



Standard Specification for Vinyl Composition Floor Tile¹

This standard is issued under the fixed designation F 1066; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers vinyl composition tile (VCT) with either smooth or embossed surfaces for flooring application.

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 The following documents of the issue in effect on the date of material purchase form a part of this specification to the extent referenced herein:

2.2 ASTM Standards:

F 386 Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces²

F 536 Test Method for Size of Resilient Floor Tile by Dial Gage Method²

F 540 Test Method for Squareness of Resilient Floor Tile by Dial Gage Method²

F 925 Test Method for Resistance to Chemicals of Resilient Flooring²

F 1265 Test Method for Resistance to Impact for Resilient Floor Tile²

F 1304 Test Method for Deflection of Resilient Floor Tile²

F 1514 Test Method for Measuring Heat Stability of Resilient Vinyl Flooring by Color Change²

F 1914 Test Method for Short-Term Indentation and Residual Indentation of Resilient Floor Covering²

2.3 Other Standards:

Fed. Std. No. 501a, Method 6211³

ANSI/ASQC Z1.4–1993 Sampling Procedures and Tables for Inspection by Attributes⁴

3. Classification

3.1 The vinyl composition floor tile covered by this specification shall be non-asbestos formulated and classified as follows: Class 1 for solid tile, Class 2 for through pattern tile, and Class 3 for surface pattern tile. These may have either smooth or embossed wearing surfaces.

4. Ordering Information

4.1 The purchaser shall state whether this specification is to be used, select the preferred options permitted herein, and include the following information in the invitation to bid and purchase order:

4.1.1 Title, number, and date of this specification,

4.1.2 Class, color, pattern, and wearing surface, (see Section 3),

4.1.3 Quantity in square feet or cartons,

4.1.4 Size required, (see 6.1),

4.1.5 Thickness required (see 6.2),

4.1.6 Lot formation if other than as specified in ANSI/ASQC Z1.4–1993 (see Sections 11 and 13),

4.1.7 Sampling, if other than as specified in ANSI/ASQC Z1.4–1993 (see Sections 11 and 13),

4.1.8 Packing requirements if other than as specified (see 15.1),

4.1.9 Depth of depressed areas, if required,

4.1.10 Palletization, if required (agreed upon between the manufacturer and the purchaser),

4.1.11 Marking, if other than specified (agreed upon between the manufacturer and the purchaser), (see 14.1), and

4.1.12 Other requirements (agreed upon between the manufacturer and the purchaser).

¹ This specification is under the jurisdiction of ASTM Committee F-6 on Resilient Floor Coverings and is the direct responsibility of Subcommittee F06.80 on Specifications.

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² Annual Book of ASTM Standards, Vol 15.04.

³ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁴ Available from American National Standards Institute, 11 West 42nd St., New York, NY 10036.

5. Materials and Manufacture

5.1 *Materials*—The tile shall be composed of binder, fillers, and pigments. The binder shall consist of one or more resins of poly(vinyl chloride) or vinyl chloride copolymers, or both, compounded with suitable plasticizers and stabilizers. Other suitable polymeric resins may be incorporated as a part of the binder.

5.2 *Color, Pattern, and Wearing Surface*—The color, pattern, and wearing surface, as applicable shall be as specified in the contract or order (see 4.1).

NOTE 1—The colors and patterns that are available are indicated in individual manufacturer's current catalogs. As manufactured, colors vary somewhat in hue and shade.

5.3 *Solid Color Tile*—Solid color tile shall be uniform throughout.

5.4 *Through Pattern Tile*—In through pattern tile, either the pattern and colors on the surface of the tile extend entirely through the thickness of the tile without significant change, or the colors appearing on the surface shall extend throughout the entire thickness of the tile, although the appearance of the pattern created by these colors will change throughout the thickness.

5.5 *Surface Pattern Tile*—The pattern of this tile need not extend through the entire thickness of the tile.

5.5.1 The appearance of the tile, when the wearing layer is removed to a depth of 0.010 in. (0.254 mm), shall compare favorably for decoration with the tile's original appearance. The removal of the wearing layer may be accomplished by any suitable method.

6. Physical Properties

6.1 *Size*—Unless otherwise specified (see 4.1.4), the tile shall be 12 by 12 in. (305 by 305 mm). A tolerance of ± 0.016 in. (0.406 mm) per linear ft (305 mm) shall be permitted when measured in accordance with Test Method F 536. Certain specialty items are available in other sizes.

6.2 *Thickness*—Unless otherwise specified (see 4.1.5), the tile shall be furnished in $\frac{1}{16}$ -in. (1.588-mm), $\frac{3}{32}$ -in. (2.381-mm), and $\frac{1}{8}$ -in. (3.175-mm) thickness. A tolerance of ± 0.005 in. (0.127 mm) shall be permitted when measured in accordance with Test Method F 386.

6.3 *Squareness*—When tested in accordance with Test Method F 540, the out-of-squareness of the tile shall not exceed 0.010 in. (0.254 mm).

