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Designation: D3462/D3462M – 23

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

This standard is issued under the fixed designation D3462/D3462M; 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 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 either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *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]

D5/D5M Test Method for Penetration of Bituminous Materials

D36/D36M Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)

D228/D228M Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing

D1079 Terminology Relating to Roofing and Waterproofing

D1922 Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method

D3161/D3161M Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method)

D3461 Test Method for Softening Point of Asphalt and Pitch (Mettler Cup-and-Ball Method)

D4977/D4977M Test Method for Granule Adhesion to Mineral-Surfaced Roofing by Abrasion

E108 Test Methods for Fire Tests of Roof Coverings

F1667 Specification for Driven Fasteners: Nails, Spikes, and Staples

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms, see Terminology D1079.

3.1.2 For testing purposes, under Test Methods D228/D228M, 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.

[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 Steep Roofing Products and Assemblies.

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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.

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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.

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 All surfaces to be exposed to the weather, when the product is properly installed, shall be surfaced with mineral granules embedded in the asphalt 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

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 E108.

5.4 *Wind Resistance,* Shingles shall pass the wind resistance test requirements of Test Method D3161/D3161M.

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 D228/D228M and determine conformance to the requirements of this specification in accordance with the following test methods:

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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][A]		
Average of single-layer specimens	. . .	90 [20]
Average of multi-layer specimens	. . .	135 [30]
Fastener pull-through resistance at 0 ± 2 °C [32 ± 4 °F], newtons [lbf][A]		
Average of single-layer specimens	. . .	104 [23]
Average of multi-layer specimens	. . .	180 [40]
Wind resistance	. . .	Class A
Fire resistance	. . .	Class A
Penetration of asphalt, 0.1 mm[B] (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][B] (tested without mineral stabilizer)	113 [235]	88 [190]
Asphalt softening point for polymer modified products, °C [°F][B] (tested without mineral stabilizer)	160 [320]	88
Weight of displaced granules	1.0 g	. . .

[A] For purposes of fastener pull-through resistance testing, the designation of each specimen as a single-layer or multi-layer shall be based on the number of layers through which the nail is pulled. The average of those specimens designated as single-layer shall meet or exceed the minimum requirement associated with single-layer specimens. The average of those specimens designated as multi-layer shall meet or exceed the minimum requirement associated with multi-layer specimens.
[B] 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/m² [lb/100 ft²]	...	3418 [70.0]
Average net mass per area of shingles (total sample), g/m² [lb/100 ft²]	...	3564 [73.0]
Mass per area of mat, g/m² [lb/100 ft²]	...	65.9 [1.35]
Mass per area of asphalt, g/m² [lb/100 ft²]	...	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/m² [lb/100 ft²]	...	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	...

8.1.1 *Weight Loss and Behavior on Heating*—Test Methods D228/D228M.

8.1.2 *Tear Strength*—Use Test Method D1922 as modified in Test Methods D228/D228M.

8.1.3 *Fastener Pull-Through Resistance*—Test Methods D228/D228M, with modifications shown in the following sections, using a galvanized roofing nail 38 mm [1½ in.] long with 9.5 mm [⅜ in.] diameter head (F1667 NL RF S S -36 Z, see Specification F1667, Table 29).

8.1.3.1 *Significance and Use*—This method provides a simple measurement of complex mechanical effects which relate to the shingle's resistance to wind.

8.1.3.2 *Specimens for Single-Layer Shingles*—Each specimen shall be composed of a single thickness of shingle. 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.

8.1.3.3 *Conditioning*—Condition specimens at the temperatures prescribed in Table 1 for at least 2 h prior to testing, and conduct the test at the prescribed temperatures.

8.1.3.4 *Report*—In addition to the reporting requirements in Test Methods D228/D228M, report the type of product, single-layer or multi-layer, along with the number of layers. Report the average and standard deviation of the pull-through force for the specimens in which the nail penetrated the single layer. Report the average and standard deviation of the pull-through force for the specimens in which the nail penetrated multiple layers.

8.1.4 *Wind Resistance*—Test Method D3161/D3161M.

8.1.5 *Fire Test Classification*—Test Method E108, Class A tests.

8.1.6 *Penetration of Asphalt*—Test Method D5/D5M.

8.1.7 *Pliability:*

8.1.7.1 *Scope*—This procedure measures the pliability of specimens of shingle material by bending through an angle of 90° under defined conditions. Pliability is assessed as the specimens' resistance to formation of surface fissures or to fracture.

8.1.7.2 *Significance and Use*—This test measures the pliability of shingles in the as-manufactured condition.

8.1.7.3 *Apparatus*—A block is required over which the test specimens are bent after conditioning as set forth in 8.1.7.5. The block shall be a cube of approximately 150 mm [6 in.] sides with one edge rounded to a radius of 25 mm [1 in.].

8.1.7.4 *Specimens*—Prepare two sets of test specimens. A set is defined as five specimens cut with their long dimension parallel to the length of the shingle (machine direction) and five specimens cut with their long dimension perpendicular to the length of the shingle (cross-machine direction). Each specimen shall be 25 ± 3 mm [1 ± ⅛ in.] in width and 150 ± 3 mm [6 ± ⅛ in.] in length. All specimens shall be cut from the portion of the shingle intended for exposure when the shingle is properly applied. For laminated and overlay-type shingles, cut the specimens from the single-thickness areas of the shingle. When shingle design does not permit cutting the specified length, then a shorter specimen is permitted, provided that it is at least 100 mm [4 in.] long and of the specified width.

8.1.7.5 *Conditioning*—Condition the specimens and the block at 23 ± 2 °C [73 ± 4 °F] for 2 ± 0.1 h and perform the test at 23 ± 2 °C [73 ± 4 °F].

NOTE 1—Other test conditions shall be permitted to give indications of pliability at different temperatures, provided that the specimens and the block are conditioned for 2 ± 0.1 h and tested at the selected temperature, and that the temperature used is noted in the report. An appropriate enclosure will be required when testing at temperatures other than ambient.

8.1.7.6 *Procedure*—Bend one set of specimens with the weather side up and one set with the weather side down, at a uniform speed through an angle of 90° in 2 ± ½ s over the rounded edge of the block. When bending, hold the specimens by hand tightly against the upper face of the block so that the projecting end of the specimen is perpendicular to the rounded edge. Bend the projecting end of the specimen over the rounded edge without exerting any force other than that required to keep the specimen in contact with the block and to avoid kinking. Maintain the block and specimens at the conditioning/test temperature during the test. Hold the specimen against the block so that contact is made with the entire curved surface during bending and that the two ends of the specimen are at 90° to each other at the end of the test.

8.1.7.7 *Failure*—Failure of a specimen in this test is defined as cracking of the filled coating asphalt which exposes the reinforcement of the shingle. The cracking shall be visible to the naked eye when the specimen is viewed in the bent condition on the mandrel block and shall not include separation of granules or other superficial fissures which do not extend through the filled coating asphalt surface to the reinforcement. Fracture through the specimen is considered a failure.

8.1.7.8 *Report*—Report the nature of the sample, the sampling procedure, the conditioning/test temperature, and the number of specimens passing the pliability test.

8.1.7.9 *Precision and Bias*—No statement is made about the precision of the procedure in 8.1.7.6 for measuring pliability since the results merely state whether there is conformance to the criteria specified in the procedure. This method of measuring pliability is biased against thicker shingles because the stress experienced in the surface of the specimen as they are bent over the mandrel increases as the thickness of the

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