INTERNATIONAL STANDARD

**ISO 19409**

First edition
2022-11

# Footwear — Sizing — Measurement of last dimensions

*Chaussures — Pointures — Mesurage des dimensions de la forme*



Reference number
ISO 19409:2022(E)

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Published in Switzerland

# Contents

Page

# Foreword

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This document was prepared by Technical Committee ISO/TC 137, *Footwear sizing designations and marking systems*.



Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

# Introduction

A shoe last is the form on which a shoe is constructed. The size and shape of the last is vital and contributes to the size and shape of the finished product. The shoe last determines the toe shape and heel height as well as the curvature of the shoe. Good fit is a key factor in a customer's choice of footwear. The footwear design and manufacturing processes also contributes to a well-constructed shoe. A standard method of measuring a last will guide the industry on correct shoe sizing based on the last dimensions and will reduce discrepancies and disputes.

# Footwear — Sizing — Measurement of last dimensions

## 1 Scope

This document specifies methods to measure the basic last dimensions. Last dimensions can be measured physically using a real last or virtually on a digital 3D model using suitable software to make equivalent measurements.

These test methods are applicable to all types of lasts.

NOTE The specified last dimensions do not necessarily correspond with anatomical foot positions and foot dimensions.

## 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/TS 19407:2015, *Footwear — Sizing — Conversion of sizing systems*

ISO/TS 19408:2015, *Footwear — Sizing — Vocabulary and terminology*



## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 19408:2015 and the following apply.



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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

**3.1**
**geodesic**
line on a curved surface such that at all points on the line, the normal to the line is also the normal to the curved surface (identical to the normal curvature)

**3.2**
**continuous geodesic**
*geodesic* (3.1) that returns to its starting point and then continues on the same path as for the first circuit when passing around the surface of an object

**3.3**
**convexity**
maximum of last bottom curvature

## 4 Principle

The different dimensions of the last are measured physically at the real last or virtually at the digital last. The measurements are taken at the described places at the last. Find the point, distance or girth at the last and measure the dimension using the described method.

# 5 Apparatus

## 5.1 Accuracy

Accuracy of all measurements shall be ±0,5 mm

**5.2 Measuring tape,** Calibrated measuring tape, thin, flexible, inelastic, with mm scale, maximum 8 mm wide.

**5.3 Right angled device in mm** (see Figure 1).

Dimensions in millimetres

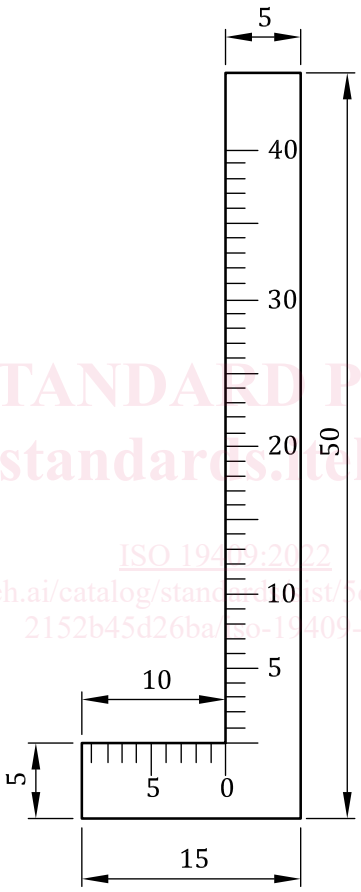


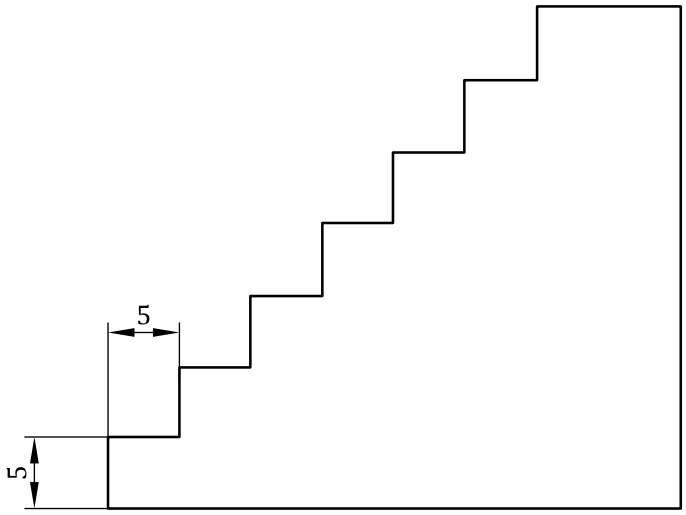



**Figure 1 — Example of right-angled device**

**5.4 Calibrated rule,** in mm, of length at least 50 mm.

**5.5 Measuring stairs for heel height,** a means of supporting the heel seat at the heel height of last (see Figure 2).

Dimensions in millimetres




NOTE Dimensions of the stairs, tolerance ±0,5 mm.

