



## Designation: F2195 – 18 (Reapproved 2023)

# Standard Specification for Linoleum Floor Tile<sup>1</sup>

This standard is issued under the fixed designation F2195; 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 specification covers floor tiles made of a homogeneous mixture of linoleum cement binder calendered or pressed onto a fibrous or suitable backing. This specification also covers linoleum floor tile without backing.

1.2 Four types of linoleum floor tile are covered. The floor covering is intended for use in commercial, light commercial, and residential buildings based on serviceability characteristics. General information and performance characteristics, which determine serviceability and recommended use, are included in this document.

1.3 The following safety hazards caveat pertains only to the test methods portion, Sections 7 and 8, of this specification.

1.4 *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.*

1.5 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.

1.6 *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:<sup>2</sup>

**F137** Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F06 on Resilient Floor Coverings and is the direct responsibility of Subcommittee F06.80 on Specifications.

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

- F141** Terminology Relating to Resilient Floor Coverings
- F150** Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
- F386** Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
- F410** Test Method for Wear Layer Thickness of Resilient Floor Coverings by Optical Measurement
- F925** Test Method for Resistance to Chemicals of Resilient Flooring
- F970** Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading
- F1514** Test Method for Measuring Heat Stability of Resilient Flooring by Color Change
- F1515** Test Method for Measuring Light Stability of Resilient Flooring by Color Change
- F2055** Test Method for Size and Squareness of Resilient Floor Tile by Dial Gauge Method

### 2.2 Other Standards:

- ANSI/ASQC Z1.4** Sampling Procedures and Tables for Inspection by Attributes<sup>3</sup>
- EN 669** Determination of the Dimensional Changes of Tiles Caused by Atmospheric Humidity Changes<sup>4</sup>
- ISO 24343-1** Determination of Indentation and Residual Indentation – Part 2: Short-Term Residual Indentation of Resilient Floor Covering<sup>5</sup>
- ISO 26985** Identification of Linoleum and Determination of Cement Content and Ash Residue<sup>5</sup>

## 3. Terminology

### 3.1 Definitions:

- 3.1.1 For definitions, refer to Terminology **F141**.

## 4. Classification

- 4.1 The floor coverings shall be of the following types:
  - 4.1.1 *Type I*—Linoleum floor tile with fibrous backing.
  - 4.1.2 *Type II*—Linoleum floor tile with special backing.
  - 4.1.3 *Type III*—Linoleum floor tile without backing.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

<sup>4</sup> Available from CEN European Committee for Standardization—Central Secretariat: rue de Stassart, 36 B-1050 Brussels.

<sup>5</sup> Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

4.1.4 *Type IV*—Static dissipative linoleum floor tile with or without backing.

NOTE 1—If any of the above structures incorporate a stabilizing inner-layer mat or fabric between the top wear-layer and the back of the structure, the flooring type will include the hyphenated suffix of “-IL.” (for example, Type II-IL, a linoleum floor tile with a special backing including an inner-layer mat or fabric).

## 5. Ordering Information

5.1 Linoleum floor tile shall be ordered by type, thickness, and other characteristics important to the purchaser for the intended use.

5.1.1 Title, number, and date of this specification,

5.1.2 Type and pattern number,

5.1.3 Quantity in square feet, square meters, pieces or cartons,

5.1.4 Size required (Section 7),

5.1.5 Thickness required (Section 7),

5.1.6 Sampling if other than as specified in ANSI/ASQC Z1.4, level 5-1 as noted in Table 1,

5.1.7 Packing requirement if other than as specified (Section 14),

5.1.8 Marking required if other than specified (Section 14), and

5.1.9 Specific Chemical Resistance (Section 8).

## 6. Materials and Manufacture

6.1 *Wear Surface*—The wear surface is the portion above the fibrous or suitable backing/bedding layer or base coat. The wear surface should have a minimum thickness of 0.04 in. (1 mm).

6.1.1 *Type I / Type II / Type III / Type IV*—For all types, the wear surface of the linoleum shall consist of a homogeneous mixture. For Type IV, the linoleum shall have incorporated into the wearing surface additives, which will give the linoleum electrostatic discharge controlling properties.

6.2 *Backings*:

6.2.1 *Fibrous*—The fibrous backing shall be firmly bonded and keyed to the linoleum mix so as to be partially imbedded in the mix.

6.2.2 *Special Backing*—In some cases a special backing is added such as cork, foam, or other suitable backing.

