



# Standard Practice for Fitting Athletic Footwear<sup>1</sup>

This standard is issued under the fixed designation F539; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice covers a practical method for fitting athletic footwear. This practice is applicable to the following general flexible types of footwear: running baseball, basketball, football, and tennis.

1.2 There are as many variations in shoe forms and materials available to users as there are variations in the anatomy of the user's feet. Shoe forms are different due to manufacturer's materials, type of construction, and also the type of activity anticipated in its end use.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Terminology

### 2.1 Definitions:

2.1.1 *end use, n*—the use for which the footwear is intended.

2.1.2 *last, n*—a block or form shaped like a person's foot, used by shoemakers in building or repairing shoes and boots.

2.1.3 *improperly fitted*—a term descriptive of footwear that is either too loose or too tight on the foot for its intended purpose or protection thereof.

2.1.4 *subject*—person on whom foot measurements are made.

## 3. Significance and Use

3.1 Improperly fitted footwear can cause discomfort, but more importantly, prolonged use causes disfiguration of the bone structure, bunions, corns, callouses, and finally fatigue, often leading to serious accidents. Footwear performance may also be diminished if improperly fitted.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.54 on Athletic Footwear.

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## 4. Apparatus

4.1 *Measuring Device*,<sup>2</sup> suitable for performing the measurements described in this practice.

## 5. Measurement Procedure

5.1 Prepare the measuring device by setting the movable width bar to its widest position and with the movable ball to heel length indicator (pointer) slid back, so that the foot can be easily positioned in the device (Fig. 1).

5.2 The subject should be in a standing position during measurement of the foot with footwear removed from both feet. The subject should wear a sock similar to one that will be worn while wearing the footwear being fitted.

5.3 Have the subject place their right heel in the area marked for the right heel. The person being measured should stand with their weight distributed equally between both feet to ensure that the foot has elongated to its maximum size. To ensure the heel is properly located in the back of the heel cup, grasp the ankle and device together (Fig. 2).

5.4 *Determination of Toe-to-Heel Length (Toe Length)*—Take measurement by looking straight down over the end of the toes. Make sure the sock is pulled tightly over the toes without drawing the toes back. Press the toes down so that they lie flat against the base of the device and read the size of the longest toe (not always the first toe). This is the toe-to-heel measurement (see Fig. 3).

5.5 *Determination of Ball-to-Heel Length (Arch Length)*—Place the thumb over the ball joint of the foot as shown in Fig. 4 and move the pointer so that the inner curved side of the pointer fits around the ball joint of the foot and the two high ribs of the pointer come in contact with the thumb as shown in Fig. 4. When the pointer is in proper adjustment, the low middle rib (marked A in Fig. 4) will be touching the bone on the side of the foot (marked B in Fig. 4). This may be checked with the index finger. Read the size indicated by the pointer as the arch length.

<sup>2</sup> The sole source of supply of the apparatus known to the committee at this time is the Brannock Device Co., 509 East Fayette St., Syracuse, NY 13202. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.

