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Footwear — Test methods for whole shoe — Heel attachment

Chaussures — Méthodes d'essai applicables à la chaussure entière — Fixation du talon

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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 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 22650:2002), which has been technically revised.

Footwear — Test methods for whole shoe — Heel attachment

1 Scope

This document specifies a method for the determination of the heel attachment of footwear. It applies to woman's medium and high heeled footwear.

This test method measures three related wear properties:

— the rigidity of the shoe backpart during normal walking;

— the amount of permanent deformation of the backpart caused by a fairly large force applied to the heel in a backward direction;

— the force required to detach the heel.

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*

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
heel attachment strength
maximum force measured under these testing condition required to detach the heel from the sole/insole assembly

Note 1 to entry: The heel attachment strength is expressed in newtons.

3.2
rigidity
back part deformation measured under these test conditions under a force of 200 N

3.3
permanent deformation
permanent set of the backpart measured under these test conditions at a force of 400 N

4 Apparatus and material

The following apparatus and material shall be used:

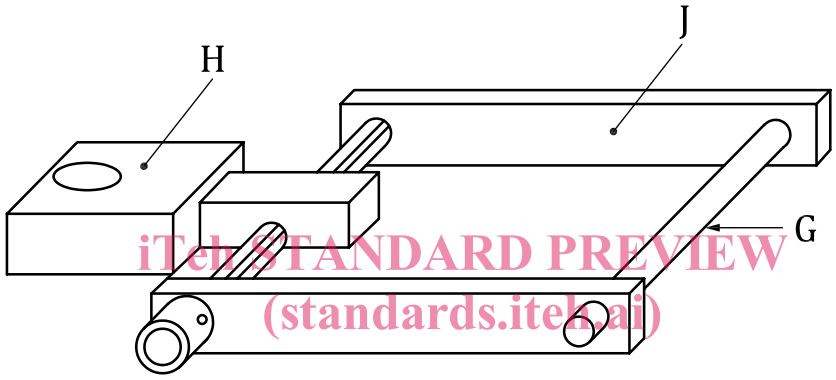
4.1 Tensile-testing machine, shall comply with the requirement of ISO 7500-1 to an accuracy corresponding to class B, with a constant rate of traverse of 100 mm/min ± 10 mm/min.

A low-inertia machine having autographic force recording facilities is essential.

4.2 Devices for attaching the shoe heel, devices for attaching the shoe heel near its tip to the upper clamp attachment of the tensile testing machine so that the heel can pivot freely during the test. Different designs are needed for chunky and slender heels as described below.

4.2.1 Device for chunky heels, as shown in Figure 1.

The 6 mm diameter rod G is removable and may be inserted through a 6 mm or 7 mm diameter pre-drilled hole in the heel as shown in Figure 3. The block H at the opposite end of the device has a 13 mm diameter hole which enables it to be fitted directly to a tensile testing machine in place of the top clamp. Alternatively, where a tensile testing machine is being used which does not have removable clamps, the block H would be replaced by a part which can be gripped in the machine clamps.

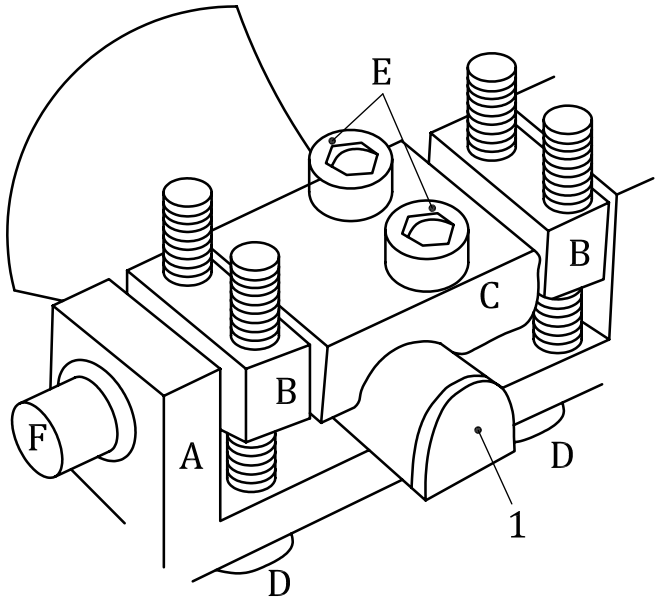


NOTE Rod G can be inserted through the hole drilled in chunky heels or removed and replaced by the clamp shown in Figure 2 for testing slender heels.

