



Standard Specification for Linoleum Floor Tile¹

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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 and health practices and determine the applicability of regulatory requirements 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.

2. Referenced Documents

2.1 ASTM Standards:²

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

¹ 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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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.

Floor Coverings by Optical Measurement

F925 Test Method for Resistance to Chemicals of Resilient Flooring

F970 Test Method for Static Load Limit

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 Gage Method

2.2 Other Standards:

ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes³

EN 433 Determination of Residual Indentation after Static Loading⁴

EN 669 Determination of the Dimensional Changes of Tiles Caused by Atmospheric Humidity Changes⁴

EN 670 Identification and Composition of Linoleum—Determination of Cement and Ash Residue⁴

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.

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.

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

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

- 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 European Norm 670.⁴

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 by 13 in. (333 by 333 mm), 20 by 20 in. (500 by 500 mm), 24 by 24 in. (610 by 610 mm). A tolerance of ± 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 ≤ 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 EN 433 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 shall not exceed 0.006 in. (0.15 mm) for tiles ≤ 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

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	± 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 ± 0.006 in. (0.15 mm)	ASTM F386	7.3
Squareness	Shall not exceed 0.010 in. (0.25 mm) for tiles ≤ 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 ≤ 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.	EN 433	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	ΔE not more than 8.0	ASTM F1514	8.6
Resistance to Light	ΔE not more than 8.0	ASTM F1515	8.7
Static Dissipation (Type IV)	Surface to ground resistance in the range of 1.0×10^6 to 1.0×10^9 Ohms tested at 100 or 500 V.	ASTM F150	8.8

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 % H₂SO₄)
 Household ammonia solution (5 % NH₄OH)
 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.

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)

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 ± 1.8°F (23 ± 1°C) and 50 ± 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

APPENDIX**(Nonmandatory Information)****X1. ADDITIONAL INFORMATION**

X1.1 The following sources can be consulted for additional information:

X1.1.1 *ASTM Standards:*

F710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring²

F1482 Guide to Wood Underlayment and Preparation of the Surface to Receive Resilient Flooring²

F1516 Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when recommended)²

X1.1.2 *Other Sources:*

EN 548 Linoleum Floor Coverings for the availability of this method⁴

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