Designation: D 3462 – 03a

Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules[1]

This standard is issued under the fixed designation D 3462; 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 asphalt roofing in shingle form, composed of glass felt or felts impregnated and coated on both sides with asphalt, and surfaced on the weather side with mineral granules. This specification is designed for the evaluation of products as manufactured. The test methods, physical requirements, and minimum masses are to be measured immediately after packaging or at a reasonable time, as agreed upon between buyer and seller, after manufacture and before installation. Physical and performance requirements after application and during in-service use of the products described herein are beyond the scope of this material specification.

1.2 Shingles meeting this specification are intended to be applied with a headlap of not less than 51 mm (2 in.).

1.3 The shingles shall be supplied with a factory-applied self-sealing adhesive or be designed to be locked together during installation of the shingles.

1.4 The values stated in SI units are to be regarded as the standard.

1.5 The following safety hazards caveat pertains only to the test method described in 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D 5 Test Method for Penetration of Bituminous Materials

D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)

D 228 Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing

D 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials

D 1370 Test Method for Contact Compatibility Between Asphaltic Materials (Oliensis Test)

D 1922 Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method

D 3161 Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)

D 4977 Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion

E 108 Test Methods for Fire Tests of Roof Coverings

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms, see Terminology D 1079D 1079.

3.1.2 For testing purposes, under Test Methods D 228D 228, glass felt shall be considered as felt.

4. Materials and Manufacture

4.1 The glass felt shall be a thin porous sheet composed predominately of fine glass fibers uniformly deposited in a nonwoven pattern. It is permitted to reinforce the glass felt with random or parallel-oriented glass yarns, or both, which are permitted to be gathered or twisted, bonded or unbonded. The felt shall contain a substantially water-insoluble binding agent.

4.2 In the process of manufacture, one or more thicknesses of glass felt shall be impregnated with an asphaltic material. When more than one thickness of felt is used, the mats shall be adhered to each other with a continuous layer of asphaltic material between adjacent felts. The nature of the asphaltic material and the thickness of the adhering layers shall ensure a firm bond between adjacent glass felts. The single felt or laminated felts shall then be coated on both sides with a hot asphaltic coating.

[1] This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.02 on Prepared Roofings, Shingles, and Siding Materials.

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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.

4.3 The asphaltic material used to impregnate, laminate, and coat the glass felt, in any or all of these functions, is permitted to be compounded with a mineral stabilizer. Glass fibers are permitted to be compounded with the asphalt in addition to, or instead of, the mineral stabilizer.

4.4 The weather side shall be completely surfaced with mineral granules embedded in the asphaltic coating.

4.5 The reverse side shall be covered with a suitable material such as pulverized sand, talc, or mica to prevent the shingles from sticking together in the package.

4.6 The shingles shall have a factory-applied adhesive that will seal the shingles together after application when activated by heat and sunlight or be designed to be locked together during installation of the shingles.

5. *Physical Requirements* Physical Requirements

5.1 Shingles shall not stick together in the package so as to cause damage upon being unpacked at ambient temperatures.

5.2 The shingles shall conform to the requirements prescribed in Table 1.

5.3 *Fire Test Classification*—Shingles shall pass all of the Class A fire exposure test requirements of Test Method E 108E 108.

5.4 *Wind Resistance*, Shingles shall pass the wind resistance test requirements of Test Method D 3161D 3161.

6. Dimensions, Masses, and Permissible Variations

6.1 The form and size of the shingles shall be as agreed upon by the purchaser and seller.

6.2 The shingles shall not vary in length or width by more than 3.2 mm (±⅛ in.) from nominal dimensions established for each size, except that the length (long dimension) of shingles without cutouts shall not vary by more than 6.4 mm (±¼ in.).

6.3 The shingles shall conform to the masses prescribed in Table 2.

7. Workmanship, Finish, and Appearance

7.1 The glass felt shall be uniformly encapsulated with asphalt and shall show no uncoated fibers.

7.2 The weather surface shall be uniform in finish and may be embossed to simulate a grain texture. The mineral granules shall cover the entire surface and shall be firmly embedded in the asphalt coating. The granules may project into the mat to a limited degree. There shall be no damage to the mat by penetrating granules as determined after extraction.

7.3 The finished shingles shall be free of visible defects such as holes, edges not cleanly cut, rents, cracks, or indentations.

