INTERNATIONAL STANDARD

ISO 17697

Second edition
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Footwear — Test methods for uppers, lining and insocks — Seam strength

Chaussures — Méthodes d'essai relatives aux tiges, doublures et premières de propreté — Résistance des piqûres

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Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

ISO 17697 was prepared by the European Committee Standardization (CEN) Technical Committee CEN/TC 309, *Footwear*, in collaboration with ISO Technical Committee TC 216, *Footwear*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 17697:2003), which has been technically revised.

Footwear — Test methods for uppers, lining and insocks — Seam strength

1 Scope

This International Standard specifies two test methods for determining the seam strength of uppers, lining or insocks, irrespective of the material, in order to assess the suitability for the end use.

These methods are as follows.

— Method A: Needle perforations. For determining the force required to pull a row of needles through an upper material, in a direction perpendicular to the row.

— Method B: Stitched seams. For determining the breaking strength of stitched seams in shoe upper and lining materials. This method is applicable to seams cut from shoes or made up to simulate footwear constructions.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration 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.

3.1
seam strength
breaking strength of a stitched seam as determined under specified conditions using a tensile testing machine

3.2
upper
materials forming the outer face of the footwear which is attached to the sole assembly and covers the upper dorsal surface of the foot

Note 1 to entry: In the case of boots, this also includes the outer face of the material covering the leg. Only the materials that are visible are included, no account should be made of underlying materials.

3.3
complete upper assembly
finished upper, fully seamed, joined or laminated as appropriate, comprising the centre material and any lining(s) together with all components such as interlinings, adhesives, membranes, foams or reinforcements, but excluding toe puffs and stiffeners

Note 1 to entry: The complete upper assembly can be flat, 2-dimensional or comprise lasted upper in the final footwear.

4 Apparatus and material

The following apparatus and material shall be used.

4.1 Method A

4.1.1 Tensile testing machine, with a jaw separation rate of (100 ± 10) mm/min, a force range appropriate to the specimen under test (this will usually be less than 500 N for footwear upper materials), capable of measuring forces to an accuracy greater than 2 % as specified by Class 2 in ISO 7500-1.

4.1.2 Needle holding jig, see Figure 1, including the following.

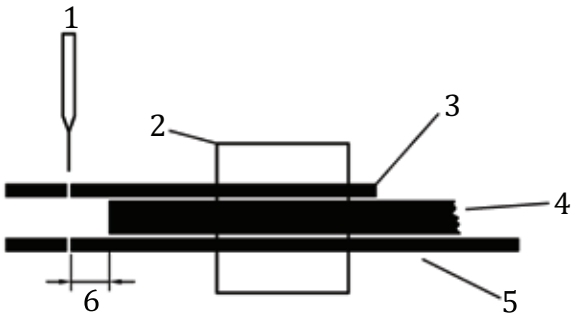
4.1.2.1 Two rectangular rigid plates, each of minimum width 30 mm and maximum thickness 6 mm. Each of the two plates is drilled with 17 holes of diameter (1,1 ± 0,1) mm. The holes shall be in a straight line parallel to and approximately 5 mm from one end of the plate. The holes should be evenly spaced so that the centres of the two extreme holes are (26,5 ± 0,5) mm apart.

4.1.2.2 One spacing plate, of width similar to the drilled plates and of thickness (3,5 ± 0,5) mm.

4.1.2.3 Means of securing the spacing plate to the surface of one of the drilled plates such that the distance between the end of the spacing plate and the centre line of the row of holes in the other plate can be adjusted and set at (3,0 ± 0,1) mm and (6,0 ± 0,2) mm. The combination will be referred to as the lower plate.

4.1.2.4 Means of securing the other drilled plate, which will be referred to as the upper plate, to the exposed surface of the spacing plate so that the holes in both of the drilled plates are aligned.

The end of one of the plates furthest from the row of holes should have means of attachment to one of the jaws of the tensile testing machine so that the rows of holes are perpendicular to the axis of the machine.

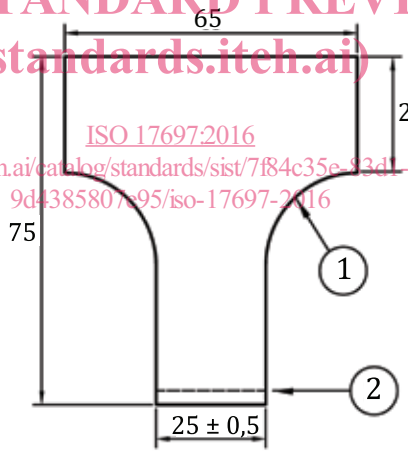


Key

1 needle
2 clamp
3 drilled plate
4 spacing plate
5 drilled plate
6 distance (see 4.1.2.3)

Figure 1 — Schematic diagram of needle holding jig (see 4.1.2)

Dimensions in millimetres



Key

1 20 (radius)
2 line of perforations

Figure 2 — Test specimen

4.1.3 Seventeen needles, normal round point (R), metric size 90 (Singer size 14)

4.1.4 Press knife, or other cutting device capable of cutting a T-shaped test specimen of the dimensions shown in Figure 2.

