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**Footwear — Test methods for outsoles —  
Needle tear strength**

*Chaussures — Méthodes d'essai applicables aux semelles d'usure —  
Résistance du point de couture*

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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 20874 was prepared by the European Committee for Standardization (as EN 12773:1999) 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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## 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of an identical text or by endorsement, at the latest by May 2000, and conflicting national standards shall be withdrawn at the latest by May 2000.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 needle tear strength for outsoles, irrespective of the material.

## 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.

## 3 Definitions

For the purposes of this standard the following definition applies:

### 3.1

#### **needle tear strength**

the quotient by division of the maximum force, occurring during tearing-out of the needle, by the thickness of the test piece

## 4 Apparatus and material

The following apparatus and material shall be used:

### 4.1 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  $\pm$  10 mm/min. Autographic recording of force or a maximum force pointer is recommended.

#### 4.2 Needle

Either a smooth-surfaced steel needle of  $1 \text{ mm} \pm 0,01 \text{ mm}$  diameter or a corresponding piece of spring steel wire, ground to a point.

#### 4.3 Clamping device

The figure 1 shows an example of a clamping device. The distance between the support links for the needle shall be adjustable, so that it can be adjusted to the thickness of the specimen. The clamping device shall be equipped with a suitable protective device to prevent the needle from jumping out.

#### 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  $10 \text{ kPa} \pm 3 \text{ kPa}$ . The gauge has a presser foot which is flat, circular and  $10 \text{ mm} \pm 0,1 \text{ mm}$  in diameter.

The gauge has a scale division of  $0,01 \text{ mm}$ .

### 5 Sampling and conditioning

The test pieces to be tested are taken in accordance with prEN 13400:1998. All test pieces shall be conditioned according to EN 12222 before testing for a minimum of 24 h.

Test pieces are strips of  $50 \text{ mm} \pm 1 \text{ mm}$  length and  $20 \text{ mm} \pm 1 \text{ mm}$  width. 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 outsoles the original 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 O



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 piece, using the thickness gauge (see 4.4). Pierce the piece with a needle of 1 mm diameter (see 4.2), 5 mm from the edge at the centre of the narrow side (see figure 1), as nearly perpendicular as possible with the aid of a template. The piece shall not have been previously bored or punched. Place the needle, which is now stuck in the piece in the clamping device (see 4.3). The distance between the support links shall be adjusted so that they just touch the piece. Clamp the lower end of the piece in the lower grip (shown in figure 1 as a scissors-clamp). Stress the piece with a feed-rate of 100 mm/min  $\pm$  10 mm/min on the clamps. Read off the maximum strength in newton which occurs during the tearing-out of the needle.

## 7 Expression of results

The needle tear strength  $S_s$  expressed in newton per millimetres of thickness is given by the formula

$$S_s = F/d$$

where

$F$  is the maximum force in newton  
 $d$  is the thickness in millimetres

The result will be 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 to this method of test;
- e) date of testing;
- f) any deviation from this test method.