



Designation: F1860 – 21a

# Standard Specification for Rubber Sheet Floor Covering With Backing<sup>1</sup>

This standard is issued under the fixed designation F1860; 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 the requirements for the compound and physical characteristics of rubber sheet floor covering having a rubber wear layer with backing. Products may also contain intermediate layers.

1.2 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.

1.3 The following precautionary statement pertains only to the test method portion, Section 10, of this specification: *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.*

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

2.2 *ASTM Standards*:<sup>2</sup>

- D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- D883 Terminology Relating to Plastics
- D1566 Terminology Relating to Rubber
- D2240 Test Method for Rubber Property—Durometer Hardness

<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.

- D3389 Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)
- F141 Terminology Relating to Resilient Floor Coverings
- 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
- F710 Practice for Preparing Concrete Floors to Receive Resilient Flooring
- F925 Test Method for Resistance to Chemicals of Resilient Flooring
- F970 Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading
- F1482 Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
- F1514 Test Method for Measuring Heat Stability of Resilient Flooring by Color Change

2.3 *ANSI Standards*:

- ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of other terms used in this standard, see Terminology F141.

## 4. Classification

4.1 *Types*—Rubber sheet floor covering covered by this specification shall conform to the following types:

- 4.1.1 *Type I*—Homogeneous
- 4.1.2 *Type II*—Heterogeneous

4.2 *Grades*—Rubber sheet floor covering shall be one of the following grades:

- 4.2.1 *Grade 1*—Fibrous backing
- 4.2.2 *Grade 2*—Foamed rubber backing

4.3 The above may have either smooth, embossed, or molded pattern surfaces.

4.4 These products shall not contain asbestos.

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

## 5. Ordering Information

5.1 Purchasers 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 or purchase order:

- 5.1.1 Title, number, and date of this specification,
- 5.1.2 Type, color, and surface (see Section 4 and 6),
- 5.1.3 Quantity, in square feet, square yards, or square meters,
- 5.1.4 Thickness required (see 8.3),
- 5.1.5 Overall thickness, if molded pattern flooring is specified (see 8.1),
- 5.1.6 Width required (see 8.4),
- 5.1.7 Length required (see 8.5),
- 5.1.8 Resistance to chemicals, (see 7.4),
- 5.1.9 Lot information, if other than as specified in AANSI/ASQC Z1.4. (see 10.1 and 11.1),
- 5.1.10 Sampling, if other than as specified in ANSI/ASQC Z1.4 (see 10.1 and 11.1),
- 5.1.11 Statement requesting certification, if certification of compliance is required (see 12.1),
- 5.1.12 Packaging and packing requirements, if other than as specified (see 14.1),
- 5.1.13 Palletization, if required,
- 5.1.14 Marking required, if other than specified (see 13.1), and
- 5.1.15 Other requirements.

## 6. Materials and Manufacture

6.1 *Homogeneous Rubber Sheet Floor Covering*—The product shall consist of a wear layer and backing. The surface coloring or mottling shall be uniform throughout the entire thickness of the wear layer. The backing shall be fibrous or foamed rubber and thoroughly bonded to the wear layer so as not to delaminate under normal use.

6.2 *Heterogeneous Rubber Sheet Floor Covering*—The product shall consist of a wear layer, intermediate layer(s), and a backing. The surface coloring or mottling shall be uniform throughout the entire thickness of the wear layer, but need not extend through the intermediate layer(s). The backing shall be fibrous or foamed rubber. The wear layer, intermediate layer(s) and backing shall be thoroughly bonded so as not to delaminate under normal use.

### 6.3 *Wear Layer:*

6.3.1 The polymeric binder of the wear layer shall satisfy the definition of rubber in Terminology D1566, and have been vulcanized, as defined in Terminology D1566 (under vulcanization), such that it becomes thermoset as defined in Terminology D883. The wear layer made from this compound shall be resistant to neutral pH cleaners.