Figure 1 — Type 1 device for providing the connecting link between the tensile testing machine and the heel stem

4.2.2 Clamp for slender heels, as shown in Figure 2 consists of a U-shaped part A which clamps against the front face of the heel (the heel breast), and parts B and C which clamp against the curved back of the heel.

The distance between parts B and A is adjustable to suit the heel tip dimensions, using the four screws D. Part C pivots in the two parts B, to allow for the tapering of most slender heels near their tip. The two screws E have pointed ends to dig into the heel and so prevent the clamp slipping. The clamp is 20 mm deep. At each end of part A are two spigots F of diameter 6 mm whose centres are 10 mm above the clamping face of part A and 10 mm from each edge. These spigots enable the clamp to be fitted into the connecting device shown in Figure 2 in place of rod G.



Key

1 top piece

NOTE This clamp can be fitted into the connecting link shown in Figure 1 in place of the removable rod G.

Figure 2 — Type 2 pivoting clamp for the stems of slender heels

4.3 Dividers, which can be opened to measure a distance of about 100 mm. These are needed to measure the amount of movement of the heel tip during the test.

5 Sampling and conditioning

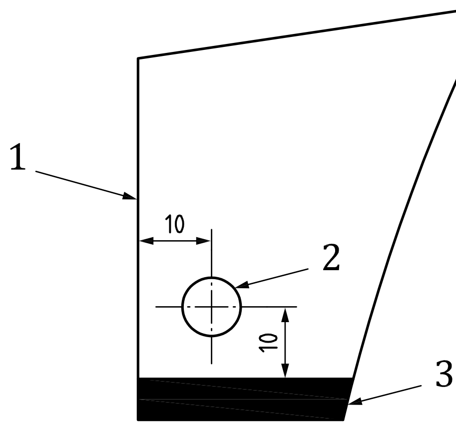
For most purposes it is not necessary to condition the footwear in a controlled atmosphere before testing it.

Cut off the shoe upper in the forepart level with the insole, so that the shoe bottom here is easier to fit into the clamping jaw of the tensile strength machine. Where the shoe upper construction includes a long stiffener in the waist region, make sure this is not cut. Leave the top piece, heel cover and heel breast flap, if used, intact. Should the shoe not have a top piece attached, it can still be tested.

In the case of heels, which are too large to be fitted into a type 2 clamp, drill a 6 mm or 7 mm diameter hole in the position shown in Figure 3 parallel to the heel breast and the heel/top piece interface, so that its centre is 10 mm from the heel breast and 10 mm above the heel/top piece interface. It is best to drill this hole from both sides inwards, as this increases its positional accuracy.

Minimum three test pieces are necessary.

Dimensions in millimetres



Key

1 heel breast

2 6 mm or 7 mm hole

3 top piece

Figure 3 — Horizontal hole drilled through a heel for insertion of rod G (see Figure 1)

To fix the clamp for slender heels (see Figure 2) to the shoe heel proceed as follows. Retract the two screws E until their tips do not protrude through part C. Unscrew the four screws D until there is sufficient space between parts A and C to insert the heel stem. Position the heel so that its forward face is in contact with part A and the interface of heel and top piece is in line with the edge of part A (see Figure 2). However, where this forward face is markedly curved, it is often better first to grind away some of the plastic near the top of the hell where it sit at the top part of the clamp. Tighten the four screws evenly until part C pivots to fit the back of the heel. Sometimes it is also better to grind away some of the back curve of the heel first so as to reduce the amount part C needs to be pivoted to fit it. This reduces the risk that the clamp might slip during the test when attached to a markedly tapering heel tip. Tighten the two screws E until their tips dig into the heel sufficiently to prevent the clamp being pulled off. The clamp will now be fixed to the heel as shown in Figure 2.