8. Sampling and Test Methods

8.1 Sample the material in accordance with Test Methods D 228D 228 and determine conformance to the requirements of this specification in accordance with the following test methods:

8.1.1 *Weight Loss and Behavior on Heating*—Test Methods D 228D 228.

8.1.2 *Tear Strength*—Use Test Method D 1922D 1922 as modified here.

8.1.2.1 Specimens shall be rectangular, 76 by 63 mm (3 by 2.5 in.) ±3 %.

8.1.2.2 Condition specimens at 23 ± 2°C (73± 4°F) for at least 2 h before testing and conduct tests at 23 ± 2°C (73 ± 4°F).

8.1.2.3 Each specimen will be composed of a single layer. Cut specimens from shingles in areas free of sealing resin and release tape. The 76-mm edges of the specimens shall be parallel to the long dimension (machine direction) of the shingles so that the tears will run in the short dimension (cross-machine direction) of the shingle. Enough specimens shall be prepared so that ten results can be recorded after excluding any that must be rejected as prescribed in 8.1.2.4.

8.1.2.4 Use an Elmendorf Tear Strength Tester with 3200- or 6400-g (31- to 63-N) full-scale capacity. Make all tests with

TABLE 1 Physical Requirements of Asphalt Shingles Made from Glass Felt

	max	min
Behavior on heating:		
Loss of volatile matter, %	1.5	. . .
Sliding of granular surfacing, mm (in.)	2 (1/16)	. . .
Tear strength, g	. . .	16.7 N (1700)
Fastener pull-through resistance at 23 ± 2°C (73 ± 4°F), newtons (lbf)		
Single-layer product	. . .	90 (20)
Multi-layer product	. . .	135 (30)
Fastener pull-through resistance at 0 ± 2°C (32 ± 4°F), newtons (lbf)		
Single-layer product	. . .	104 (23)
Multi-layer product	. . .	180 (40)
Wind resistance	. . .	pass
Fire resistance	. . .	Class A
Penetration of asphalt, 0.1 mm[A] (tested without mineral stabilizer)	. . .	15
Pliability at 23 ± 2°C (73± 4°F)		
Weather side up machine direction	. . .	4 of 5 shall pass
Weather side up cross direction	. . .	4 of 5 shall pass
Weather side down machine direction	. . .	4 of 5 shall pass
Weather side down cross direction	. . .	4 of 5 shall pass
Asphalt softening point, °C (°F)[A] (tested without mineral stabilizer)	113 (235)	88 (190)
Compatibility of factory-applied, self-sealing adhesive and asphaltic coating at 66°C (150°F), mm[A]	0.5	. . .
Weight of displaced granules	1.0 g	. . .

[A] The requirements are to be tested for by the manufacturer of the shingles. They cannot be determined on the finished product.

TABLE 2 Masses of Asphalt Shingles Made from Glass Felt

	max	min
Minimum net mass per area of shingles (individual bundle), g/m^2 (lb/100 ft^2)	...	3418 (70.0)
Average net mass per area of shingles (total sample), g/m^2 (lb/100 ft^2)	...	3564 (73.0)
Mass per area of mat, g/m^2(lb/100 ft^2)	...	65.9 (1.35)
Mass per area of asphalt, g/m^2 (lb/100 ft^2)	...	732 (15.0)
Mass per area of mineral matter passing a No. 6 (3.35-mm) sieve and retained on a No. 70 (212-μm) sieve, g/m^2 (lb/100 ft^2)	...	1221 (25.0)
Mass percent of mineral matter passing a No. 70 (212-μm) sieve based on the total asphalt and mineral matter passing the No. 70 (212-μm) sieve	70.0	...

granule surface of specimens facing away from knife blade. Do not reject the results from specimens that tear through a side edge as opposed to the top edge. Reject results of specimens that tear in such a way that the portion of the specimen that is in the stationary jaw rubs against the pendulum.

8.1.2.5 Report the average tear resistance of ten specimens to the nearest 10 g (0.1 N).

8.1.2.6 The following criteria shall be used to judge the acceptability of the results at the 95 % confidence level:

(1) Repeatability—Duplicate results by the same operator should be considered suspect if they differ by more than 17 %.

(2) Reproducibility—The results submitted by each of two laboratories should be considered suspect if they differ by more than 28 %.

8.1.3 *Fire Test Classification*—Test Method E 108E 108, Class A tests.

