



Designation: F3261 – 20

Standard Specification for Resilient Flooring in Modular Format with Rigid Polymeric Core¹

This standard is issued under the fixed designation F3261; 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 specification covers resilient flooring, typically in tiles or planks format, or both, that are surface decorated or printed and protected by a clear wear layer.

1.2 This type of floor covering utilizes a polymeric rigid core as part of the product structure.

1.3 This type of floor covering may utilize an attached underlay backer for reduced noise and for reducing issues concerning minor subfloor irregularities.

1.4 This type of floor covering is intended for use in commercial and residential buildings. General information and performance characteristics that determine serviceability and recommended use are included in this specification.

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 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.*

1.7 *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:²

F141 Terminology Relating to Resilient Floor Coverings

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.

F387 Test Method for Measuring Thickness of Resilient Floor Covering With Foam Layer

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

F1914 Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering

F2055 Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method

F2199 Test Method for Determining Dimensional Stability and Curling Properties of Resilient Flooring after Exposure to Heat

F2421 Test Method for Measurement of Resilient Floor Plank by Dial Gauge

2.2 Other Standards:

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

ISO 23999 Resilient floor coverings—Determination of dimensional stability and curling after exposure to heat³

ISO 24337 Laminate floor coverings—Determination of geometrical characteristics³

NALFA LF01 Laminate Flooring Specification and Test Methods⁴

3. Terminology

3.1 Definitions:

3.1.1 *backing or backer*—layer(s) of the product described in this specification located below the polymeric rigid core layer that provides some functional property, for example, noise reduction, underfoot comfort, balance, thickness or other benefit

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

⁴ Available from the North American Laminate Flooring Association (NALFA) at www.nalfa.com.

3.1.2 *décor or print layer*—the layer of resilient flooring with polymeric rigid core providing visual aesthetic properties

3.1.3 *LVP (Luxury Vinyl Plank)/LVT (Luxury Vinyl Tile), bonded to polymeric rigid core*—a marketing term that is applied to resilient floor tile products – See Terminology **F141**. Resilient flooring product, typically in plank or tile format that incorporates a *décor*, usually printed and protected by a vinyl wear layer, polymeric rigid core or backing layer(s), or combination thereof, where the combination of visual, texture and gloss provide enhanced aesthetic and durability compared to a base grade solid or chip visual tile products – for example, VCT (vinyl composition tile).

3.1.4 *polymeric rigid core*—the material layer which provides thickness, stiffness, dimensional stability and other properties needed for the finished resilient flooring.

3.1.4.1 *Discussion*—The polymeric rigid core layer is an inner layer of the flooring located below the *décor* layer (for example, wear layer, *décor*, polymeric rigid core and backer).

3.1.5 *resilient flooring with polymeric rigid core*—a rigid floor covering, typically in a plank or tile format, having a multiple layer product structure, for example, wear layer, *décor*, polymeric rigid core, or backer(s), or combination thereof. The planks/tiles have worked edges that allow the product to be joined or butted together to form a larger integral unit. The product may vary in surface texture and gloss. Resilient flooring with polymeric rigid core does not include products having a textile or non resilient surfaces such as wood, stone, metal, etc.

3.1.6 *rigid*—when a flooring product has sufficient stiffness to bridge minor subfloor irregularities and sufficient stiffness that it takes significant effort to deflect the product when supported between two fixed supports.(for example, resilient flooring with polymeric rigid core, laminate flooring, wood flooring, etc).

3.1.7 *wear layer*—the upper portion of the resilient flooring, that protects the pattern and design, exclusive of temporary finishes and maintenance coatings.

4. Classification

4.1 The modular flooring, in tile or plank form, covered by this specification shall be classified as follows:

4.1.1 *Class I*—Printed with clear transparent/translucent wear layer.

4.1.1.1 *Type A*—Smooth surface.

4.1.1.2 *Type B*—Embossed surface.

4.1.2 *Grade*—Grades shall be classified by the total wear layer thickness (sum of PVC and non-PVC wear layers). The wear layer system shall consist of a single layer or multiple layers that do not delaminate under normal use.

4.1.2.1 *Grade 1*—Commercial, 0.020 in. (0.5 mm) min.

4.1.2.2 *Grade 2*—Wear layer < 0.020 in. (0.5 mm).

4.1.3 *Backing*—Backing classes shall indicate if there is an attached underlay backing or not.

4.1.3.1 *Backing Class A*—No attached underlay backing. Product shall be suitable for floor applications above, on, and below-grade.

4.1.3.2 *Backing Class B*—With attached underlay backing. Product shall be suitable for floor applications above, on, and below-grade.

