



Designation: **F1914 – 17 F1914 – 18**

Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering¹

This standard is issued under the fixed designation F1914; 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.

1. Scope

1.1 This test method covers procedures to determine short-term indentation and residual indentation of resilient flooring, when subjected to concentrated loads.

1.2 The test methods appear in the following order:

Indentation by McBurney² Test
Indentation and Residual Indentation

Section
4 to 10
11 to 15

1.3 There are two procedures with their respective apparatus. The first (McBurney Test) is described in Sections 4 to 10 and is restricted to a spherical foot. It is only used for initial indentation measurements of VCT. The second is described in Sections 11 to 15 and has interchangeable feet with variable geometry. It is used to measure initial and residual indentation.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

- 2.1 *ASTM Standards:*³
- [E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)
 - [E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids](#)
 - [F141 Terminology Relating to Resilient Floor Coverings](#)
 - [F1066 Specification for Vinyl Composition Floor Tile](#)
 - [F1303 Specification for Sheet Vinyl Floor Covering with Backing](#)
 - [F1700 Specification for Solid Vinyl Floor Tile](#)
 - [F1913 Specification for Vinyl Sheet Floor Covering Without Backing](#)
 - [F2982 Specification for Polyester Composition Floor Tile](#)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology [F141](#).

¹ This test method is under the jurisdiction of ASTM Committee [F06](#) on Resilient Floor Coverings and is the direct responsibility of Subcommittee [F06.30](#) on Test Methods - Performance.

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² The sole source of supply of the McBurney Indentation Tester known to the committee at this time is Frazier Precision Co, Gaithersburg, MD. 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 committee¹, which you may attend.

³ 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.

INITIAL INDENTATION MEASUREMENTS OF VCT (MCBURNEY TEST)²

4. Significance and Use

4.1 This test method measures short-term indentation of resilient flooring and is useful as a predictor of performance in actual installations over time.

4.2 The slope, *m*, of a log-log plot indentation (I) versus time (T), is related to the indentation of tile in service. The 115°F (46°C) indentation is a measure of the tendency of the tile to indent at temperatures above 77°F (25°C).

5. Apparatus

5.1 *Apparatus*²—The indentation tester is a spherical foot device consisting essentially of a rigidly mounted indenter acting under an initial load of 2.00 ± 0.02 lbf (8.90 ± 0.09 N) and a total deadweight load of 30.00 lbf ± 0.25 lbf (133.45 ± 1.11 N) with a suitable dial indicator, calibrated in 0.0005 in. (0.01 mm) increments. The spherical foot shall be 0.250 ± 0.0005 in. (6.35 ± 0.01 mm) in diameter. A suitable apparatus is shown in Fig. 1.

5.2 *Flat Glass Plate*, of 0.25 in. (6.35 mm) minimum thickness for supporting the specimen and tester during test.

5.3 *Timing Device* that will indicate the time in seconds.

5.4 *Thermometer*, calibrated as in Specification E2251.

5.5 *Circular Plexiglas Template*, 3.50 in. (88.9 mm) in diameter, 0.25 in. (6.35 mm) thick and having a 0.3125 in. (7.94 mm) diameter hole drilled in the center and a 0.75 in. (19.05 mm) diameter concentric circle etched on the face.

5.6 *Water Baths*, or air atmosphere maintained at 77 ± 0.9°F (25 ± 0.5°C) or 115 ± 1°F (46 ± 0.5°C).

6. Test Specimens

6.1 The test specimen shall be a full tile, usually 12 by 12 in. (approximately 305 by 305 mm) or 9 by 9 in. (approximately 230 by 230 mm). Larger tiles shall be cut to one of the above sizes.

7. Conditioning

7.1 For testing in air, condition the specimen(s) for 1 h at the test temperature.

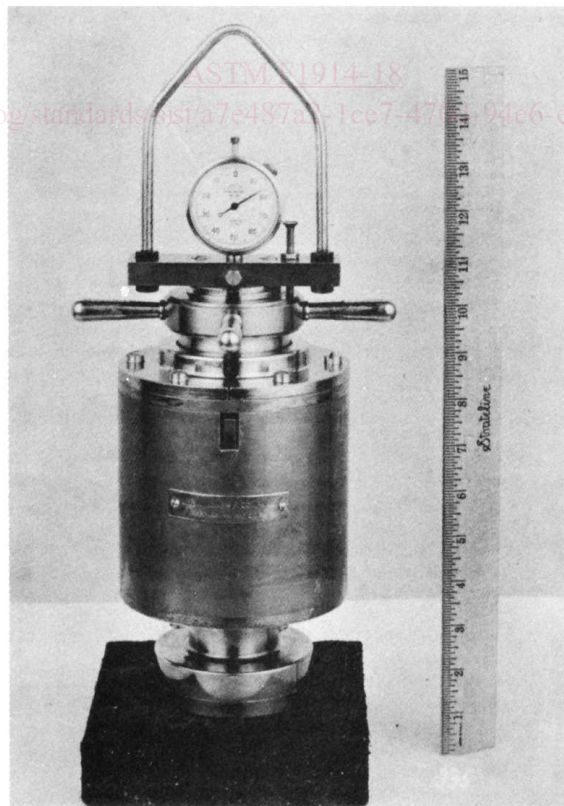


FIG. 1 Apparatus for Measuring Indentation: McBurney

7.2 For testing in water, condition the specimen(s) at the test temperature for 15 min minimum and 30 min maximum (see Table 1).