6 Test method

6.1 Principle

The basis of the test is that the forepart of the shoe is clamped in one jaw of a tensile testing machine. The heel, near the top piece, is attached in a specified manner to the other jaw of the machine and pulled backwards from the forepart at a specified rate of jaw separation. A general purpose laboratory tensile testing machine with suitable attachments may be used.

The following three quantities are measured:

a) The amount of movement of the tip of the heel relative to the forepart at a force of 200 N.

NOTE 200 N is two or three times larger than the backward force which is applied to the heel during normal walking but the amount of deformation it produces in the test is believed to be a valid way of distinguishing between those shoes which have adequate backpart rigidity in wear and those which do not.

b) The amount of permanent deformation produced by a force of 400 N.

c) The force required to detach the heel completely. The mode of failure is also noted.

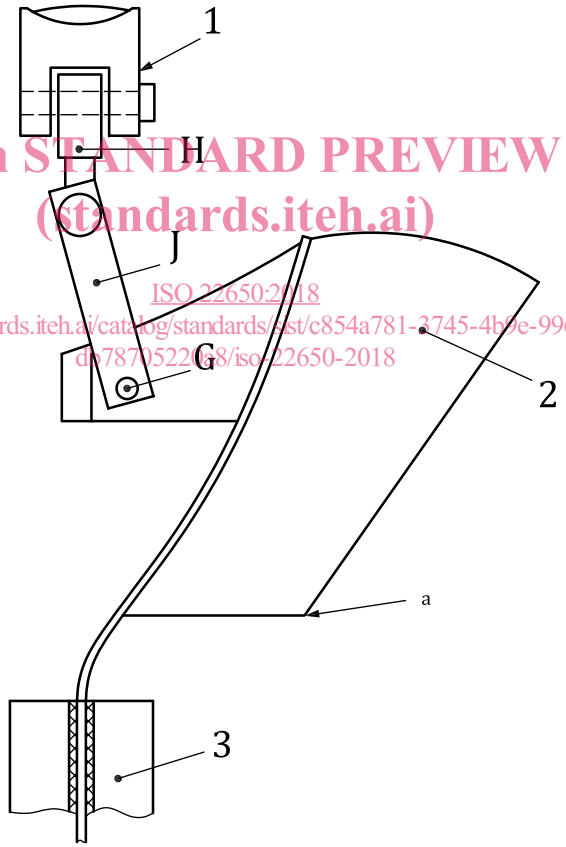
6.2 Procedure

Fit the device shown in Figure 1 in place of the top clamp of the tensile testing machine or, where this cannot be done, clamp block H or its equivalent in this clamp. If necessary reset the force reading to zero, to allow for the mass of the device or for any difference in mass between the device and the clamp.

In the case of a shoe with a chunky heel which has been pre-drilled, as described under "Preparation of the shoe for test". Partially withdraw rod G (see Figure 1) and insert it through the heel and then through the second bar J. Chunky heels fixed to the device in this way are shown in Figures 4 and 5. Wherever possible fix the shoe so that the shoe bottom faces towards the operator.

In the case of a shoe with a slender heel which has had the type 2 clamp shown in Figure 2 attached to it, remove rod G from the connecting device and insert the clamp in its place as shown in Figure 6.

Clamp the forepart of the shoe in the lower clamp of the tensile testing machine so that the shoe bottom faces outwards, the longitudinal axis of the shoe backpart coincides with the axis of the testing machine as viewed from the front, and the edge of the clamp grips the forepart a little forward of the end of the shank (see Figure 5). (Note that the forepart will be not gripped centrally relative to its clamping jaw.) Check that the clamping operation has not produced any tension or compression in the load measuring system. If it has, move the cross-head just sufficiently to eliminate this.



Key

1 upper clamp attachment of tensile testing machine
2 backpart of upper left on
3 lower clamp of tester
a Cut to remove upper in forepart.

Figure 4 — Side view of shoe with chunky heel clamped in a tensile testing machine using the link shown in Figure 1