6.3.2 The wear layer must have a minimum thickness of 0.040 in. (1.0 mm) when measured in accordance with Test Method F410.

6.3.3 The appearance of the rubber sheet floor covering after removing 0.020 in. (0.51 mm) of the wear layer thickness, shall compare favorably in appearance with the sheet flooring's

original appearance. The removal of the wear layer may be accomplished by any suitable method.

6.3.4 The wear layer may have a smooth, embossed, or molded pattern surface.

6.4 *Intermediate Layers*—The layer(s) may consist of, but not be limited to, rubber, foamed rubber, or other materials, which are intended to improve the performance characteristics of the product.

6.5 *Backings*—The composition of the backings shall be fibrous or foamed rubber and may contain other ingredients provided the resultant backing is suitable for installation on floors above-, on-, or below-grade when installed according to manufacturer's installation recommendations.

6.6 *Color, Pattern, and Wearing Surface*—The color, pattern, and wear layer surface, as applicable, shall be as specified in the contract or order (see 5.1).

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

NOTE 2—Where color match is a concern, samples from the manufacturer shall be obtained to verify color acceptability.

## 7. Performance Requirements

7.1 *Hardness*—The rubber sheet floor covering shall have a durometer hardness of not less than 85 (Shore, Type A) when tested in accordance with Test Method D2240. The backing material shall be removed prior to testing and may be accomplished by any suitable method.

7.2 *Modulus at 10 % Elongation*—When tested in accordance with Test Method D412 at a rate of 6 in. (152.4 mm)/min, using a 1 in. (25.4 mm) by 5 in. (127 mm) gage length rectangular specimen, the modulus shall not be less than 300 psi (2.07 MPa). For molded pattern rubber sheet floor covering, the raised pattern shall be removed by any suitable method. Prior to testing, the backing material shall be removed and may be accomplished by any suitable method.

7.3 *Static Loading*—When tested in accordance with Test Method F970, with an applied load of 250 lb (113.4 kg), the residual indentation shall not be greater than 0.005 in. (0.127 mm).

7.4 *Resistance to Chemicals*—When tested in accordance with Test Method F925, the rubber sheet floor covering shall have no more than a slight change in surface dulling, color change or surface attack when exposed to the following chemicals:

- 7.4.1 White vinegar (5 % acetic acid),
- 7.4.2 Rubbing alcohol (70 % isopropyl alcohol),
- 7.4.3 Sodium hydroxide solution (5 % NaOH),
- 7.4.4 Hydrochloric acid solution (5 % HCl),
- 7.4.5 Sulfuric acid solution (5 % H<sub>2</sub>SO<sub>4</sub>),
- 7.4.6 Household ammonia solution (5 % NH<sub>4</sub>OH), and
- 7.4.7 Household bleach solution (5.25 % NaOCl).

NOTE 3—These basic chemicals are representative of 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 an unusual application need to be resistant to a specific

chemical, this additional requirement should become part of the procurement document, (see 5.1.8).

NOTE 4—Since standard SBR rubber flooring is not recommended for installation where the product will be exposed to animal fats, vegetable oils, and petroleum-based reagents, mineral oil, olive oil, kerosene, and gasoline have been removed from the standard chemical list to eliminate any confusion regarding product selection.

**7.5 Resistance to Heat**—When tested in accordance to Test Method **F1514**, the color change of the rubber sheet floor covering shall have an average  $\Delta E$  not greater than 8.0 after seven days exposure to 158 °F (70 °C). The specimen surface shall be wiped with a clean, white cotton cloth prior to taking the initial and post test conditioned period color readings to remove any wax bloom or other contaminants which may affect the accuracy of the color readings.

**7.6 Abrasion Resistance**—When tested in accordance with Test Method **D3389** and with the abrader equipped with H-18 wheels and a load of 500 gf (gram-force) per wheel, the maximum material loss shall not exceed 1 g after 1000 cycles.

