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### Footwear — Test methods for whole shoe — Flexing durability

ICS: 61.060

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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](http://www.iso.org/directives)).

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For an explanation of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

# Footwear — Test methods for whole shoe — Flexing durability

## 1 Scope

This International Standard specifies two test methods for the determination of the flexing durability of whole shoes. The two methods may not give comparable results.

These methods are not applicable to the whole shoes with heel height more than 70 mm, or the thickness of flexing area of the soles more than 25 mm, or flexing angle less than 45° according to ISO 17707:2005, Clause 6 rigidity test.

## 2 Normative references

The following referenced documents are indispensable for the application 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 17707:2005, *Footwear — Test methods for outsoles — Flex resistance*

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

ISO 19952, *Footwear — Vocabulary*

## 3 Principle

The footwear specimen is repeatedly flexed through a specified angle about its natural flexing line by a test machine. After a predetermined time or number of flexes the footwear is subjectively assessed for signs of damage.

## 4 Apparatus

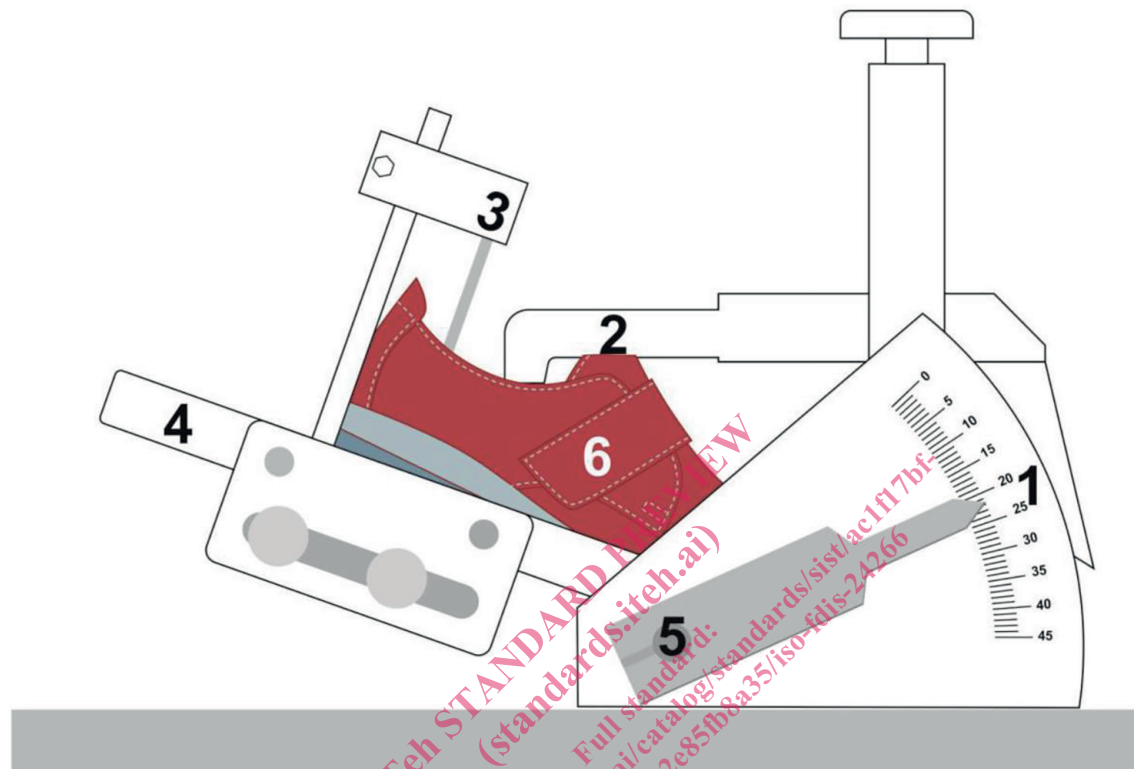
### 4.1 Method A

#### 4.1.1 Flexing machine

**4.1.1.1** A means of firmly clamping any type of footwear at the heel and toe. A number of toe clamps will be necessary to ensure all sizes of footwear can be clamped securely.

**4.1.1.2** A method of flexing the footwear about its flexing line at a rate of  $140 \pm 10$  cycles per minute through a range of flexing angles.

**4.1.1.3** A means of recording either the number of flexes or the duration of the test providing the speed of the machine is constant and known.



**Key**

- 1 Flexing angle indicator
- 2 Front holding clamp
- 3 Rear holding clamp
- 4 Shoe platform
- 5 Flexing axis
- 6 Test-piece (whole shoe)

**Figure 1 — Flexing machine**

**4.1.2 Vernier caliper**

To an accuracy of better than 0,02 mm.

