Designation: F 489 – 96$^{\epsilon 1}$

An American National Standard

# Standard Test Method for Using a James Machine[1]

This standard is issued under the fixed designation F 489; 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 (ε) indicates an editorial change since the last revision or reapproval.

$\epsilon^1$ NOTE—Per Committee F13 Bylaws, editorially replaced term definitions with reference to Terminology F 1646 in January 2004.

## 1. Scope

1.1 This test method covers laboratory measurement of the dry static coefficient of friction of shoe sole and heel materials on controlled walking surfaces and under controlled conditions. It is recognized that certain contaminants and conditions may alter results.

NOTE 1—See Test Method D 2047 for information on measurement of the static coefficient of friction of floor surfaces for the James Machine.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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. Referenced Documents

2.1 *ASTM Standards:* [2]

D 2047 Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

F 1646 Terminology Relating to Safety and Traction for Footwear

## 3. Terminology

3.1 See Terminology F 1646 for the following terms used in this test method:

3.1.1 Coefficient of friction,

3.1.2 Friction, and

3.1.3 Slip.

## 4. Significance and Use

4.1 The James Machine is a laboratory instrument intended to measure the slip resistance characteristics of shoe sole and heel materials. However, the tendency to slip may be influenced by foreign materials or lubricants on the shoe materials or on the walking surfaces. Consequently, acceptable levels of slip resistance as determined by this test method may not predict an individual's resistance to slipping while walking or running on various surfaces.

## 5. Apparatus

5.1 *James Machine* (Fig. 1),[3] with three weights of 25 lb (11.4 kg) each, plus supporting members (80 lb (36.3 kg) total).

5.2 *Shoe*, faced with the specimen under test.

## 6. Walking Surfaces

6.1 A 12 by 12-in. (305 by 305-mm) square of surface shall be used for testing.

6.2 The surfaces to be used shall be OVCT tiles[4] or a surface agreed upon between laboratories.

6.3 The surfaces are prepared by thoroughly wiping with a 3 % ammoniacal solution using a clean cloth prior to conditioning.

## 7. Preparation of Shoe Sole and Heel Materials Samples

7.1 Sand the sample using a 60-grit silicon carbide abrasive paper[5] to remove finish or mold characteristics, or both.

[1] This test method is under the jurisdiction of ASTM Committee F-13 on Safety and Traction for Footwear and is the direct responsibility of Subcommittee F13.10 on Traction.

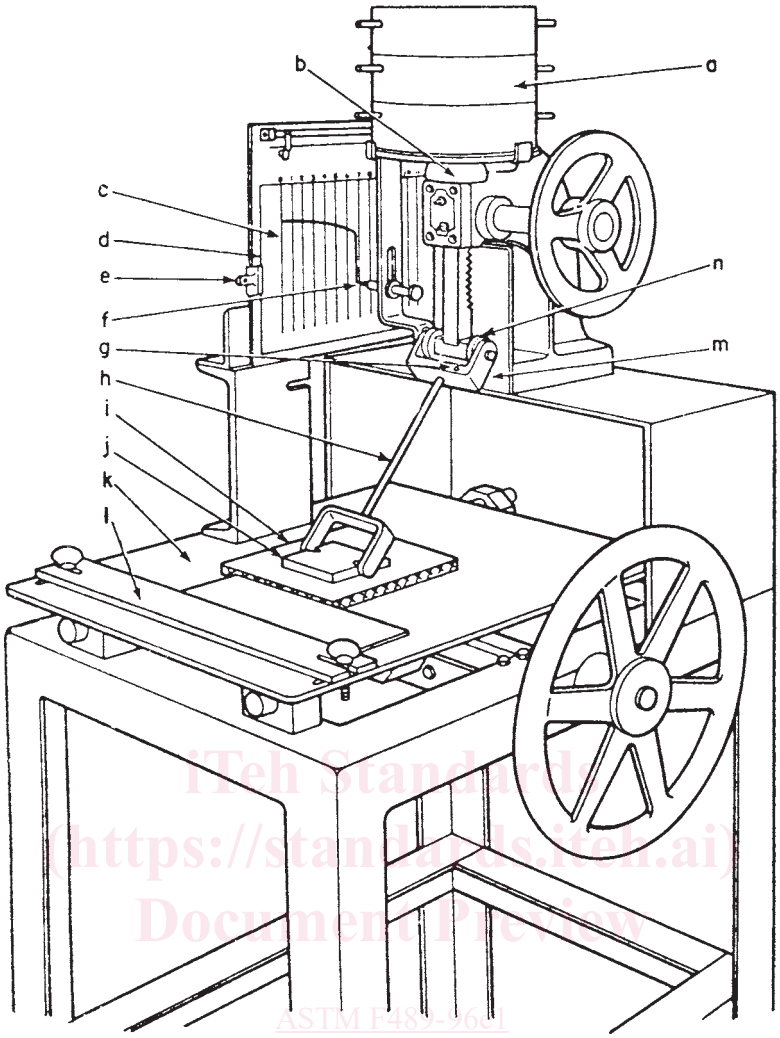
Current edition approved Feb. 10, 1996 Published April 1996. Originally published as F 489 – 77. Last previous edition F 489 — 77 (1988)$^{\epsilon 1}$.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] This machine was developed by S. V. James of the Underwriters Laboratories, Inc. The machine is available from Quadra, Inc., 1833 Oakdale Ave., Racine, WI 53405. Phone (414) 637-6525.

[4] OVCT is official vinyl composition tile and is available from the Chemical Specialties Manufacturers Assn., 1901 I St., N.W., Washington, DC 20006. These tiles may be used and reused for testing. Tiles should be discarded when they show excessive wear or when erratic results are obtained.

[5] 60-grit silicon carbide abrasive paper is available from the 3M Corp., St. Paul, MN.




a—Weights
b—Cushion
c—Chart
d—Chart Board
e—Spring Clip
f—Recording Pencil
g—Set Screw
h—Strut
i—Walking Surface
j—Shoe and Specimen
k—Test Table
l—Retaining Bar
m—Back Plate
n—Ball Bearing Rollers

**FIG. 1 The James Machine**



7.2 Again sand the sample using 400A wet or dry silicon carbide abrasive paper.[6]

7.3 Brush the sanded sample to remove loose particles.

## 8. Test Specimens

8.1 Specimens, 3 by 3 in. (76 by 76 mm), prepared in accordance with 6.1 and 6.2, and 6.3 shall be applied to the shoe by use of double-faced tape[7] or a suitable adhesive.

8.2 The specimen shall be wiped with a clean, dry cloth to remove dust or foreign matter from the surface after conditioning.

## 9. Conditions for Testing

9.1 Run the specimens under the following conditions:

9.1.1 Both surfaces dry and conditioned 18 h at 73 ± 3.6°F (22.8 ± 2°C).

9.2 This procedure may also be used at other conditions, such as 36°F (2.2°C) dry.

## 10. Calibration

10.1 Obtain a calibration curve as follows:

10.1.1 Attach a low-friction ball bearing unit[8] to the shoe.

[6] 400A wet or dry Tri-M-Ite is available from the 3M Corp., St. Paul, MN.

[7] Suitable tape is available from the 3M Corp., St. Paul, MN.

[8] Suitable linear ball bearing units may be obtained from the Turnomat Division of Heil Grinding & Manufacturing Co., 455 Adirondack St., Rochester, NY 14606. Model BP-1000W is suitable and two units are needed.