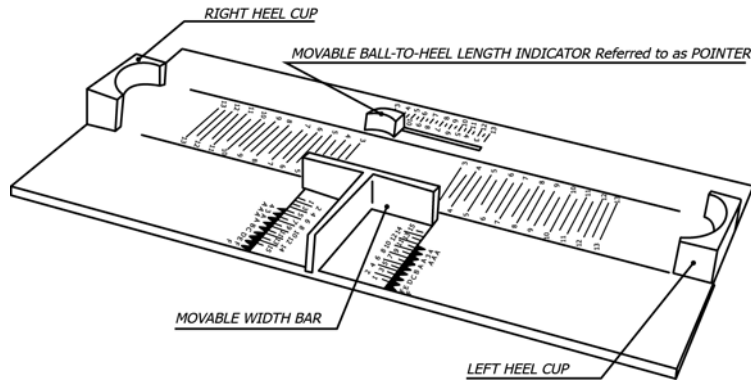


FIG. 1 Measuring Device

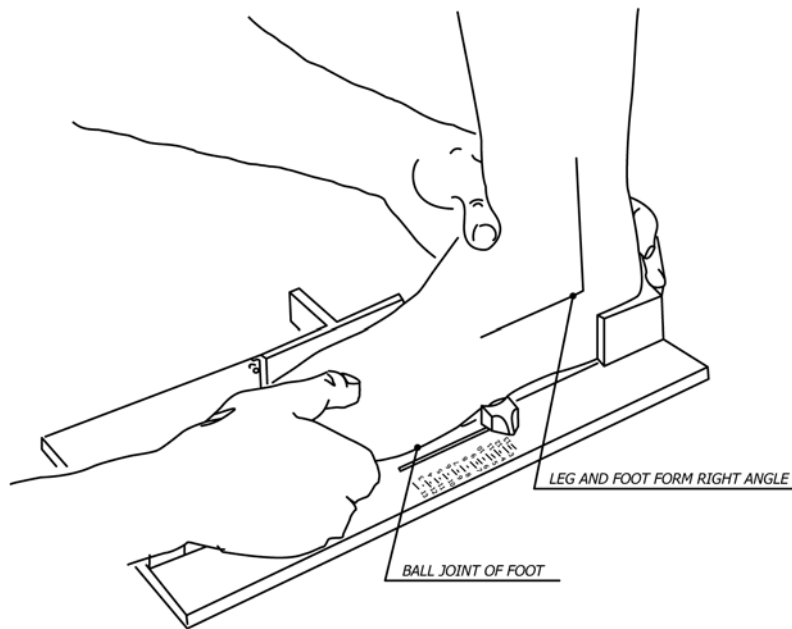


FIG. 2 Placement of the Foot in the Measuring Device

5.6 *Determination of Measured Foot Length in Terms of Shoe Size*—Compare the arch length with the toe length and fit as follows:

5.6.1 If the arch length and toe length measurements are the same, the reading is the correct shoe size.

5.6.2 If the arch length and toe length measurements differ, the shoe size should correspond to the larger of the two measurements.

NOTE 1—If the arch length is significantly larger than the toe-to-heel measurement, than a compromise between the two sizes may be needed.

5.7 *Determination of Width*—Determine the width by sliding the width bar snugly to the edge of the foot, but do not squeeze the foot. Select the number on the width bar that is the same as the length size previously determined. Follow down this line and observe which width area it lines up with, or comes nearest (see Fig. 5). If it comes between width marks, choose the wider width for a thick foot, or the narrower width for a thin foot. If the foot is extremely fleshy or has a very high instep, it may be necessary to fit the foot to an additional width

wider. If the foot is extremely thin, compress the foot slightly with the width bar and take the reading while holding the bar in this position.

5.8 *Measurement of the Other Foot*—To measure the opposite foot, reverse the device end for end, so that the other foot is in the correct heel cup. Follow the procedures in 5.5 – 5.7. After both feet have been measured compare the sizes of both feet. It is not uncommon for a person to have feet of different size. In this event fit to the larger of the two feet.

NOTE 2—*Trial Fitting*—Due to the differences in manufacturing, styling, and other factors, the fitter of footwear should be knowledgeable of shoe styles and the fit characteristics of each type of footwear they are fitting. It may be necessary to make compensations from the measured size to achieve the proper fit. The fitting process should always involve trial fittings (see Section 7) to ensure the proper size was selected.