8.1.4 *Wind Resistance*—Test Method D 3161D 3161.

8.1.5 *Penetration of Asphalt*—Test Method D 5D 5.

8.1.6 *Asphalt Softening Point*—Test Method D 36D 36.

8.1.7 *Compatibility*—Test Method D 1370D 1370.

8.1.8 *Minimum Net Mass and Average Net Mass*—Test Methods D 228D 228.

8.1.9 *Mass of Glass Mat, Asphalt, and Mineral Matter*—Test Methods D 228D 228.

8.1.10 *Weight of Displaced Granules*—Test Method D 4977D 4977.

8.1.11 *Fastener Pull-Through Resistance*:

8.1.11.1 *Scope*—This test method measures the force required to pull a fastener head through a specimen of shingle material under defined conditions in a specified test apparatus. The test provides a simple measurement of complex mechanical effects which relate to the shingle's resistance to wind.

8.1.11.2 *Fasteners*—Various fasteners appropriate for application of shingles shall be permitted in this test. A standard galvanized roofing nail with 9.5-mm (⅜-in.) diameter head is used in the following procedure. The specific fastener used must be reported with the results, and if necessary, the orientation of any prominent geometric features with respect to the shingle orientation shall also be reported.

NOTE 1—When other fasteners, for example, staples, are used with this test procedure and apparatus, the effects of varying orientation of the staple crown with the shingle orientation (lengthwise or at some angle to the length direction of the shingle), or the effects of the staple crown not being parallel to the shingle surface, will generally cause greater variability in the results than when using a roofing nail.

8.1.11.3 *Specimens*—For single-layer shingles, prepare ten specimens 98 ± 3 mm (3⅞ ± ⅛ in.) square for each sample or shingle material to be tested at each test condition. Each specimen shall be composed of a single thickness of shingle. Specimens shall be permitted to include areas containing sealant (factory-applied adhesive) or release tape, or both, if this is expected to be in the nailing area when the shingles are applied in accordance with the manufacturers'/sellers' instructions. If this is the case, then note it in the report since it could affect the result. For normal testing, the central area of the specimen where the nail penetrates shall be typical of the single thickness exposed area of the shingle under test. For shingles with tab cutouts, any specimen in which the cutout is visible through the opening in the plate (see 8.1.11.5*(2)) will have the effect of increasing the variability of the results.*

NOTE 2—Specimens shall be permitted to include areas containing sealant (factory-applied adhesive) or release tape, or both, if this is expected to be in the nailing area when the shingles are applied in accordance with the manufacturers'/sellers' instructions. If this is the case, then note it in the report since it could affect the result. For normal testing, the central area of the specimen where the nail penetrates shall be typical of the single thickness exposed area of the shingle under test. For laminated shingles, it is possible to obtain useful information by performing the test through the double thickness area of the shingle. When this is done, note it in the report as an exception to the standard procedure.

8.1.11.4 For multi-layer shingles, prepare ten specimens 98 ± 3 mm (3⅞ ± ⅛ in.) square using the following procedure. These specimens shall be cut from the manufacturers' specified fastening position on the shingle. First determine the manufacturers' specific defined fastener placement position on the shingle. This may be found in the written instructions or by a drawing showing the specific fastening points on the shingle wrapper. Once this position is determined, cut a 98 ± 3-mm (3⅞ ± ⅛-in.) wide strip from the shingle with this fastening position centered in the strip. Typically, this strip will be cut from the long dimension, or length, of the shingle. Use this strip to cut consecutive specimens 98 ± 3 mm (3⅞ ± ⅛ in.) in length. No less than three specimens in a row or more than four specimens in a row from one shingle can be used to make up the ten specimens required for testing.

(1) Specimens shall be permitted to include areas containing sealant (factory-applied adhesive) or release tape, or both, if this is expected to be in the nailing area when the shingles are applied in accordance with the manufacturers'/sellers' instructions. If this is the case, then note it in the report since it could affect the results.

8.1.11.5 *Procedure*—Push a 38-mm (1½-in.) long galvanized roofing nail with 9.5-mm (⅜-in.) diameter head through the center of the specimen (entering from the granule side and exiting at the backsurfacing side as in normal shingle application) such that the head of the nail rests against the granule surface and the shank protrudes from the backsurface. It is permitted to use a fixture to locate the center of the specimen