4.2 Method B

4.2.1 Tensile testing machine, with a jaw separation rate of (100 ± 10) mm/min, a force range appropriate to the specimen under test (this will usually be up to 2 kN), capable of measuring forces to an accuracy greater than 2 % as specified by Class 2 in ISO 7500-1.

4.2.2 **Small sharp hand knife or scissors**, for cutting test specimens.

4.2.3 If made up seams are to be tested, **a press knife** capable of cutting test specimens, (50 ± 2) mm × (50 ± 2) mm, is useful.

4.2.4 If made up seams are to be tested, **a sewing machine and accessories**.

5 Sampling and conditioning

5.1 Method A

5.1.1 Store the shoes or the uncut sheet material or uppers in a controlled standard atmosphere specified in ISO 18454 for a minimum of 24 h prior to testing and carry out the test in this atmosphere.

5.1.2 Cut six test specimens with the dimensions specified in Figure 2. Three shall be cut with the base edge of the T parallel to the along direction of the material [backbone direction for leather and selvage (warp) or machine direction for non-leather materials] and three shall be cut perpendicular to this.

Prepare test pieces from complete upper assemblies when the lining material is permanently attached to the upper material.

For materials, cut test specimens from a range of positions across the full usable width and length of the sheet material. For a material with a woven structure, this will ensure that no two test specimens contain the same warp or weft threads.

For test specimens, cut from footwear uppers avoid any areas containing perforations, cut three test specimens with the base edge of the T parallel to the X-axis of the upper as defined in ISO 17709 and three with the base edge perpendicular to the X-axis.

It can be impossible to cut a test specimen of sufficient size from certain types of footwear especially children's and the test specimen size shall not be reduced. If it is not possible to cut the correct size test specimen from a shoe upper, the materials themselves shall be tested.

5.1.3 Mark the along direction on each of the test specimens.

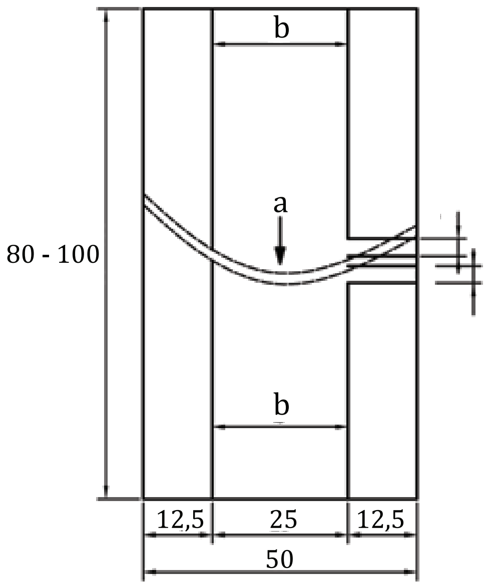
5.2 Method B

5.2.1 Store the shoes or the uncut sheet material or uppers in a controlled standard atmosphere specified in ISO 18454 for a minimum of 24 h prior to testing and carry out the test in this atmosphere.

5.2.2 Test specimens cut from shoes or uppers.

5.2.2.1 Where possible, use the knife (4.2.2) to cut two rectangular test specimens of dimensions (90 ± 10) mm × (50 ± 2) mm from the upper, including any lining materials, such that the seam is approximately mid-way between the two ends of the test specimen (see Figure 3).

Dimensions in millimetres



Key

a seams

b cuts

Figure 3 — Test specimen cut from shoe

5.2.2.2 If the shoe upper is too small to allow this, then the size of test specimen may be reduced, but the width of the central portion, see 5.2.2.3 and Figure 3, shall not be less than 10 mm.

5.2.2.3 Make cuts in each test specimen parallel to the longer edges from points 3 mm from the seam to the edges of the material, to provide a test specimen having a central portion of width (25 ± 0,5) mm and two edge pieces of width (12,5 ± 0,5) mm (see Figure 3).

5.2.3 Test specimens prepared by making up seams.

5.2.3.1 Use either the hand knife or scissors (4.2.2) or press knife (4.2.3) to cut pieces, (50 ± 2) mm × (50 ± 2) mm, of each material to be used in the construction. The number of pieces of material required will vary according to the construction of the seam. This may consist of two pieces of the same or different upper materials stitched together and may include one or more lining materials. Reinforcing tapes may also be included. Cut sufficient pieces to allow the preparation of three seamed test specimens for each direction of test. If required, materials may be skived before seaming.

The test direction, along or across, is at 90° to the direction of the seam. The number of directions of test will vary according to the upper construction. Separate tests in the along and across directions can be sufficient, but in some cases, test specimens can need to be prepared with along and across directions combined or with material cut on the bias.

For non-leather materials, cut test specimens from a range of positions across the full usable width and length of the sheet material. For a material with a woven structure, this shall prevent any two test specimens containing the same warp or weft threads.

5.2.3.2 Use the sewing machine (4.2.4) to stitch together the squares of material to produce three test seams for each direction of test. The choice of type of seam, needle size and type, thread and stitch density shall be selected to simulate the shoe construction of interest. Where these are not known, guidance

