
**Footwear — Test methods for insoles
— Resistance to stitch tear**

Chaussures — Méthodes d'essai applicables aux premières de montage — Résistance au déchirement des points 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 216, *Footwear*.

This second edition cancels and replaces the first edition (ISO 20876:2001), which has been technically revised.

Footwear — Test methods for insoles — Resistance to stitch tear

1 Scope

This document describes a method for evaluating the ability of an insole, irrespective of the material, to hold stitches, or to take clenched metal fastenings. The method has become accepted as a general quality criterion for insole materials even where attachment is by means of adhesives.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 17709, *Footwear — Sampling location, preparation and duration of conditioning of samples and test pieces*

ISO 18454, *Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

resistance to stitch tear

force required to pull a loop of wire of specified dimensions through a test specimen of insole material

4 Apparatus and material

The following apparatus and material shall be used:

4.1 Drill, fitted with a twist drill bit, with diameter of 1,60 mm ± 0,01 mm.

4.2 Drilling jig, to ensure accurate spacing of 8,0 mm ± 0,2 mm between the centres of each pair of holes (see [Figure 1](#)) in the test piece.

4.3 Steel wire, 150 mm in length, with a diameter of $0,90 \text{ mm} \pm 0,01 \text{ mm}$ (20 SWG).

This is formed over a 7 mm diameter mandrel into a loop with parallel arms of equal length by applying a force of 1,5 kN to 2 kN to each end of the wire so that the shape of the loop conforms to that of the mandrel.

NOTE Loops which have become mis-shapen by use can be reused, provided that the irregularities are removed, over the forming mandrel.

4.4 Tensile testing machine, the tensile testing machine shall comply with the requirement of ISO 7500-1, to an accuracy corresponding to class 2, with a constant rate of transverse of $100 \text{ mm/min} \pm 20 \text{ mm/min}$. Autographic recording of force or a maximum force pointer is recommended.

4.5 Attachment to the tensile testing machine, consisting of the following two parts:

4.5.1 Upper jaw, consisting of a rigid supporting plate for the test piece, with a rectangular aperture $12,0 \text{ mm} \pm 0,5 \text{ mm}$ by $6,0 \text{ mm} \pm 0,5 \text{ mm}$ and a means of attachment to the force-measuring system so that the line of action of the force passes through the centre of the aperture and is perpendicular to the plate.

4.5.2 Lower jaw, containing a means of attaching the steel wire loop to the drive system so that the two arms of the loop are held parallel by two guide holes 8 mm apart and equidistant from the line of action of the force applied during the test.

The attachment is designed to ensure that in the test the loop is drawn through the centre of the aperture in the rigid supporting plate for the test piece, with the plane of the loop parallel to the longer side of the aperture.

4.6 Dial micrometer gauge, standing on a firm base and loaded with a dead weight such that the presser foot applies a pressure of $49 \text{ kPa} \pm 5 \text{ kPa}$ ¹⁾. The gauge has a presser foot which is flat, circular and 10,0 mm in diameter.

The gauge has scale divisions of 0,01 mm.

5 Sampling and conditioning

From the footwear insole, cut insole or from the component as supplied, cut two rectangular test pieces approximately $75 \text{ mm} \times 25 \text{ mm}$, one test piece perpendicular to the other. Mark both test pieces to show their orientation.

If the test pieces are taken from the shoe or from the cut component, sampling shall be done in accordance with ISO 17709.

Condition the test pieces, in accordance with ISO 18454, for a minimum of 24 h.

6 Test methods

6.1 Measure the thickness (in millimetres) of each test piece at three points equally spaced along the centreline parallel to the 75 mm side, using the dial micrometer gauge (4.6).

6.2 Using the drill fitted with a 1,6 mm twist drill bit (4.1), drill each test piece from the face side with three pairs of holes along the centreline and parallel to the 75 mm side. Use the drilling jig (4.2) to ensure that the holes of each pair are accurately spaced $8,0 \text{ mm} \pm 0,2 \text{ mm}$ apart. Drill one pair of holes in the centre and the other two pairs midway between the centre pair and the ends of the test specimen as shown in Figure 1.

1) $1 \text{ Pa} = 1 \text{ N/m}^2$.

6.3 Thread the wire loop (4.3) through a pair of holes in one test piece from the face side.

Keeping the arms of the loop parallel, pass them through the aperture in the test piece supporting plate (4.5.1), and through the guide holes (8 mm apart) in the lower jaw attachment (4.5.2). Clamp the ends firmly in position.

Operate the tensile testing machine (4.5) until the insole material fails.

Note the maximum force (in newtons) exerted. If the mass of the stitch-tear attachment contributes to the recorded force, correct this value to obtain the net force exerted on the test piece.

6.4 Repeat the method on the remaining two pairs of holes in the test piece. Carry out this procedure similarly on the second test piece.

7 Expression of results

7.1 For each test piece calculate the mean of the three maximum forces noted. Report these two values as the stitch-tear resistances for the principal directions, in newtons to the nearest 0,1 N.

The results will be the average of the three values.

7.2 For each test piece calculate the mean value of three thickness measurements.

8 Test report

The test report shall include the following information:

- a) a reference to this document, i.e. ISO 20876:2018;
- b) stitch-tear resistance, for each principal direction, expressed in accordance with 7.1;
- c) thickness of each test piece, expressed in accordance with 7.2;
- d) full description of shoe samples tested including commercial styles codes, colours, nature, etc.;
- e) description of sampling procedure, where relevant;
- f) details of any deviation from the standard test method;
- g) date of testing;
- h) any deviation from this test method.
- i) standard atmospheric conditions observed during the test.

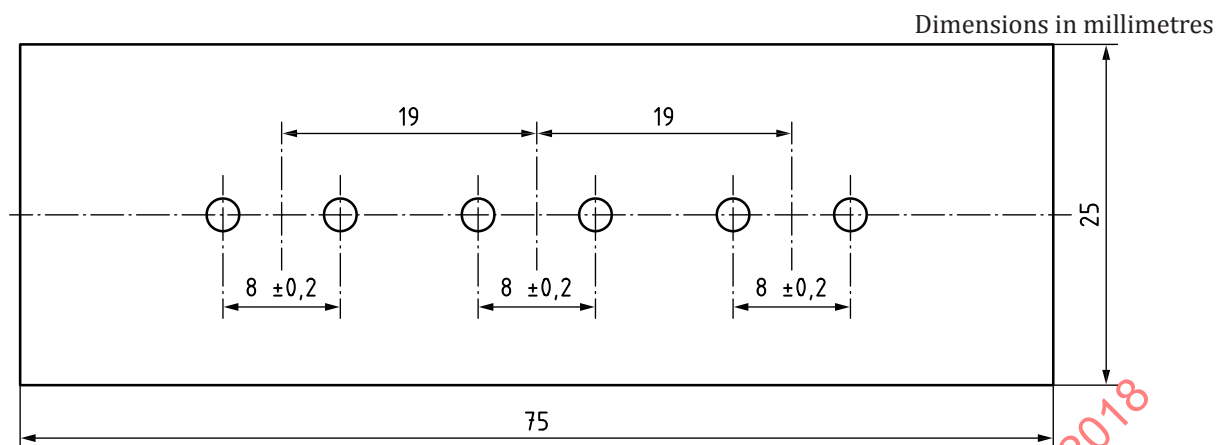


Figure 1 — Test piece