**Figure 2 — Example of measuring stairs**

**5.6 Toe spring gauge,** to measure the toe spring as given in ISO/TS 19408:2015, 2.2.13. The scale of the gauge is marked in mm (see Figure 3).



Dimensions in millimetres

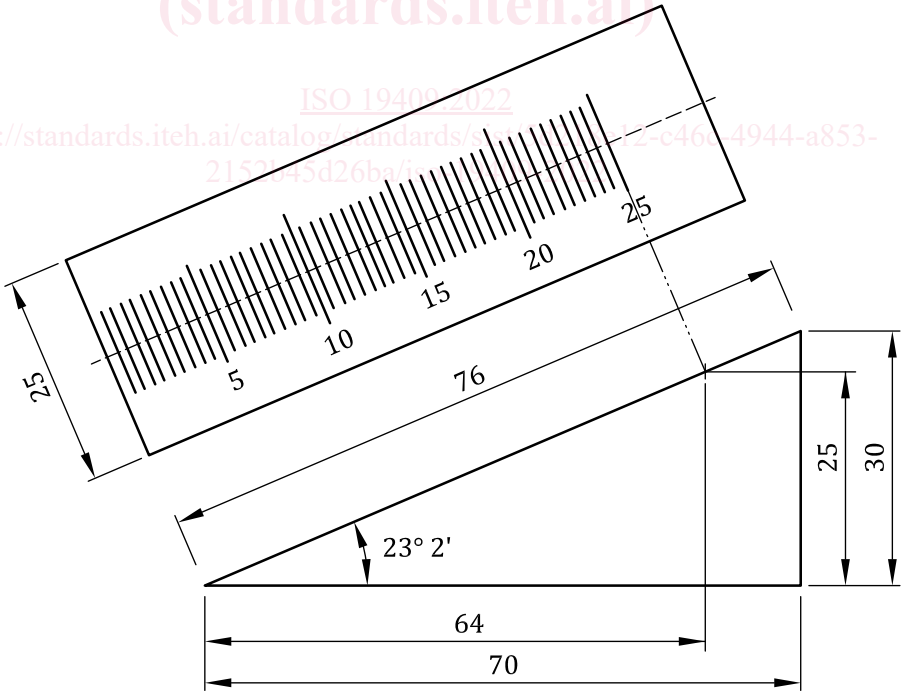
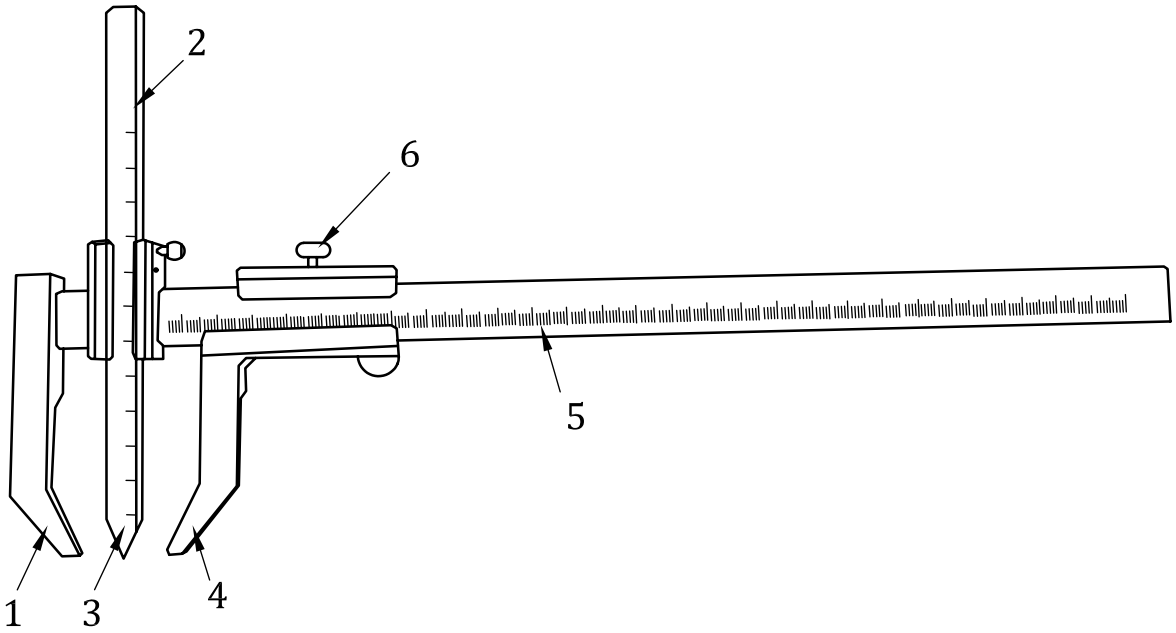



**Figure 3 — Example of toe spring gauge**

**5.7 Vernier calliper** (in mm), accuracy of 0,1 mm, of length approximately 100 mm for measurement of toe height, width of ball and heel as given in ISO/TS 19408:2015, 2.2.12, 2.1.15 and 2.2.8.

