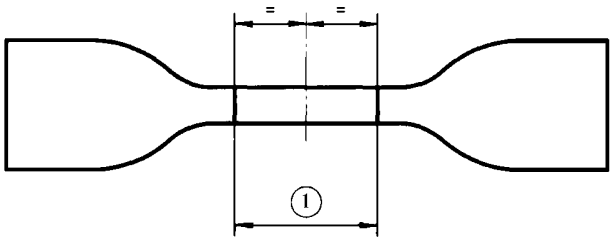
In all cases, the average for each property shall be reported.

8 Test report

The test report shall include the following information:

a) results, expressed in accordance with clause 7;
b) description of the samples tested including commercial styles codes, colours, nature, etc.;
c) reference to this method of test;
d) details of the test piece used;
e) the median thickness of test piece used;
f) date of testing.

Dimension in millimetres



1 Test length (see table 2)

Figure 2 – Shape of dumb-bell test pieces

Table 2 – Test length of dumb-bells

Dimensions in millimetres

Type of test piece	Type 1	Type 2
Test length	25,0 ± 0,5	20,0 ± 0,5

Bibliography

ISO 37 Rubber, vulcanized or thermoplastic – Determination of tensile stress-strain properties.

Annex ZZ
(informative)

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

European Standard	International Standard
EN 10002-2:1991[a]	ISO 7500-1:1999
EN 12222:1997	ISO 18454
EN 13400:2001[c]	ISO 17709[b]

[a] EN 10002-2:1991 has been cancelled and replaced by EN 7500-1:1999 (ISO 7500-1:1999).

[b] To be published.

[c] Published as an EN in November 2001.

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