## 6. Observation and Interpretation of Fitting Problems

6.1 Observe signs in the user's present worn footwear for specific problems illustrated in 6.2 – 6.6.

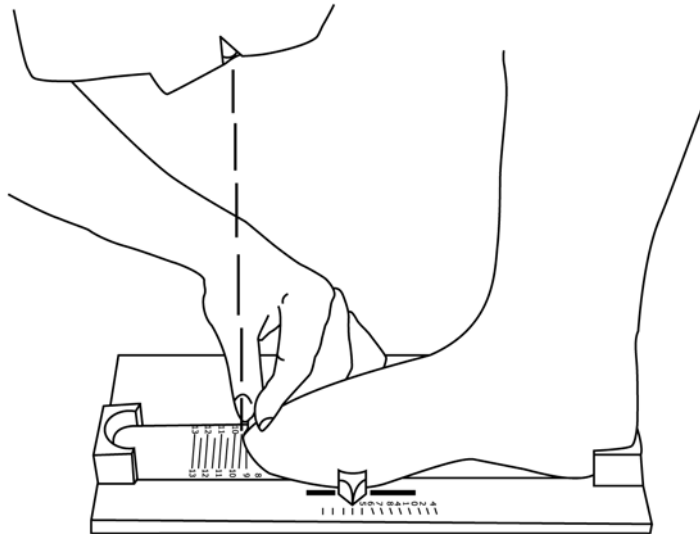


FIG. 3 Measurement of Toe Length

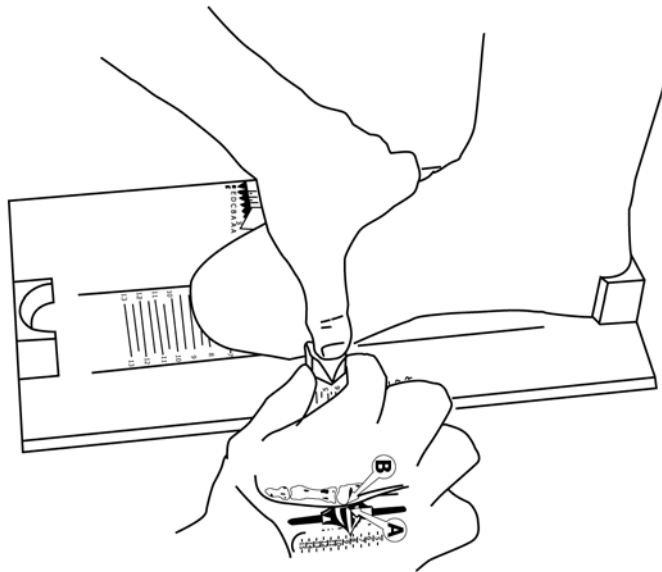


FIG. 4 Measurement of Arch Length

**6.2 Observation of Sweat Lines:**

6.2.1 The sweat line inside of the shoe indicates how the ball of the foot sets in the shoe.

6.2.2 The sweat line indicates the amount of weight that is carried through the arch of the foot.

6.2.3 The sweat line shows where the toes come in contact with the shoe and reveals if the little toe has had enough room.

**6.3 Indications of Short Shoes:**

6.3.1 Longitudinal folds in the leather on the outside of the shoe under the interlongitudinal arch indicate a shoe that is too short for the foot.

6.3.2 Wear lines on the outsole of the shoe show where the ball of the foot is during wear; and if these wear lines are beyond the wide part of the shoe, the shoe should be longer.

6.3.3 A shoe that wears over the outsole to the outside is an indication that the shoe is too short.

6.3.4 A shoe that is pushed out of shape over the little toe is a sign of short shoes.

6.3.5 A shoe in which the counter and upper is run over in the heel indicates that the shoe is too short for the foot.

6.3.6 An indentation of the toe end of the upper on the inside by the end of the big toe may be caused by a shoe that is too short for the foot (see also 6.5.1).

**6.4 Indications of Long Shoes:**

6.4.1 Excessively turned up toes, with pronounced wrinkles across the vamp, may be caused by a shoe that is too long.

6.4.2 Gaping quarters at the top may be caused by a shoe that is too large or a person who may have a weak arch. In such cases, the shoe should be fitted shorter.

