
**Footwear — Test methods for outsoles —
Tear strength**

*Chaussures — Méthodes d'essai applicables aux semelles d'usure —
Résistance au déchirement*

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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.

International Standard ISO 20872 was prepared by the European Committee for Standardization (as EN 12771:1999) 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.

Annex A of this International Standard is given for information only.

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Contents

	Page
Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Apparatus and material	4
5 Sampling and conditioning	5
6 Test method	6
7 Expression of results	6
8 Test Report	6
Bibliography	9

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of an identical text or by endorsement, at the latest by June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.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

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1 Scope

This European standard specifies a method for the determination of the tear strength of outsoles, irrespective of the material, using trouser test pieces.

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.
prEN 13400:1998	Footwear - Sampling location of components for footwear.
EN 10002-2	Metallic materials - Tensile testing - Part 2: Verification of the force measuring system of the tensile testing machines.
ISO 4648	Rubber, vulcanized or thermoplastic - Determination of dimensions of test pieces and products for test purposes.

3 Terms and definitions

ISO 20872:2001

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For the purpose of this standard the following definitions apply:

3.1

trouser tear strength

the median force, required to propagate a cut in a specified trouser-shaped test piece by tearing, divided by the thickness of the test piece

3.2

median

If n measured values are arranged in increasing order of magnitude and numbered 1 to n , the median of these n values is the $((n+1)/2)^{\text{th}}$ value, if n is odd.

If n is even, the median lies between the $(n/2)^{\text{th}}$ and $(n/2+1)^{\text{th}}$ values and is not defined uniquely. Unless otherwise specified, it may be taken to be the arithmetic mean of these two measured values.

4 Apparatus and material

The following apparatus and material shall be used:

4.1 Dies

The die used for cutting trouser test pieces shall have the outline dimensions shown in figures 1 and 2.

4.2 Nick cutter

A sharp razor blade or a sharp knife free from ragged edges shall be used for producing a cut or a nick in the test piece. The test piece shall be cut to a depth of $40 \text{ mm} \pm 5 \text{ mm}$ in the direction indicated in figures 1 and 2. The last 1 mm (approximately) of the cut shall be made with a razor blade or a sharp knife.

4.3 Tensile-testing machine

The tensile-testing machine shall comply with the requirement of EN 10002-2, to an accuracy corresponding to class 2, with a constant rate of traverse of $100 \text{ mm/min} \pm 10 \text{ mm/min}$. A low-inertia machine having autographic force recording facilities is essential.

4.3.1 Grips

The machine shall be provided with a type of grip which tightens automatically as the tension increases and exerts a uniform pressure across the clamped end of the test piece. Each grip shall incorporate a means for positioning so that the test pieces are inserted symmetrically and in axial alignment with the direction of the pull.

4.4 Thickness gauge

Thickness gauge, standing on a firm base and loaded with a dead weight such that the presser foot applies a pressure of $10 \text{ kPa} \pm 3 \text{ kPa}$ (see ISO 4648).

The gauge has a presser foot which is flat, circular and $10 \text{ mm} \pm 0,1 \text{ mm}$ in diameter. The gauge has scale division of 0,01 mm.

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5 Sampling and conditioning

Three test pieces to be tested shall be taken according to prEN 13400:1998. All test pieces shall be conditioned according to EN 12222 before testing for a minimum of 24 h. Cut the test pieces with the die (see 4.1).

The thickness of the test piece shall be preferably:

- $2,0 \text{ mm} \pm 0,2 \text{ mm}$ for polymeric and elastomeric compact outsoles;
- $4,0 \text{ mm} \pm 0,2 \text{ mm}$ for semi-expanded and cellular outsoles;
- for leather outsole the full thickness shall be tested.

The test is being performed with at least 3 specimens. Their uniform thickness (see specification below) 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

Measure the thickness of the test pieces, using the thickness gauge (see 4.4).

Mount the test piece in the testing machine; apply a steadily increasing traction force at a rate of separation of the grips of 100 mm/min \pm 10 mm/min until the piece breaks. Record the force throughout the tearing process.

7 Expression of results

The tear strength T_s expressed in newton per millimetre thickness, is given by the formula

$$T_s = F/d$$

where

F is the median force in newton, calculated in accordance with the following procedure:

From the force peak values of the trace for tear strength, the median peak force (see 3.2) of peak force values is determined by the appropriate method specified below.

NOTE In applying the methods described in this Standard, it should be assumed that the trace being evaluated is a time record of the variation of force during the period of test.

Method A (for traces having less than five peaks)

Determine the median of the values of the force peaks in the trace.

If there is only one force peak, consider its value to be the median.

Method B (for traces having five to twenty peaks)

Consider only the peak values of the central 80% of the complete trace and determine the median peak force of these values.

d is the median thickness, in millimetres, of the test piece.

The result is expressed as the average of the three determinations.

8 Test Report

The test report shall include the following information:

- a) results, expressed in accordance with clause 7;
- b) thickness of the test pieces;
- c) full description of the samples tested including commercial styles, codes, colours, nature, etc.;
- d) reference of this method of test;
- e) date of testing;
- f) type of specimen;
- g) any deviations from this test method.