6.3 *Composition*:

6.3.1 *Linoleum Cement Content*—The minimum amount of linoleum cement shall be 30 % when tested in accordance with ISO 26985.

## 7. Physical Properties

7.1 *Wear Surface*—The thickness of the wear surface shall be determined in accordance with Test Method F410. The minimum thickness of the wear surface/topcoat, shall be 0.040 in. (1.0 mm).

7.2 *Size*—Unless otherwise specified (see 5.1.4), the tile size shall be nominal 13 in. by 13 in. (333 mm by 333 mm), 20 in. by 20 in. (500 mm by 500 mm), 24 in. by 24 in. (610 mm by 610 mm). A tolerance of  $\pm 0.016$  in. (0.4 mm) per tile (305 mm) shall be permitted when measured in accordance with Test Method F2055. Other sizes may be available.

7.3 *Thickness*—Unless otherwise specified (see 5.1.5), the tile shall be furnished in 0.080 in. (2.0 mm), 0.100 in. (2.5 mm), 0.125 in. (3.2 mm), 0.160 in. (4.0 mm). The overall thickness when measured shall be determined in accordance with Test Method F386.

7.4 *Squareness*—When tested in accordance with Test Method F2055, the out-of-squareness of the tile shall not exceed 0.010 in. (0.25 mm) for tiles  $\leq 16$  in. (400 mm) or 0.014 in. (0.35 mm) for tiles  $> 16$  in. (400 mm).

## 8. Performance Requirements

8.1 *Residual Indentation*—When tested in accordance with Test Method ISO 24343-1 under 112 lb (50.8 kg) load, 0.445 in. (11.30 mm) diameter flat foot and 150 min indentation, the average residual indentation at the end of 150 min recovery

**TABLE 1 Characteristics and Tests**

Property	Requirement	Test Method	Reference
Wear Surface	Wear surface shall be a minimum thickness of 0.040 in. (1.0 mm).	ASTM F410	7.1
Size, tolerance	$\pm 0.016$ in. (0.4 mm) per tile (305 mm)	ASTM F2055	7.2
Thickness	Average overall thickness shall be the nominal thickness with a tolerance of $\pm 0.006$ in. (0.15 mm)	ASTM F386	7.3
Squareness	Shall not exceed 0.010 in. (0.25 mm) for tiles $\leq 16$ in. (400 mm) or 0.014 in. (0.35 mm) for tiles $> 16$ in. (400 mm).	ASTM F2055	7.4
Residual Indentation	Shall not exceed 0.006 in. (0.15 mm) for tiles $\leq 0.100$ in. (2.5 mm) thick or 0.008 in. (0.20 mm) for tiles $> 0.100$ in. (2.5 mm) thick, tested with a load of 112 lb (50.8 kg), 0.445 in. (11.3 mm) diameter flat foot, 150 min loading dwell time and measured after a 150 min recovery.	ISO 24343-1	8.1
Static Load	Residual indentation shall not exceed 0.005 in. (0.12 mm), tested with a load of 150 lb (67.5 kg)	ASTM F970	8.2
Flexibility	The wear surface will not crack or break when bent face out. See Table 2.	ASTM F137	8.3
Dimensional Stability	No more than 0.1 %	EN 669	8.4
Resistance to Chemicals	No more than a slight change in surface dulling, surface attack or staining	ASTM F925	8.5
Resistance to Heat	$\Delta E$ not more than 8.0	ASTM F1514	8.6
Resistance to Light	$\Delta E$ not more than 8.0	ASTM F1515	8.7
Static Dissipation (Type IV)	Surface to ground resistance in the range of $1.0 \times 10^6$ to $1.0 \times 10^9$ Ohms tested at 100 or 500 V.	ASTM F150	8.8

shall not exceed 0.006 in. (0.15 mm) for tiles  $\leq 0.100$  in. (2.5 mm) thick or 0.008 in. (0.20 mm) for tiles  $> 0.100$  in. (2.5 mm) thick.

**8.2 Static Load Resistance**—When tested in accordance with Test Method **F970**, the residual indentation shall not exceed 0.005 in. (0.12 mm) tested with a load of 150 lb (67.5 kg).

**8.3 Flexibility**—When tested in accordance with Test Method **F137**, the flexibility shall be such that the wear surface will not crack or break when bent face out over the specified mandrel diameter (see **Table 2**).

**8.4 Dimensional Stability**—When tested in accordance with EN 669, (24 h at 80 % relative humidity and 73.4 °F or 23 °C) the tile shall not change in linear dimensions by more than 0.1 %.