6.4.3 If the counter is run over on either side of the heel, the shoe is too large for the foot; or this situation may indicate a foot problem such as weak ankles or flat feet.

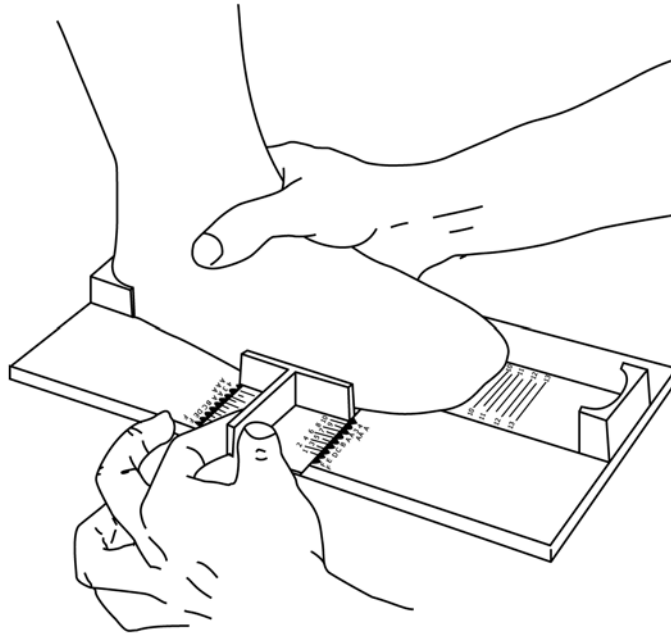


FIG. 5 Measurement of Foot Width

6.5 *Observation of Improper Width Fit:*

6.5.1 An indentation of the toe end of the upper on the inside by the end of the big toe may be caused by a shoe that is too narrow in width (see 6.3.6).

6.5.2 Undue creasing at the outside ball area is a common fault found in many athletic shoes and is due to a shoe that is too wide for the foot.

6.6 *Indications of Physical Abnormalities:*

6.6.1 Extreme dips in the insole indicate metatarsal problems.

6.6.2 Pronounced treading over on the outside of the forepart (ball area) may be an indication of a weakness in the foot, such as flat foot, or some trouble in the metatarsal area.

6.6.2.1 Another cause of pronounced treading over on the outside of the ball area might occur if the shoe is too roomy in either the seat or the ball area.

6.6.3 Undue fullness in the ball area is a sign that either the shoe has not been fitted correctly “heel to ball” (the joints of the foot are too far forward) or arch weakness in the foot.

7. **Procedure for Fit Trial**

7.1 The fit trial should be completed with full weight bearing on the foot. Have the user stand up but do not lace the shoes. The purpose of this is to allow the user’s feet to adapt to the new shoe. Lace the shoes.

7.2 *Arch and Toe Length*—Check for proper length of the user’s foot arch length and toe length in footwear (see Figs. 6 and 7).

7.2.1 Check the correct length. The shoe must be long enough to allow ample room for natural movements of the toes. The tip of the toe cap should extend ½ in. (13 mm) beyond the end of the great toe for normal feet. For a thick and fleshy foot with a low arch, a ¼-in. (6-mm) allowance is proper.

7.2.2 Check on the heel portion of the shoe. The heel should fit snugly and the counter should not bulge outward.

7.3 *Width*—Check the user’s foot for proper width in footwear (see Fig. 8) or place your hand across the vamp to feel for the ball of the foot at the widest part of the shoe with the index