5. Ordering Information

5.1 The purchaser shall state whether this specification is to be used, select the preferred options permitted herein, and include the following contract requirements on the purchase order:

5.1.1 Title, number, and date of this specification;

5.1.2 Class, type and pattern number (Section 4);

5.1.3 Quantity in square feet, pieces, or cartons;

5.1.4 Size required (7.2);

5.1.5 Thickness required (7.3);

5.1.6 Lot formation if other than as specified in ANSI/ASQC Z1.4 (see Sections 10 and 12);

5.1.7 Sampling if other than as specified in ANSI/ASQC Z1.4 (see Sections 10 and 12);

5.1.8 Packing requirement if other than as specified (Section 14);

5.1.9 Palletization if required (agreement between the manufacturer and the purchaser);

5.1.10 Marking required if other than specified (Section 13) (agreement between the manufacturer and the purchaser);

5.1.11 *Chemical Resistance* (See 8.4)—The basic chemicals used in the test are those likely to be found in domestic, commercial, and institutional use. Many proprietary compounds contain one or more of these basic chemicals. Should the flooring for unusual application need to be resistant to a specific chemical, this additional requirement should become part of the procurement document; and

5.1.12 Other requirements (agreement between the manufacturer and the purchaser).

6. Materials and Manufacture

6.1 The product is a laminated resilient flooring structure consisting of a wear surface, a visual *décor*, a rigid polymeric core designed to give added stiffness to the finished flooring, good water resistance, and if the product utilizes profiled edges, good joint strength. The product can be manufactured with or without an attached underlay backer for better noise reduction and to help with accommodating minor subfloor irregularities.

6.2 *Material*—The wear surface of the resilient tile(s) or plank(s) shall be composed of binder, filler, and pigments compounded with suitable lubricants and processing aids. The binder consists of one or more polymers or copolymers of vinyl chloride, other modifying resins, plasticizers, and stabilizers, which comprise at least the following minimum percent weight: The polymers or copolymers of vinyl chloride comprise at least 60 % of the weight of the binder. Any copolymer of vinyl chloride used shall contain at least 85 % vinyl chloride. The backer layer, core, and *décor* layer may be exempt from having to be polyvinyl chloride (PVC)-based polymer, but they shall use polymeric binder and meet the binder levels referenced in the **Table 1** requirements. Products may utilize an underlay attached to the resilient flooring product described in this specification. Attached underlays may

TABLE 1 Minimum Binder Content

	Class I
Clear wear layer	90 %
Base/inter layer(s)	30 % ^A

^A Single composite average of binder content for layers, other than clear wear layer and the attached underlay. Attached underlay is excluded from binder content requirement.

include products such as cork, IXPE foam, etc. provided the finished resilient flooring product, with the attached underlay meets all requirements of this product specification.

6.3 *Class, Type, and Pattern Number*—The class, type, and pattern number, as applicable, shall be as specified in the contract or order (see 4.1).

NOTE 1—The patterns that are available are indicated in individual manufacturer’s current catalogs or on the manufacturer’s website.

6.4 *Printed Tile or Plank*—The structure of printed luxury vinyl plank (LVP) and luxury vinyl tile (LVT) are formed of a vinyl wear layer, which may be transparent or translucent. The pattern and colors are created by a print or other surface decoration between the wear layer and the intermediate colored layer or polymeric core layer. Other base layers may be added. Products shall comply with Table 1 for binder content.

6.4.1 For commercial applications, the wear layer shall be a minimum of 0.020 in. (0.5 mm) thick.

6.4.2 *Non-PVC Layer*—The top layer(s) of a product can be a non-PVC layer(s), which may constitute part of the total wear layer system up to 49 % and is not removable by normal maintenance procedures. Non-PVC compositions (specialty performance layer(s) used as the top layer) are not described by binder limits.

7. Physical Requirements

7.1 *Binder Content*—The binder content shall be determined by a statement of formula (manufacturer certificate of compliance).

7.2 *Size*—The products are available in a range of sizes. Unless otherwise specified (see 5.1.4), for dimensions 12 in. (305 mm) or smaller, a size tolerance of ±0.016 in. (0.4 mm) will be allowed. For dimensions larger than 12 in. (305 mm), but smaller than or equal to 18 in. (457 mm), a size tolerance of ±0.018 in. (0.45 mm) will be allowed. For dimensions larger than 18 in. (457 mm), a size tolerance of ±0.020 in. (0.5 mm) will be allowed when measured in accordance with Test Method F2055 for tiles and certain size planks when applicable. Certain specialty items may be available in other sizes. Planks will follow same basic guidelines based on allowable size tolerance. Planks utilize ISO 24337 for size measurement. For plank length 24 up to 48 in. (610 up to 1220 mm), a size tolerance of ±0.060 in. (1.5 mm) will be allowed, and for plank length 48 in. (1220 mm) or greater, a size tolerance of ±0.080 in. (2 mm) will be allowed.