7. Mechanical Properties

7.1 Indentation:

7.1.1 When the tile is tested in accordance with Test Method F 1914 at a temperature of 77°F (25°C), the indentation at the end of 1 min shall be not less than 0.006 in. (0.152 mm), and not more than 0.015 in. (0.381 mm).

7.1.2 When tested in accordance with Test Method F 1914 the indentation at the end of 10 min shall be in conformance with the requirements of Table 1, and shall correspond to the indentation recorded at the end of 1 min.

7.1.3 When tested in accordance with Test Method F 1914 at a temperature of 115°F (46.1°C), the indentation shall be less than 0.032 in. (0.813 mm) at the end of 30 s.

TABLE 1 Ten Minute Indentation

1 min		After 10 min, max		1 min		After 10 min, max	
in.	mm	in.	mm	in.	mm	in.	mm
0.006	0.152	0.0100	0.254	0.011	0.279	0.0162	0.411
0.007	0.178	0.0112	0.284	0.012	0.305	0.0174	0.442
0.008	0.203	0.0124	0.315	0.013	0.330	0.0186	0.472
0.009	0.229	0.0137	0.348	0.014	0.356	0.0197	0.500
0.010	0.254	0.0149	0.378	0.015	0.381	0.0209	0.531

7.1.4 *Embossed Tile*—When the requirement for flat surface as set forth in Test Method F 1914 cannot be met, the test shall be made by the manufacturer on unembossed stock and the manufacturer shall supply a certificate of compliance.

7.2 *Impact*—When the tile is tested in accordance with Test Method F 1265, the tile shall not break or crack beyond the prescribed circle of zinc oxide paste.

7.2.1 For $\frac{1}{8}$ -in. (3.175-mm) tile the weight shall be dropped from a height of 20 in. (508 mm). For tile gage less than $\frac{1}{8}$ in., the weight shall be dropped from a height of 10 in. (254 mm). Test all products with a 0.143-lb (0.065-kg) weight dropped 4 times.

7.2.2 When testing embossed tile, inscribe a $3 \pm \frac{1}{8}$ -in. (76.2 ± 3.175 -mm) diameter circle centrally on the back of each specimen with a felt pen, pencil, or other suitable marker. Do not use the zinc oxide paste specified in Test Method F 1265. Cracks should not go beyond the $3 \pm \frac{1}{8}$ -in. (76.2 ± 3.175 -mm) diameter circle. The test shall be run on the specimen with the wearing surface up.

8. Performance Requirements

8.1 *Deflection*—The tile, when tested in accordance with Test Method F 1304, shall deflect not less than 1.0 in. (25.4 mm) both across and with the grain, without breaking.

8.2 *Dimensional Stability*—When tested in accordance with Method 6211 of Fed. Std. No. 501a, the tile shall not change in linear dimensions, more than 0.024 in. (0.610 mm) per linear ft.

8.3 Resistance to Chemicals:

8.3.1 The chemical resistance of the tile shall be determined in accordance with Test Method F 925. Vinyl composition floor tile shall have no more than a slight change in surface dulling, surface attack, or staining when exposed to the following chemicals:

- 8.3.1.1 White vinegar (5 % acetic acid),
- 8.3.1.2 Rubbing alcohol (70 % isopropyl alcohol),
- 8.3.1.3 White mineral oil (medicinal grade),
- 8.3.1.4 Sodium hydroxide solution (5 % NaOH),
- 8.3.1.5 Hydrochloric acid solution (5 % HCl),
- 8.3.1.6 Sulfuric acid solution (5 % H₂SO₄),
- 8.3.1.7 Household ammonia solution (5 % NH₄OH),
- 8.3.1.8 Household bleach (5.25 % NaOCl),
- 8.3.1.9 Olive oil (light),
- 8.3.1.10 Kerozene (K1),
- 8.3.1.11 Unleaded gasoline (regular grade), and
- 8.3.1.12 Phenol (5 % active phenol).

NOTE 2—The basic chemicals are representative of those likely to be found in residential, commercial, and institutional use. Many proprietary

compounds contain one or more of these basic 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.

8.4 *Resistance to Heat*—When tested in accordance with Test Method F 1514, the color change of the vinyl composition floor tile shall have an average ΔE not greater than 8.0 after 7 days exposure to 158°F (70°C).

9. Workmanship, Finish, and Appearance

9.1 The floor tile furnished in accordance with this specification shall be an acceptable match to approved samples in pattern, color, and surface appearance. The product shall be free of defects that adversely affect performance or appearance. Such defects include blemishes, spots, indentations, cracks, blisters, and breaks in corners or edges.

10. Sampling

10.1 Sampling for testing physical properties, mechanical properties, and performance requirements listed in Table A1.1 shall be done in accordance with the provisions set forth in ANSI/ASQC Z1.4–1993. The inspection level shall be special inspection level S-1, as noted in Table I, and the acceptable quality level (AQL) shall be 6.5 defects per hundred units as noted in Table II-A or as otherwise specified in 10.2 herein. The lot size shall be expressed in units. A unit represents a single, manufactured, inventoried, finished tile.

10.2 Sampling for testing physical properties, mechanical properties, and performance requirements listed in Table A1.1 shall be agreed upon by the purchaser and the manufacturer as part of the procurement document.

