**~~Designation:D3161–08~~ Designation: D 3161 – 08a**

# Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)[1]

This standard is issued under the fixed designation D 3161; 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

~~1.1This test method covers the procedure for testing the wind resistance of asphalt shingles when applied to a test deck on low slopes in accordance with the manufacturer's instructions at the most susceptible slope for wind damage of 2:12 (17%) permitted by those instructions. It is used to benchmark the blow-off resistance of sealed and interlocked shingles at a given wind velocity, but may be used to test unsealed or sealed shingles at other wind velocities as is applicable.~~

1.1 This test method covers the procedure for evaluating the wind resistance of asphalt shingles that results from the shingle's rigidity (with or without contribution from sealant) or mechanical interlocking (with or without contribution from sealant) or any combination thereof. The shingles are applied to a test panel in accordance with the manufacturer's instructions and tested at a 2:12 (17 %) slope, or at the lowest slope permitted by those instructions.

1.2 The values stated in SI 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 *ASTM Standards:* [2]

D 1079 Terminology Relating to Roofing and Waterproofing



## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1079.

## 4. ~~Type and Classes of Shingles~~

~~4.1Shingles are of two types:~~ Classes of Shingles



4.1 Shingles are of three classes:

~~4.1.1 *Type I*—Shingles with a factory-applied adhesive (self-sealing shingles).~~

~~4.1.2*Type II*—Shingles of the lock type, with mechanically interlocking tabs or ears.~~

~~4.2Shingles are of three classes:~~

~~4.2.1~~*Class A*—Pass at a test velocity of 97 km/h (60 mph).

~~4.2.2~~

4.1.2 *Class D*—Pass at a test velocity of 145 km/h (90 mph).

~~4.2.3~~

4.1.3 *Class F*—Pass at a test velocity of 177 km/h (110 mph).

## 5. Significance and Use

5.1 Most asphalt shingles that have demonstrated wind resistance by this test have also performed well in use. Natural wind conditions differ with respect to intensity, duration, and turbulence; these conditions are beyond the means of this test to simulate. The results of this test do not directly correlate to wind speeds experienced in service, and no accommodation is made in this test method for building height, building exposure category, or building importance factor.

~~5.2Many factors influence the sealing characteristics of shingles in the field; for example, temperature, time, roof slope,~~

[1] This test method 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.

~~contamination by dirt and debris, and fasteners that are misaligned or under-driven and interfere with sealing. It is beyond the scope of this test method to address all of these influences. When testing shingles with sealant, this test method is designed to determine the wind resistance when representative samples of shingles are sealed under defined conditions before testing.~~

5.2 Many factors influence the wind resistance of shingles in the field; for example, temperature, time, roof slope, contamination by dirt and debris, and fasteners that are misaligned or under-driven. It is beyond the scope of this test method to address all of these influences. This test method is designed to evaluate the wind resistance of asphalt shingles as described in the scope when representative samples are applied to test panels in accordance with the manufacturer's instructions and conditioned as specified before testing.

## 6. Apparatus

6.1 *Test Machine*, capable of delivering a horizontal stream of air through a rectangular opening 914 mm (36 in.) wide and 305 mm (12 in.) high at a velocity not less than 97 km/h (60 mph). At a velocity of not less than 177 km/h (110 mph), it is permissible to add a duct section to the equipment to lower the height of the rectangular opening to 152 mm (6 in.). The test velocity shall not vary more than ±5 mph as measured at a minimum of three evenly spaced locations across the orifice. The machine shall be equipped with an adjustable stand to receive a test panel and be adapted to setting the test panel at any desired slope, at any horizontal distance from the lower edge of the duct opening, and at various angles incident to the wind direction.

6.2 *Timer*, capable of reading to the nearest minute.

6.3 *Mechanical Circulation Conditioning Cell or Room*, ~~for self-sealing shingles,~~ having forced circulation of air capable of receiving a 1.27-m (50-in.) wide by 1.68-m (66-in.) long, or larger test panel on a slope of 2:12 (17 %) and of maintaining a uniform temperature of 57 to 60°C (135 to 140°F).

## 7. Test Samples

7.1 The test panels shall be of plywood, tightly matched sheathing boards, or other suitable decking material and not less than 1.27 by 1.68 m (50 by 66 in.) in size. They are to be of such rigidity that they will not twist or distort with normal handling, or vibrate from the wind velocity during the test.

7.2 Apply ~~self-sealing~~ shingles to duplicate panels, parallel to the short dimension of the panel, in the normal manner recommended by the manufacturer. Use roofing nails, properly positioned in accordance with the manufacturer's instructions, to fasten each ~~shingle, and no cement other than the factory-applied adhesive shall be used to fasten down the tabs.~~ shingle. Do not apply pressure to the shingle tabs either during or after application.

7.3 Apply lock-type shingles to ~~at least four~~an additional two panels, parallel to the short dimension of the panel, in accordance with the manufacturer's instructions.

7.4 Secure the shingles at the outer edge of ~~the~~each test panel by exposed nailing to simulate anchoring at the rake edges of a roof deck.

7.~~4~~5 Control the temperature at 27 ± 8°C (80 ± 15°F) and maintain the slope of the panel at 2:12 (17 %) during application of the shingles.

## 8. ~~Conditioning of Self-Sealing Shingle Test Decks~~ Conditioning of Shingle Test Panels

8.1 Maintain the test panels at a slope of 2:12 (17 %) and at a temperature of 27 ± 8°C (80 ± 15°F) until beginning heat conditioning.

8.2 Place the test panels in the conditioning cell or room on a slope of 2:12 (17 %) and maintain at a temperature of 57 to 60°C (135 to 140°F) for a continuous period of 16 h.

8.3 After completion of the conditioning period, allow the test panels to come to room temperature 27 ± 8°C (80 ± 15°F) while being maintained at a slope of 2:12 (17 %).

8.4 Exercise care to avoid pressure on, or damage to, shingle tabs by any twisting or distortion of the test panels in handling.

## 9. ~~Conditioning of Lock-Shingle Test Decks~~

~~9.1Maintain the test panels at a temperature of 27 ± 8°C (80 ± 15°F) before conduct of the wind test. No further conditioning of these panels is required.~~

## ~~10.Test Procedure~~

~~10.1~~*Test Procedure*

9.1 *Location of the Test Panel* —Install the panel on the test carriage and accurately adjust it in relation to the duct so that the exposed edge of the target course will be on the same level as the lower edge of the duct orifice at a horizontal distance of 178 ± 1 mm (7 ± 1/16 in.). The target course shall be the third course up from the bottom of the panel. The test slope shall be 2:12 (17 %) for self-sealing shingles, and at the lowest slope recommended by the manufacturer for lock-type shingles.

~~10.1.1Test~~9.1.1 Test a minimum of two panels for self-sealing shingles.

~~10.1.2Since~~9.1.2 Since the design of lock-type shingle makes it difficult to determine the most critical angle of wind direction, conduct the test at a minimum of three different angles using a separate panel for each test (head-on, with the bottom of the target course parallel to and 178 mm (7 in.) away from the machine orifice; and with the panel rotated 30 and 60° from the head-on