## 8. Dimensions, Mass, and Permissible Variations

**8.1 Overall Thickness**—Molded pattern rubber sheet floor covering shall be measured for overall thickness at the thickest cross sectional area of the flooring. The thickness of the molded pattern shall be uniform throughout the flooring.

**8.2 Base Thickness**—Molded pattern rubber sheet floor covering base thickness shall be measured at the thinnest cross sectional area of the flooring. The thinnest cross sectional area shall be uniform throughout the flooring.

**8.3 Thickness**—The thickness of the rubber sheet floor covering shall be as specified in the contract or order (see 5.1.4). An average tolerance, based on five individual measurements, of  $\pm 0.008$  in. ( $\pm 0.2$  mm) from the specified thickness shall be permitted in the base thickness alone or in combination with the overall thickness, when measured in accordance with Test Method **F387**. The difference between the five individual measurements can not be greater than 0.010 in. (0.25 mm) from the nominal thickness. In the case of molded pattern rubber sheet floor covering, overall thickness and base thickness shall be reported.

**8.4 Width**—The width shall be as specified in the contract or order (see 5.1.6). The net width (gross width less selvages) shall not be less than as marked on the label or package when measured in accordance with 8.6.

**8.5 Length**—The length of the roll shall be as specified in the contract or order (see 5.1.7). The sheet length shall not be less than as marked on the label or package when measured in accordance with 8.6. Each roll shall be in one piece, except that less than 20 % of the rolls in any one shipment may consist of not more than two pieces, the shortest length shall not be less than 5 linear yards (4.57 m), or as agreed upon by the purchaser and seller. Such rolls shall be clearly marked.

**8.6 Length and Width Measurements**—Measurements shall be made with a calibrated 100 ft (30 m) steel tape graduated at intervals of  $\frac{1}{16}$  in. or 1 mm. The roll shall be extended to its full length on a flat surface and all creases and buckles removed, insofar as practical, without applying stresses that cause any significant stretching. Measurements of length shall be rounded to the nearest inch or 10 mm. Net width shall be measured to the nearest  $\frac{1}{16}$  in. or 1 mm at not less than ten locations uniformly distributed along the length of each roll, and the results averaged.

## 9. Workmanship, Finish, and Appearance

**9.1** The rubber sheet floor covering furnished in accordance with this specification shall be an acceptable match to approved samples in color, pattern, and appearance. The product shall be free of defects, that adversely affect performance or appearance. Such defects include: blemishes, spots, lines, cracks, indentations, blisters, and delamination.

## 10. Sampling for Test

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

**10.1.1** Samples shall be obtained in the required length from the outside end of the roll and shall encompass the total width of the material.

**10.2** Sampling for testing physical characteristics listed in **Table 1** shall be agreed upon by the purchaser and the manufacturer as part of the procurement document.

**TABLE 1 Characteristics and Tests**

| Characteristic             | Requirement   | ASTM Test Method | Reference |
|----------------------------|---|------------------|-----------|
| Composition of Material    | Certificate of Compliance   |                  | 6.1       |
| Wear Layer Thickness       | min 0.040 in. (1.0 mm)  | F410             | 6.3.2     |
| Hardness                   | min 85 Shore A  | D2240            | 7.1       |
| Modulus at 10 % Elongation | min 300 psi (2.07 MPa)  | D412             | 7.2       |
| Static Loading             | $\leq 0.005$ in. (0.127 mm) at 250 lb (113.4 kg) load                             | F970             | 7.3       |
| Resistance to Chemicals    | No more than a slight change in surface dulling, color change, or surface attack. | F925             | 7.4       |
| Resistance to Heat         | avg $\Delta E$ not greater than 8.0   | F1514            | 7.5       |
| Abrasion Resistance        | Less than 1 g loss after 1000 cycles  | D3389            | 7.6       |
| Average Thickness          | $\pm 0.008$ in. ( $\pm 0.2$ mm)   | F387             | 8.3       |
| Width                      | Not less than as specified  | Section 8        | 8.4       |
| Length                     | Not less than as specified  | Section 8        | 8.5       |