11. Conditioning

11.1 *Conditioning in Air*—Condition the specimens for physical tests in air maintained at $73.4 \pm 3.6^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$) and $50 \pm 5\%$ relative humidity for not less than 3 h before testing.

11.2 *Conditioning in Water*—Maintain the water temperature at $77 \pm 0.9^\circ\text{F}$ ($25 \pm 0.5^\circ\text{C}$) unless otherwise specified. Immerse the specimen for not less than 15 min or more than 30 min before testing in either air or water.

12. Inspection

12.1 Inspection of the vinyl composition floor tile for defects that would adversely affect performance shall be done in accordance with the provisions set forth in ANSI/ASQC

Z1.4–1993. The inspection level shall be level L-1, as noted in Table I, and the acceptable quality level (AQL) shall be 6.5 defects per hundred units as noted in Table II-A or as otherwise specified in 12.2 herein. The lot size shall be expressed in units. A unit represents a single, manufactured, inventoried, finished tile.

12.2 Inspection of the vinyl composition floor tile for defects that would adversely affect performance shall be agreed upon by the purchaser and the manufacturer as part of the procurement document.

13. Certification

13.1 When specified in the purchase order or contract, a manufacturer's certification and any other documents required to substantiate certification shall be furnished to the purchaser that the material was manufactured to meet this specification.

14. Product Marking

14.1 Unless otherwise specified in the purchase order or contract, shipping containers shall be marked with the name of the material as defined by the contract or order under which the shipment is made, the size, thickness, the pattern number, the quantity contained therein and the name of the manufacturer or shall be as specified in 4.1.

15. Packaging and Packing

15.1 The vinyl composition floor tile shall be packaged in accordance with normal commercial practice and packed to ensure acceptance by common carrier and to provide protection against damage during normal shipping, handling, and storage or shall be as specified in 4.1.8.

16. Special Government Requirements

16.1 The depressed areas of embossed tile shall involve no more than one third of the original, flat tile surface area prior to embossing as measured on a full tile. On embossed tile, there shall be no depressed area into which a $\frac{5}{8}$ -in. (15.875-mm) diameter circle can be placed, except that this shall not apply to tile that have an overall embossed surface, such as brick, slate, or other textures.

17. Keywords

17.1 resilient flooring; tile; vinyl composition floor tile; vinyl composition tile (VCT)

ANNEX
(Mandatory Information)
A1. CHARACTERISTICS AND TESTS
TABLE A1.1 Characteristics and Tests

Characteristic	Requirement	Test Method	Reference
Composition of wearing surface		Certificate of Compliance	5.1-5.5
Size, tolerance	±0.016 in. (0.406 mm) per linear foot	F 536	6.1
Thickness	±0.005 in. (0.127 mm), as specified	F 386	6.2
Resistance to heat	ΔE not greater than 8.0	F 1514	8.4
Indentation (flat surface)			
77°F (25°C)—1 min	0.006 to 0.015 in. (0.152 to 0.381 mm)	F 1914	7.1.1
77°F (25°C)—10 min	see Table 1	F 1914	7.1.2
115°F (46°C)—30 s	<0.032 in. (0.813 mm)	F 1914	7.1.3
Indentation (embossed surface)	same as flat surface	F 1914 ^A or Certificate of Compliance	7.1.4
Impact	No cracks beyond limit	F 1265	7.2
Deflection (MD and AMD)	1 in. (25.4 mm), min	F 1304	8.1
Dimensional stability	0.024 in. (0.610 mm) per linear foot, max	Fed. Std. 501a (Method 6211)	8.2
Resistance to chemicals	no more than a slight change in surface dulling, surface attack, or staining	F 925	8.3
Squareness	0.010 in. (0.254 mm), max	F 540	6.3

^A Test Method F 1914 cannot be used, the manufacturer will submit a certificate of compliance.

APPENDIX
(Nonmandatory Information)
X1. ADDITIONAL INFORMATION

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

X1.1.1 *ASTM Standards:*

D 3564 Practice for Application of Floor Polishes to Maintain Vinyl Asbestos Tile or Flooring²

F 141 Terminology Relating to Resilient Floor Covering²

F 142 Test Method for Indentation of Resilient Floor Coverings (McBurney Test)²

F 373 Test Method for Embossed Depth of Resilient Floor Coverings²

F 510 Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method²

F 511 Test Method for Quality of Cut (Joint Tightness) of Resilient Floor Tile²

F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring²

F 1482 Guide to Wood Underlayment Products Available for Use Under Resilient Flooring²

X1.1.2 *Other Sources:*

Recommended Work Practices for the Removal of Resilient Floor Coverings⁵

National Motor Freight Classification⁶

Uniform Freight Classification⁷

⁵ Available from Resilient Floor Covering Institute, 966 Hungerford Dr., Suite 12B, Rockville, MD 20850.

⁶ Available from American Trucking Assoc., Inc., Tariff Order Section, 1616 P St. N.W., Washington, DC 20036.

⁷ Available from Uniform Classification Committee, Tariff Publishing Officers, Room 1106, 222 S. Riverside Plaza, Chicago, IL 60666.

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