SLOVENSKI STANDARD
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Footwear - Test methods for outsoles - Tensile strength and elongation

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Schuhe - Prüfverfahren für Laufsohlen - Zugfestigkeit und Längsdehnung

Chaussures - Méthodes d'essai applicables aux semelles d'usure - Résistance a la traction et allongement

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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 allongement

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.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

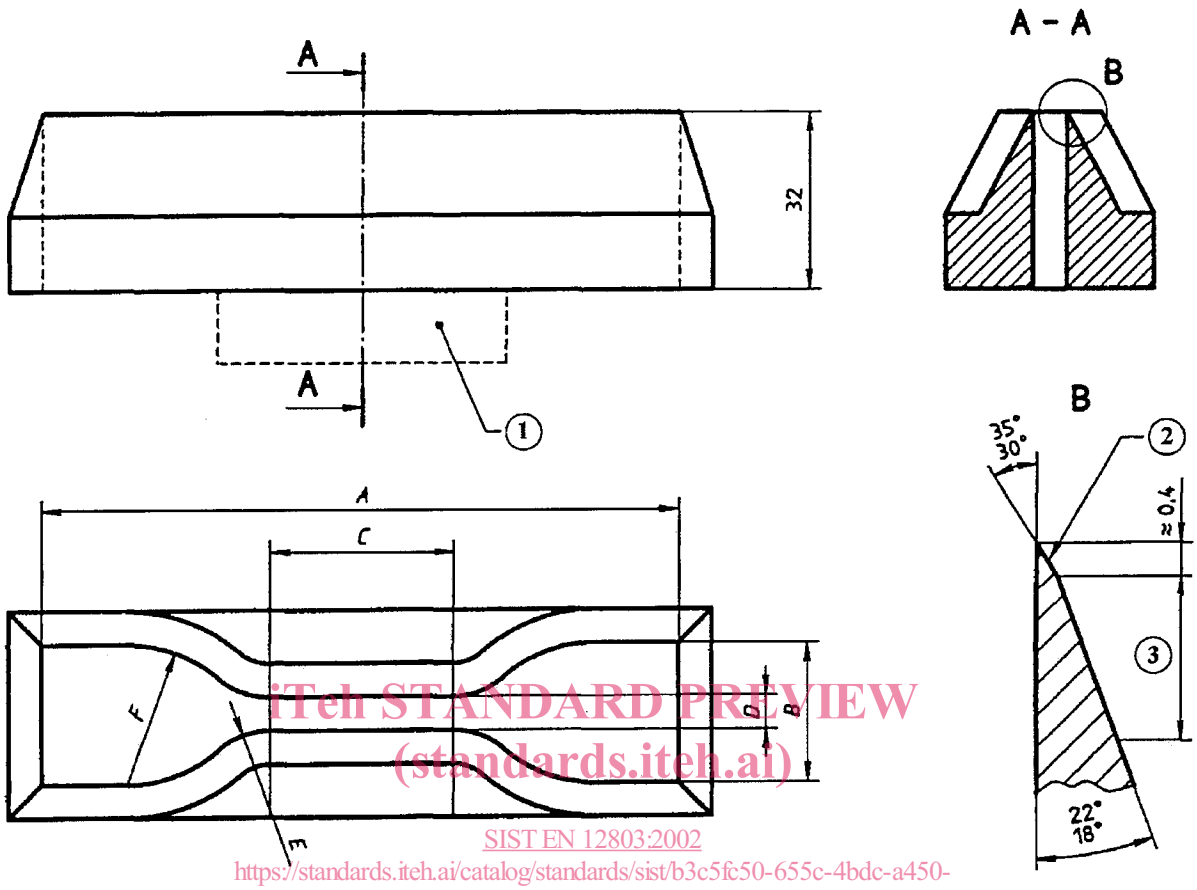
The following apparatus and material shall be used:

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 min (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 newtons
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