**5.8 Cylinders of modelling clay,** diameter 25 mm ± 2 mm with different heights.

### 5.9 Device to measure convexity (see Figure 4).




**Key**

1 fixed clamp
2 vice ruler
3 convexity/concavity sensor
4 measuring clamp
5 main ruler
6 screw



**Figure 4 — Example of device to measure convexity**

## 6 Sampling

A physical last may be used, such as a model or shoemaking last. Alternatively, a virtual assessment may be carried out using a suitable digital 3D model.

The following information are required from the last designer/maker:

a) heel height of last;

b) toe spring of last.

If only one parameter is stated by the last maker, then the other parameter can be determined by measurement.

## 7 Procedure

### 7.1 General

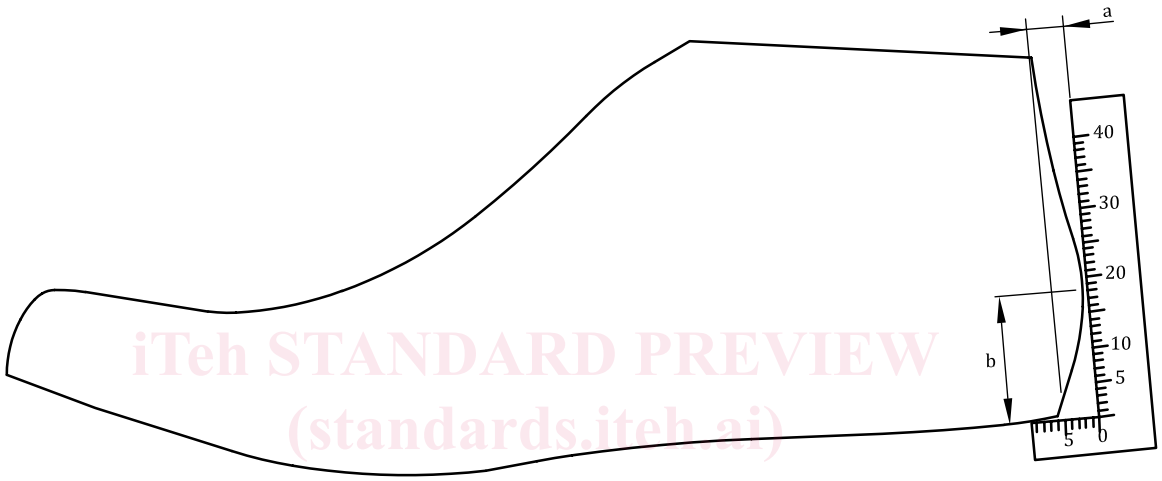
This procedure describes the physical methods to measure last dimensions. The virtual method measures the same dimensions using the digital tools of computer system.

## 7.2 Last length measurement

Mark the central line in accordance with ISO/TS 19408:2015, 2.2.2 at the last bottom and measure this length *d* (see ISO/TS 19408:2015, 2.2.1) using the measuring tape (5.1).

### 7.2.1 Heel curve

Use the right-angled device (5.2) to measure the maximum of heel curve (see $l_1$ ISO/TS 19408:2015, Figure A.6). Place the short arm of the right-angled device at the heel point of feather line, following the increase of the last points of the last bottom. The long arm of the device shall touch the maximum of the heel curve, see Figure 5. Read the value of the maximum curvature (convex) of the heel curve, see Figure 5, a, $l_1$ from the scale of the short arm of the device. Read the value of the height to the maximum of the heel curve, see Figure 5, b from the scale of the long arm of the device.






**Key**

a maximum of heel curve (convex curvature)

b height of maximum of heel curve



**Figure 5 — Measurement of the maximum of heel curve**

### 7.2.2 Hang over of the last top

Use the right-angled device (5.2) to measure the last top overhang (see for example distance “e” in accordance with ISO/TS 19408:2015, Figure A.6. Place the short arm of the right-angled device at the prominent point of feather line, following the increase of the last points of the last bottom. The long arm of the device shall touch the maximum of the prominent point of the last (see Figure 6). Read the value of the distance of the maximum of the prominent point of the last top “e” from the scale of the short arm of the device.