**4.2 Method B**

**4.2.1 Flexing machine**

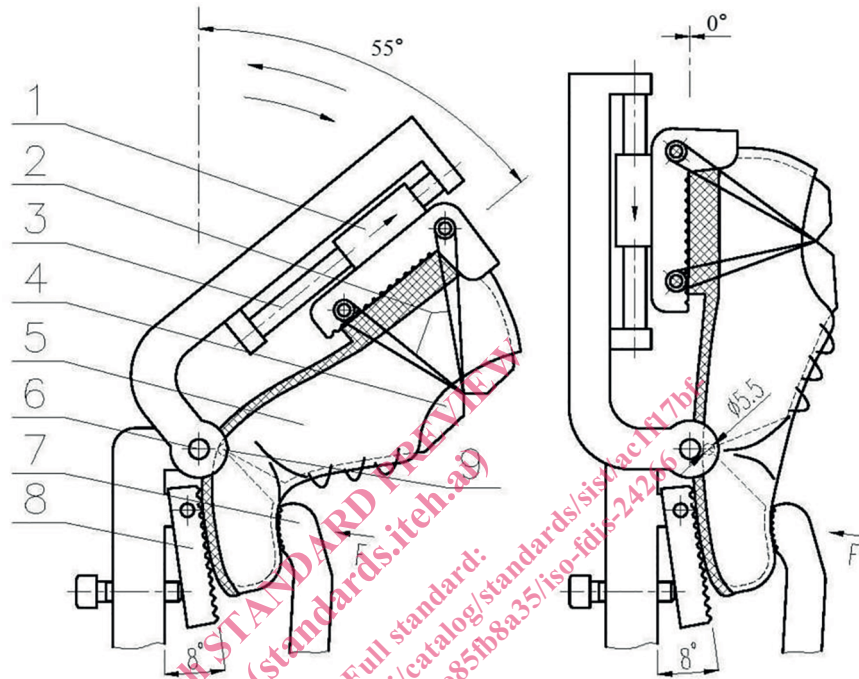
**4.2.1.1** The flexing angle can be adjusted between  $(0 - 55)^\circ$ , see [Figure 1](#).

**4.2.1.2** The flexing frequency can be adjusted between (100 - 300) cycles per minute.

**4.2.1.3** Sample holder can fasten the sample firmly to ensure it will not loosen during test. The inclination angle of sample holder is adjustable to make sure test sample can be under natural condition without flex in any directions when the tester is at the minimum flex angle.

**4.2.1.4** A means of stopping the machine automatically after the specified flexing cycles.

**4.2.1.5** A means of blasting air to the flexing area of sample to prevent overheating.



#### Key

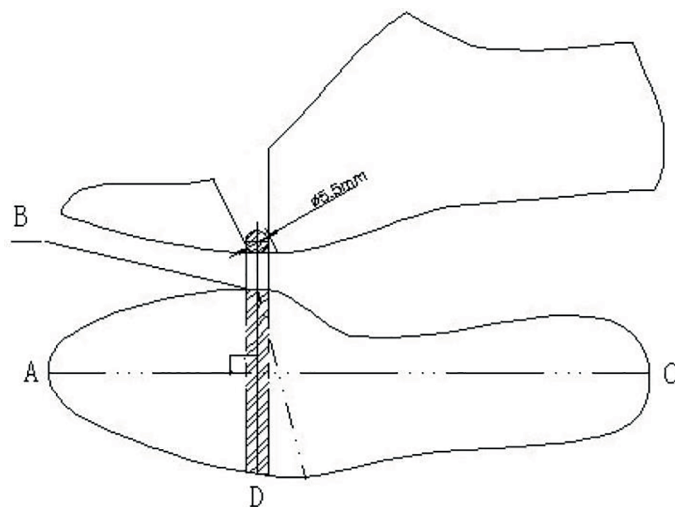
- 1 Slider
- 2 Strings used to fixed the back of the sample
- 3 Slide rail
- 4 Flexing last
- 5 Sample (whole shoe)
- 6 Flexing central axis
- 7 Front part of the clamp
- 8 Adjustable backer
- 9 Flexing axis of the last

**Figure 2 — Flexing machine**

### 4.2.2 Flexing last

**4.2.2.1** Steel axis in the bottom of the last with a size of  $\varnothing 5,5 \text{ mm} \times 40 \text{ mm}$ , so as to make the last flexing at the joint position (see [Figure 2](#)). When the last keeps at normal position, the bottom of the last shall be smooth and flat.