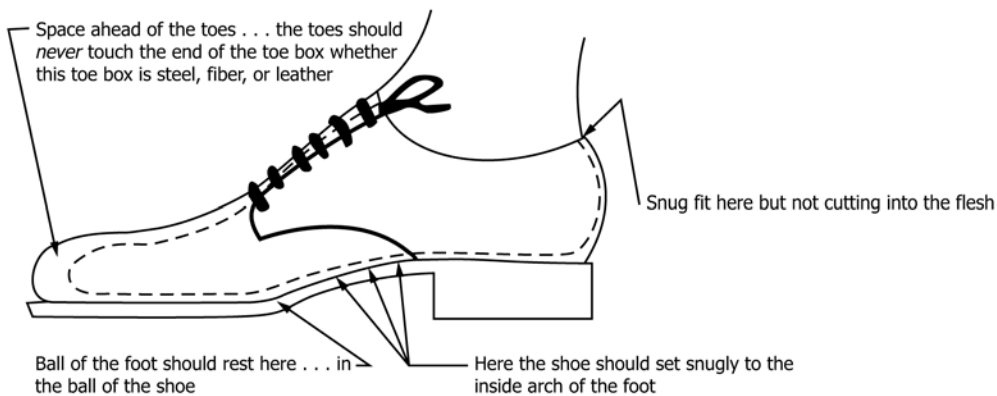
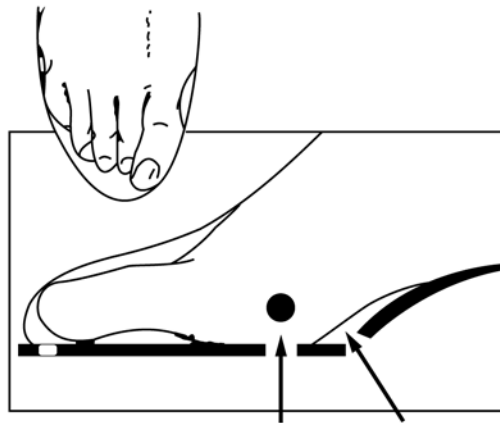
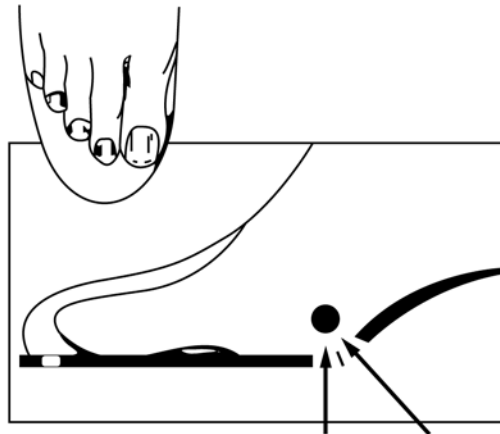


FIG. 6 Determination of Correct Shoe Length



*Incorrectly Fitted*  
The toes are cramped and twisted — stopping ventilation and creating excessive perspiration, which causes rotting of inner soles, linings, and upper leather. Short shoes like these cause enlarged great-toe joints and bunions, as well as general foot discomfort. Each step strains the foot-arch. Without support under its entire arch-span, the foot sags down, nerves and blood vessels are pinched, interfering with circulation, and trouble follows.



*Properly Fitted*  
Arch base of shoe and ball-joint of foot meet at the same point. Foot arch rests comfortably on shank of shoe, full length. Foot and shoe bend at the same place — no sagging. Toes, too, are straight. There is ample space in front of them — no crowding, plenty of ventilation. These feet will be comfortable, and these shoes will keep their shape. Heel-to-ball measurement assures this scientific fitting.