**8.5 Resistance to Chemicals**—The chemical resistance of linoleum tile shall be determined in accordance with Test Method **F925** when exposed to the following chemicals. The linoleum floor tile shall have no more than a slight change in surface dulling, surface attack, or staining when exposed to the following chemicals:

- White vinegar (5 % acetic acid)
- Rubbing alcohol (70 % isopropyl alcohol)
- White mineral oil (Medicinal grade)
- Hydrochloric acid (5 % HCl)
- Sulfuric acid (5 % H<sub>2</sub>SO<sub>4</sub>)
- Household ammonia solution (5 % NH<sub>4</sub>OH)
- Household bleach (5.25 % NaOCl)
- Disinfectant—phenol type (5 % active phenol)
- Kerosene (K1)
- Olive oil (Light)
- Unleaded gasoline (Regular grade)

**NOTE 2**—These chemicals are representative of those likely to be found in domestic, commercial, and institutional use. Many proprietary compounds contain one or more of these chemicals. Should the flooring for an unusual application need to be resistant to a specific chemical, this additional requirement should become part of the procurement document.

**8.6 Resistance to Heat**—The resistance of the linoleum tile flooring to color change from exposure to elevated temperature, 158 °F (70 °C), over a specified time, 7 days, shall be determined in accordance with Test Method **F1514**. Remove drying room yellowing by exposing the sample to a Xenon-arc light source for a minimum of 4 h and a maximum of 24 h before measuring initial color. The color change shall not have an average delta E greater than 8.0.

**8.7 Resistance to Light**—The resistance of the linoleum tile flooring to color change from exposure to light, simulated by a properly fitted Xenon-arc radiant energy source, over time, 200 h, shall be determined in accordance with Test Method **F1515**. Remove drying room yellowing by exposing the sample to a Xenon-arc light source for a minimum of 4 h and a maximum

of 24 h before measuring initial color. The color change shall not have an average delta E greater than 8.0.

**8.8 Static Dissipation**—The static dissipative properties of Type IV linoleum tile shall be determined in accordance with Test Method **F150** when tested at 100 or 500 V, surface to ground.

## 9. Workmanship, Finish, and Appearance

**9.1** Materials furnished under this specification shall be an acceptable match to an approved sample(s) in pattern, color and surface appearance. The product shall be free of defects that would adversely affect performance or appearance.

**9.2** Drying room yellowing will disappear when the linoleum is exposed to either natural or artificial light to give a stable color in service, it may reappear or not disappear in areas not exposed to light.

## 10. Sampling

**10.1** Sampling for testing physical characteristics listed shall be done in accordance with provisions set forth in ANSI/ASQC Z1.4. The inspection level shall be special inspection level 5-1 as noted in **Table 1**, and the acceptance quality level (AQL) shall be 6.5 defects per hundred units as noted in the table II-ADR as specified in 10.1.

## 11. Conditioning

**11.1** Condition the specimens for physical tests in a conditioned room maintained at a temperature of 73.4 °F  $\pm$  1.8 °F (23 °C  $\pm$  1 °C) and 50 %  $\pm$  5 % relative humidity for 24 h.

## 12. Inspection

**12.1** Inspection of the linoleum floor tile for defects that would adversely affect performance (Sections **7** and **8**) shall be agreed upon by the purchaser and the manufacturer as part of the procurement documents or shall be as specified in **5.1**.

## 13. Certification

**13.1** When specified in the purchase order or contract, a manufacturer's certification shall be furnished to the purchaser that the material was manufactured, sampled, tested, inspected and packaged in accordance with this specification and has been found to meet the requirements.

## 14. Packaging, Packing and Marking

**14.1** The linoleum floor covering shall be packaged and marked in accordance with normal commercial practice and packed to ensure acceptance by common carrier and to provide product protection against damage during normal shipping, handling and storage.

**14.2** When product sample sets, sample set cover cards, marketing and technical literature reference specification, the complete product classification information relative to this specification shall be included.

## 15. Keywords

15.1 drying room yellowing; fibrous; floor tile; linoleum; linoleum cement; rosin; static dissipative

**TABLE 2 Flexibility**

Product Thickness	Mandrel Diameter
0.080 in. (2.0 mm)	1.25 in. (30 mm)
0.100 in. (2.5 mm)	1.5 in. (40 mm)
0.125 in. (3.2 mm)	2.0 in. (50 mm)
0.160 in. (4.0 mm)	2.5 in. (60 mm)