

TESTING APPLICATION STANDARD (TAS) No. 107-95

TEST PROCEDURE FOR WIND RESISTANCE TESTING OF NON-RIGID, DISCONTINUOUS ROOF SYSTEM ASSEMBLIES (Modified from ASTM D 3161)

1. Scope

- 1.1 This test method covers the determination of the resistance to wind blow-up or blow-off of asphalt shingles, metal shingles or other non-rigid, discontinuous Roof System Assemblies when installed in compliance with the manufacturer's current, published installation instructions.

2. Referenced Documents

- 2.1 *ASTM Standards*
D 3161 Standard Test Method for Wind Resistance of Asphalt Shingles.
E 380 Excerpts from the Standard Practice for Use of the International System of Units (SI) (the Modernized Metric System)

2.2 *The Florida Building Code, Building.*

2.3 *Roof Consultants Institute Glossary of Terms*

3. Terminology & Units

3.1 Definitions- For definitions of terms used in this specification refer to ASTM D 3161; and/or Chapters 2 and 15 (High Velocity Hurricane Zones) of the *Florida Building Code, Building*; and/or the RCI Glossary of Terms. Definitions from the *Florida Building Code, Building* shall take precedence.

3.2 Units - For conversion of U.S. customary units to SI units, refer to ASTM E 380.

4. Types of Roof System Assemblies

4.1 Asphalt shingles are of two types:

- 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.

4.2 Metal shingles or other non-rigid, discontinuous Roof System Assemblies shall be tested under this Protocol at the direction of the Product Control Supervisor.

5. Significance and Use

5.1 Asphalt shingles, metal shingles or other non-rigid, discontinuous Roof System Assemblies that have demonstrated wind resistance by this test have also performed well in use. Local wind conditions may differ from the test conditions both in intensity and duration, and should be taken into consideration. This method is suitable for use in specifications and regulatory statutes. This method, assisted by experience and engineering judgment, will also prove useful for development work.

6. Test Limitations and Precautions

6.1 This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

7. Apparatus

7.1 Test Machine

7.1.1 The 'test machine' shall be capable of delivering a horizontal stream of air through a rectangular opening, 36 in. (914 mm) wide and 12 in. (305 mm) high, at a velocity of 110 mph (177 km/h) \pm 5% as measured at the orifice.

7.1.2 The 'test machine' shall be equipped with an adjustable stand on which a test panel is placed. The stand shall be adjustable 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.

- 7.2 Clock
- 7.3 Mechanical Circulation Conditioning Cell or Room
 - 7.3.1 A mechanical circulation conditioning cell or room with a forced air circulation shall be utilized for self-sealing shingle conditioning. The cell or room shall be capable of receiving a minimum 50 in. (1.27 m) wide by 66 in. (1.68 m) long test panel at a slope of 2 in:12 in. and of maintaining a uniform temperature of 135 to 140°F (57 to 60°C).

i. Test Specimen

- 8.1 Deck
 - 8.1.1 The wood test deck shall consist of APA 32/16 span rated sheathing of 1⁵/₃₂ in. thickness and not less than 50 in. by 66 in. (1.27 m by 1.68 m) in dimension. The wood test deck shall be of such rigidity that it will not twist or distort with normal handling, or vibrate from the wind velocity during the test.
- 8.2 Underlayment
 - 8.2.1 Underlayment shall be two layers of 15 lb ASTM D 226, type I asphalt saturated felt mechanically attached to the wood test deck, with 12 ga. roofing nails and 1⁵/₈ in. tin caps, in a 12 in. grid pattern staggered in two rows in the field and 6 in. o.c. attachment at any laps.
- 8.3 Self-Sealing Asphalt Shingles
 - 8.3.1 Apply self-sealing asphalt shingles to duplicate test decks, parallel to the short dimension of the test deck, in compliance with the manufacturer's instructions.
 - 8.3.2 Asphalt shingles shall be attached using 12 ga. roofing nails, properly positioned in compliance with the manufacturer's instructions, to fasten each shingle. No cement, other than the factory-applied adhesive, shall be used to fasten down the tabs. Do not

apply pressure to the shingle tabs either during or after application.