7.3 Thickness:

7.3.1 *Product*—Unless otherwise specified (see 5.1.5), the tile or plank, or both, shall be furnished in thicknesses not less than nominal 0.080 in. (2 mm). A tolerance of ±0.005 in. (0.13 mm) shall be permitted when tested in accordance with Test

Method F387. If the plank or tile product uses an attached backing layer, a tolerance of ±0.008 in. (0.20 mm) shall be permitted when tested in accordance with Test Method F387.

7.3.2 *Wear Layer*—For Class I products, the thickness shall be measured in five unembossed locations to determine the thickness average. See Test Method F410. See 4.1.2.

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 a planks test in accordance with ISO 24337, the same out-of-squareness limits shall apply as for tiles 0.010 in. (0.25 mm) maximum.

7.5 *Flatness*—Determination of width flatness (*f_w*). When tested in accordance with Test Method ISO 24337.

7.5.1 *Adjustment and Calibration of the Measuring Apparatus:*

7.5.1.1 On the apparatus for measuring width flatness, adjust the support bars or feet according to the width of the test specimen to be evaluated. The measurement, *d*, shall be adjusted to be not less than the width, *w*, of the test specimen minus 10 mm, that is, $d \geq w - 10$ mm. See Fig. 1. Use an appropriate caliper gauge and measure the *d* value. Record the *d* value to the nearest 0.020 in. (0.5 mm).

7.5.1.2 The apparatus shall be set to, or verified to zero against the flat, smooth reference plate (that is, granite block, steel plate) before each measurement.

7.5.2 *Measuring*—For each of the five specimens, place the specimen with the surface layer up on the test surface. Place the adjusted and zeroed apparatus for measuring width flatness on the specimen as shown in Fig. 1. Find and determine the maximum deviation, *f_w*, for each specimen. No force, but the mass of the measurement apparatus gauge, shall affect the flatness of the test specimen when the measurement is taken. The maximum deviation can be either positive (+ or convex) or negative (– or concave) and shall be recorded as measurements are taken. Measure values along with their sign (“+” for upward curl or “–” for downward curl) to the nearest 0.0005 in. (0.01 mm). For *f_w* products 9 in. (229 mm) in width or less, the requirement shall be a maximum of ±0.2 mm. For products wider than 9 in. (229 mm), the requirement for width flatness, *f_{wconcave}*, the maximum shall be <0.15 % mm and for *f_{wconvex}*, the maximum shall be <0.2 % mm of the width of the test specimen.

7.5.3 *Determination of Length Flatness (f_l)*—For each of the five specimens, place the test specimen firmly against the steel rule as shown in Fig. 2. If a gap is visible, insert a thickness gauge of successive thickness leaves into the gap at the

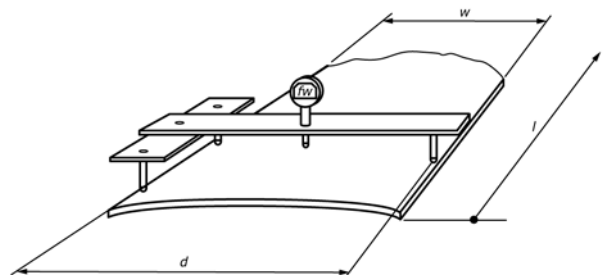


FIG. 1 Determination of Width Flatness (*f_w*)

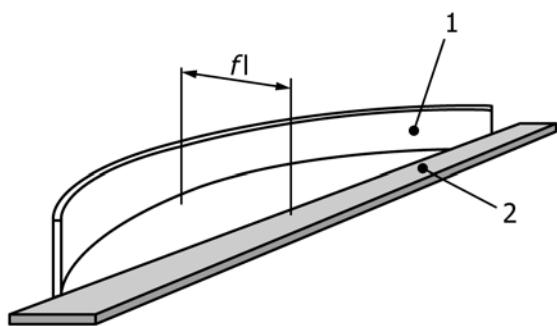


FIG. 2 Determination of Length Flatness (fl)

- 1 - Test specimen
- 2 - Steel rule

maximum deviation until the largest thickness leaf that will fit without forcing it into the gap is found. This value is the maximum deviation, fl . If necessary, use the caliper gauge instead. The measured value shall be expressed as negative when the surface layer is facing toward the rule and positive when the surface layer is facing away from the rule. Record all five measured values, with its sign, with the result achieved from the appropriate thickness gauge. For length flatness, fl , the requirement, $f_{concave}$, the maximum shall be $<0.15\%$ mm and f_{convex} the maximum shall be $<0.2\%$ mm of the length of the test specimen.