7.3 Condition the indentation tester and glass plate in the same medium and for at least the same time period as the specimen(s).

8. Procedures

8.1 Nonembossed Surfaces:

8.1.1 Place the specimen on the glass plate with the wearing surface up.

8.1.2 Place the indenter on the specimen. Be sure the indenter tip is retracted into the base when the instrument is placed on the specimen and when being moved to another test location.

8.1.3 Apply the initial 2-lbf (8.9-N) load (shaft assembly) to the specimen surface.

8.1.3.1 Position the 28-lbf (124.5-N) load on the specimen by holding down with the thumb the 2-lbf (8.9-N) shaft cross bar to proper load.

8.1.3.2 Gently lower the load to force the shaft cross bar upward until there is no clearance between the shaft and the upper wear plate. This will ensure proper 2-lbf (8.9-N) loading and positioning of the 28-lbf (124.5-N) load.

8.1.4 Set the dial gage at zero.

8.1.5 Release the 28-lbf (124.5-N) load and start the timing device. (Steps 8.1.3 – 8.1.5 should not exceed a total of 5 s.) Load release should be smooth and as mechanical as possible. Turn the collar at least one-half turn beyond release to allow sufficient travel for indentation. Do not hold the collar handle after the load is released as this may tilt the instrument from vertical.

8.1.6 Record the depth of indentation at 1 min ± 1 s and 10 min ± 1 s to the nearest 0.0001 in. (0.0025 mm) for 77°F (25°C) testing and at 30 ± 1 s for 114.8°F (46°C) testing.

8.1.7 Perform three of the required tests at randomly selected locations on the specimens. Record the three individual readings and the average for each time period.

8.2 Embossed Surfaces:

8.2.1 Prior to conditioning use the template described in 5.5 to locate areas on the specimen where a flat surface lies within the 0.75 in. (19.05 mm) diameter circle etched in the template. Mark the area for placement of the indenter by tracing around the template with a pencil. Follow the procedure detailed in 8.1 – 8.1.7 after placing the indenter with its base inside the circle.

NOTE 1—If the embossed surface of the tile is such that a 0.75 in. diameter smooth area cannot be located in the same or parallel plane that the indenter base will rest on, or the surface is completely nonuniform such as a textured surface, or both, the test shall not be made.

9. Report

9.1 Report the tile indentation as the average value(s) of the three tests made at each temperature and time interval. These shall be designated as the 1-min, 10-min and 30-s indentation values. Include in the report the nominal gage of the tile; that is, 1/16, 3/32, or 1/8 in. (approximately 1.6, 2.4, or 3.2 mm, respectively).

10. Precision and Bias

10.1 *Precision*—The precision statement is based on round robin testing performed at committee members' laboratories using this procedure to perform the tests.

10.1.1 *Repeatability*—The estimated repeatability at the 95 % confidence limit is as follows:

TABLE 1 Sample Conditioning and Testing Parameters

Product Specification	Conditioning			Indenter Foot		Total Load	Indentation Time	Recovery Time for Residual Indentation
	Temperature	Medium	Time	Geometry	Diameter			
F1066	77 ± 1°F	water	15–30 min	spherical	0.25 ± 0.0005 in. (6.35 ± 0.0127 mm)	30 ± 0.25 lb (13.6 ± 0.115 kg)	1 min	N/A
	25 ± 0.5°C	air	1 h					
F1066	77 ± 1°F	water	15–30 min	spherical	0.25 ± 0.0005 in. (6.35 ± 0.0127 mm)	30 ± 0.25 lb (13.6 ± 0.115 kg)	10 min	N/A
	25 ± 0.5°C	air	1 h					
	115 ± 1°F	water	15–30 min	spherical	0.25 ± 0.0005 in. (6.35 ± 0.0127 mm)	30 ± 0.25 lb (13.6 ± 0.115 kg)	30 s	N/A
	46 ± 1°C	air	1 h					
F2982	73.4 ± 3.6°F (23 ± 2°C)	water	15–30 min	spherical	0.25 ± 0.0005 in. (6.35 ± 0.0127 mm)	30 ± 0.25 lb (13.6 ± 0.115 kg)	1 min	N/A
	air	1 h						
	73.4 ± 3.6°F (23 ± 2°C)	water	15–30 min	spherical	0.25 ± 0.0005 in. (6.35 ± 0.0127 mm)	30 ± 0.25 lb (13.6 ± 0.115 kg)	10 min	N/A
	air	1 h						
F1303, Type I	75 ± 4°F 23 ± 2°C	air	6 h	spherical	0.75 ± 0.0005 in. (19.05 ± 0.0127 mm)	50 ± 0.5 lb (22.7 ± 0.225 kg)	5 min	60 min
F1303, Type II	75 ± 4°F 23 ± 2°C	air	6 h	flat	0.25 ± 0.0005 in. (6.35 ± 0.0127 mm)	75 ± 0.75 lb (34.2 ± 0.340 kg)	15 min	60 min
F1913								
F1700	75 ± 4°F 23 ± 2°C	air	6 h	flat	0.178 ± 0.0005 in. (4.521 ± 0.0127 mm)	140 ± 1 lb (63.5 ± 0.454 kg)	10 min	60 min