8.4 Lock-Type Asphalt Shingles

- 8.4.1 Apply lock-type asphalt shingles to not less than four test decks, parallel to the short dimension of the panel, in compliance with the manufacturer's instructions. Secure the shingles at the outer edge of the test panel by exposed nailing to simulate anchoring at the rake edges of a roof deck.

8.5 Metal Shingles or Other

- 8.5.1 Apply metal shingles or other non-rigid, discontinuous components to duplicate test decks, parallel to the short dimension of the test deck, in compliance with the manufacturer's instructions.

- 8.6 Control the temperature at 80 ± 15°F (27 ± 8°C) and maintain the slope of the panel at 2 in:12 in. (17% slope) during shingle application.

9. Conditioning

- 9.1 Maintain the test specimens at a slope of 2 in:12 in. and at a temperature of 80 ± 15°F (27 ± 8°C) until the commencement of heat conditioning.
- 9.2 Place the test specimens in the conditioning cell or room at a slope of 2 in:12 in. and maintain at a temperature of 135 to 140°F (57 to 60°C) for a continuous 16 hour period.
- 9.3 After completion of the conditioning period, allow the test specimens to come to room temperature [80 ± 15°F (27 ± 8°C)] while at a slope of 2 in:12 in.
- 9.4 Exercise care to avoid pressure on shingle tabs by any twisting or distortion of the test specimens during handling.

10. Procedure

- 10.1 Location of the Test Panel
 - 10.1.1 Install the test specimen on the test carriage and adjust it in relation to the duct such that the exposed edge of the

target course is on the same level as the lower edge of the duct orifice at a horizontal distance of 7 in. \pm 1/16 in. (178 \pm 1 mm). The target course shall be the third course up from the bottom of the test specimen. The test incline shall be 2:12 in. for self-sealing shingles, and at the lowest incline recommended by the manufacturer for lock-type asphalt and metal shingles and other non-rigid, discontinuous systems.

- 10.1.2 Since the design of lock-type shingle may make it difficult to determine the most critical angle of wind direction, conduct the test at a minimum of three different angles: 1) head-on; 2) with the bottom of the target course parallel to and 7 in. (178 mm) away from the machine orifice; and, 3) with the test specimen rotated 30 and 60 degrees from the head-on position, with the bottom corner of the third-course tab nearest to the duct being 7 in. (178 mm) away from and in the same horizontal plane as the bottom of the machine orifice. Test another panel at the position judged to be most critical on the basis of the first three tests.

10.2 Performing the Test

- 10.2.1 Maintain the ambient temperature at 75 \pm 5°F (24 \pm 3°C) during the wind tests.
- 10.2.2 As soon as the test specimen is set in position, start the fan, adjust to produce a velocity of 110 mph (177 km/hr) \pm 5% at the orifice, and maintain continuously for 2 hours, or until such lesser time as a failure occurs.
- 10.2.3 During the test, an observer shall note any lifting of shingle tabs or non-rigid components and shall record any damage to a full shingle or non-rigid component or the disengaging of a locking ear or tab, or a shingle tab, including any failure of adhesive. The time at which any of these 'failures' occur shall be noted.

- 10.2.4 If failure occurs during the test, stop the air flow and record the exposure time. The end point for failure shall be taken as the time at which the sealing feature fails to restrain one or more full shingle tabs, or a locking ear or tab of a lock shingle tears loose or disengages from its locking position or a non-rigid component is damaged so as to affect the performance of the system. In addition, no free portion of a shingle or non-rigid component shall lift so as to stand upright or bend back on itself during the test.

11. Certification

- 11.1 A test report will be provided to the Chief Code Compliance Officer confirming successful compliance with the test provisions of this Protocol. Completion of this test Protocol is one in a series of Testing Application Standards required by the *Florida Building Code, Building* for Product Control Approval of non-rigid, discontinuous Roof System Assemblies.