FIG. 7 Fitting of Footwear

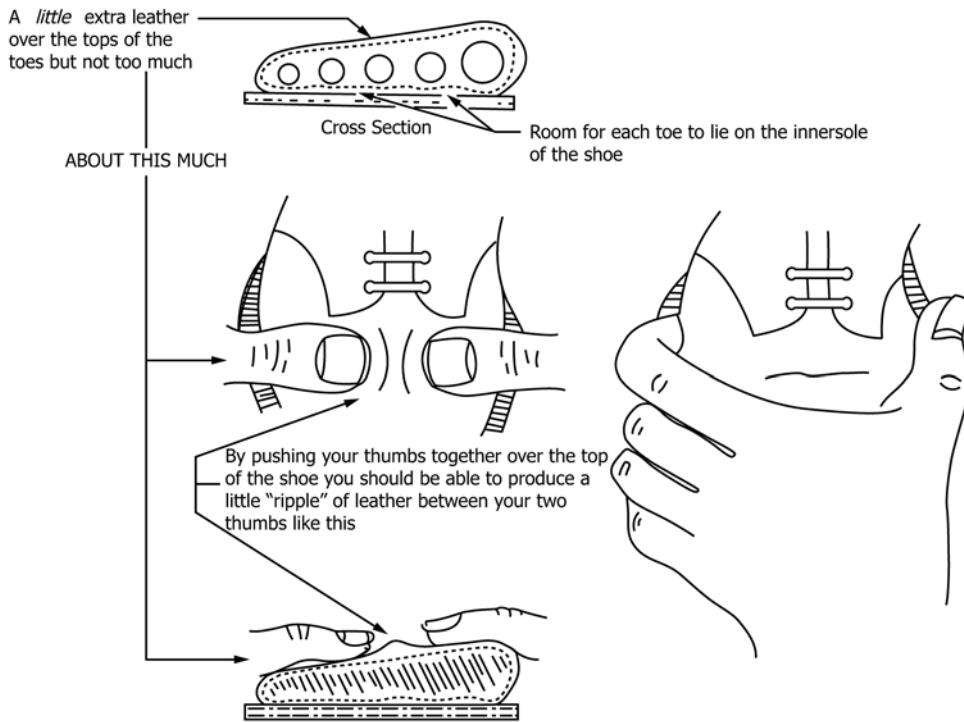


FIG. 8 Determination of Correct Shoe Width

finger. The index finger should fit over the ball and right down into the space between the upper and the sole.

7.3.1 *Inside Arch Area*—Check the inside arch area. Using your fingers, check the shoe upper material under the arch.

Have the user transfer his weight forward to ensure that the material is smooth and snug when the user is in that position. If wrinkles and folds are present, the shoe is not the proper size.

7.3.2 *Vamp Area*—Check the vamp area to see if it feels right. Place the hand so the index finger is tight on the outer edge of the sole and draw the thumb across the vamp. By applying a slight pressure, the fitter will be able to determine if

the foot fills the shoe without tightness or if a tight vamp causes bad vamp crease; and if there is a bite in the toes. In a shoe that fits properly the body is carried on the insole and not on the foot. To determine this, have the user stand and then the big toe joint and the forefinger on the outer edge of the shoe. If excessive pressure is applied to the fingers, the weight is being carried on the shoe does not fit properly. If the shoe fits properly, the fitter should be able to see the extension of the foot. If the foot does not have an extension, the forefinger should be able to see the extension of the foot with the sole when the hand is laid across

7.3.3 *Instep*—Check the instep. A shoe should fit snug over the instep. The eyelets at the throat-line should have a separation of at least ½ in. (13 mm). If arch supports or any

other inlay such as taping is used excessively, the shoe should be fitted slightly larger than is customary.

7.4 If the footwear does not fit as described in 7.2 and 7.3, a different last must be tried. The apparent cause is illustrated in Fig. 9.

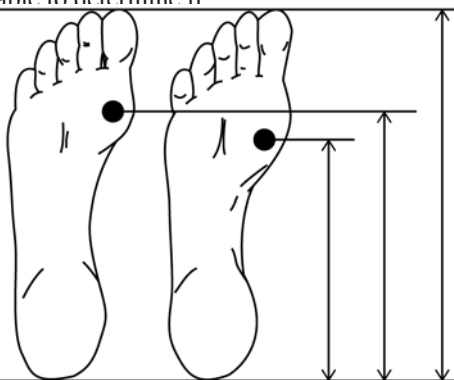


FIG. 9 Determination of Correct Arch Length

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