7.6 Openings—Determination of openings between elements (o). When tested in accordance with ISO 24337.

7.6.1 Assembling—By hand force, without using any glue, against the steel rule as a guide, firmly assemble eleven elements taken as specimens on the test surface as shown in Fig. 3. The alignment of the individual elements shall be ensured within ± 0.200 in. (5 mm). No difference shall be made whether the joint design is a glueless mechanical type, a design to be glued, or held together by any other means. Glue shall, in any case, not be used for this assembly. This test is performed with the elements dry assembled.

7.6.2 Measuring—Using thickness gauges or an optical comparator, measure the openings, without applying any force to the elements, at the eight indicated points in Fig. 3. Record all eight measured values with the result achieved from the appropriate thickness gauge or the comparator value.

7.7 Ledging—Determination of height difference between elements (h) is sometimes referred to as overwood, when tested in accordance with ISO 24337.

7.7.1 Assembly—Use the same specimens as described in 7.6.1 for measuring height difference. Verify that specimens were assembled and checked to have been assembled as detailed in 7.6.1. The test assembly with the measuring points locations is illustrated in Fig. 3.

7.7.2 Measuring—Using a caliper or depth gauge, measure the height differences, without applying any force to the elements, at the eight indicated points. Place the base of the instrument at one side of the joint and measure the maximum height difference at the other side of the joint. Do not carry out the measurement further than 0.25 in. (6.35 mm) from the joint edge. Record all eight measured values to the nearest 0.002 in. (0.05 mm).

8. Performance Requirements

8.1 Residual Indentation—When tested in accordance with Test Method F1914, under 75 lb (34 kg) load, 0.25 in. (6.35 mm) diameter flat foot, and 15 min indentation, the average residual indentation at the end of a 60 min recovery shall not exceed 0.007 in. (0.18 mm) maximum residual indentation. Choose area for testing as uniformly flat (unembossed) as possible. Measure overall thickness (Test Method F387) in spot to be indent tested with the 0.25 in. (6.35 mm) diameter round flat foot. After indent test has been completed, including recovery time, measure final overall thickness in the same location using a slightly smaller round flat foot, for example, 0.178 in. (4.52 mm), and calculate final residual indentation.

8.2 Surface Integrity Test—When tested in accordance with Test Method F1914, under 140 lb (63.5 kg) load, 0.178 in. (4.5 mm) diameter flat foot, and 10 min test duration, the surface shall not puncture through the wear layer and décor layer, down into the polymeric rigid core layer. After running the 10 min applied load portion of the Test Method F1914 indent test described above, examine the area to determine if the wear layer/décor layer has been punctured through down into the polymeric rigid core layer. Use of a microscope, magnifier or by simply highlighting the area with a marking pen (applying and wiping off the excess) to ink the test location, can be helpful in determining if the surface integrity has been punctured through. Failures are punctures or open tears through the wear layer and décor layer down into the polymeric rigid core. Dents without breaking the surface do not constitute failure. See Fig. 4 showing an example of a surface integrity failure.

8.3 Dimensional Stability:

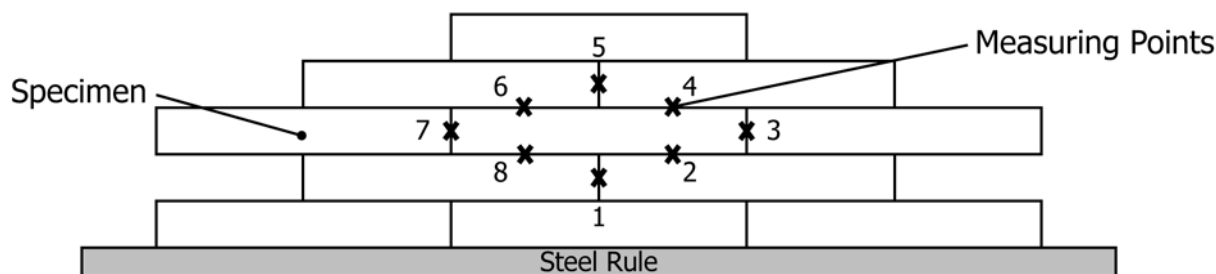


FIG. 3 Example Test Assembly for Openings and Height Difference between Elements at Eight Measuring Points Indicated

"X" Measurement location for openings, "o" and for ledging or height difference, "h"