4.2.2.2 The maximum flexible angle of the flexing last is no less than 50°.



**Key**

AC Central line

B The median ball area strings used to fixed the back of the sample

BD Steel axis

**Figure 3 — Flexing last**

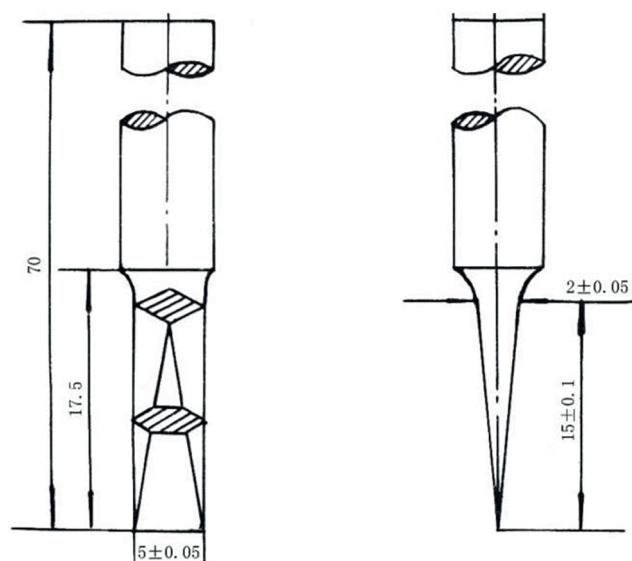
**4.2.3 Vernier callipers**

To an accuracy of better than 0,02 mm.

**4.2.4 Cutting tool**

The cutting tool is shown in [Figure 3](#).

NOTE Means of firmly clamping the footwear or the outsole is advisable to minimize the risk of breaking the chisel as it is withdrawn from the outsole.



Dimensions in millimetres

**Figure 4 — Schematic diagram of chisel**



## 5 Sampling and conditioning

5.1 At least one pair of whole shoes, soles or outsoles are needed for each test.

5.2 Place all test pieces in a standard controlled atmosphere in accordance with ISO 18454 for at least 4 h prior to test and the test shall also be carried out under this controlled atmosphere.

## 6 Test method

### 6.1 Method A

6.1.1 Draw a line down the length of the footwear insole from the center of the heel toward the center of the toecap.

6.1.2 Along the line drawn as A, the appropriate distance from the heel given in below [Table 1](#) and mark this point (point B in [Figure 4](#)). This corresponds to the typical position of the ball joint of the wearer's foot.

6.1.3 Mark a second point on the line drawn which is  $(5 \pm 1)$  mm closer to the heel than the point marked as point B in [Figure 4](#).

6.1.4 Draw a line across the width of the insole passing through the second point and at  $90^\circ$  to the first line. This is the flexing line of the footwear (see [Figure 4](#)).

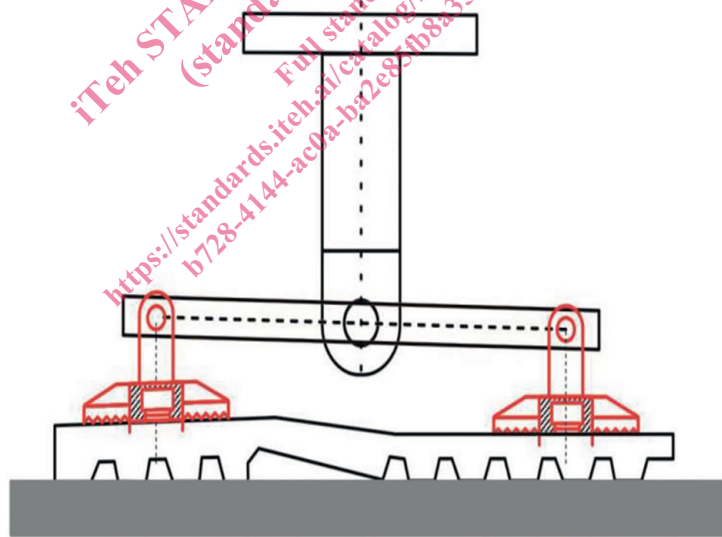


Figure 5 — Marked insole

6.1.5 Set the flexing machine to the footwear through an angle of  $(30 \pm 1)^\circ$  similar to that experienced during normal walking.

6.1.6 Secure the footwear in the machine to make the flexing line pass under the center of both holes in the toe clamp (see ).

6.1.7 Operate the flexing machine. After approximately 500 cycles, check to assure that the footwear is still securely clamped. Run the machine again.