
Draft Jamaican Standard

Method of Test

For

Impact and Non-Impact Resistant Building Envelope

Components Using Uniform Static Air Pressure



BUREAU OF STANDARDS JAMAICA

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Jamaican Standards establish requirements in relation to commodities, processes and practices, but do not purport to include all the necessary provisions of a contract.

The attention of those using this standard specification is called to the necessity of complying with any relevant legislation.

Amendments

No.	Date of Issue	Remarks	Entered by and date

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Foreword

The increasing frequency and intensity of hurricanes affecting Jamaica and the wider Caribbean underscore the need for reliable and standardized test methods to evaluate the performance of construction systems under extreme wind conditions.

This standard has been developed to establish a uniform method for assessing the resistance of building materials, components, and assemblies to hurricane-induced impact forces.

This standard is voluntary.

Committee representation

Related Documents

This standard makes reference to the following:

- a) *AAMA 1304, Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems*
- b) *ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*
- c) *ASTM F588, Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact*
- d) *ASTM F842, Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact*
- e) *The Florida Building Code, Building*
- f) *TAS 301, Testing Application Standard (Tas) 301-94 Testing Laboratory*

Acknowledgement

Acknowledgement is made to the International Council Code for permission to reproduce material from their standard.

Jamaican Standard Method of Test for Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure

1. Scope

This standard outlines the method of test for conducting uniform static air pressure testing on materials and products such as wall cladding, glass block, exterior doors, garage doors, skylights, exterior windows, storm shutters, and any other external component which help maintain the integrity of the building envelope.

Design pressures calculated in accordance with ASCE 7 are permitted to be multiplied by 0.6.

2. Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AAMA 1304, *Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems*
ASTM E283, *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*

ASTM F588, *Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact*

ASTM F842, *Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact*

The Florida Building Code, Building

TAS 301, *Testing Application Standard (Tas) 301-94 Testing Laboratory*

3. Definitions

For the purpose of this standard the following definition applies:

3.1

maximum deflection

The maximum displacement of the specimen measured to the nearest 1/8 of an inch attained from the original position while the maximum test load is being applied.

3.2

permanent deformation

The permanent displacement of the specimen measured to the nearest 1/8 of an inch from the original position to final position that remains after maximum test load has been removed.

3.3

specimen

The entire assembled unit submitted for test, including but not limited to anchor-age devices, and structure to which product is to be mounted.

3.4

specimen failure

A change in condition of the specimen indicative of deterioration under repeated load or incipient failure, such as cracking, fastener loosening, local yielding, or loss of adhesive bond.

3.5

test chamber

An airtight enclosure of sufficient depth to allow unobstructed deflection of the specimen during pressure cycling, including ports for air supply and removal, and equipped with instruments to measure test pressure differentials.

3.6

test load

As determined by Sections 1625 and 1626 of the Florida Building Code, Building.

4. Test specimen and procedure

4.1 All parts of the test specimen shall be full size, using the same materials, details, methods of construction and methods of attachment as proposed for actual use. The specimen shall consist of the entire assembled unit attached to a given type of structural framing of the building and shall contain all devices used to resist wind forces and windborne debris. When testing glazed products, the material used to make such glazed product windborne debris resistant (i.e., fillers, film and similar) shall be an integral part, factory applied, of such glazed product. In the case of windows, doors, and sliding glass doors, a pressure treated nominal 2 × 4 wood buck #3 Southern Pine shall be used for attachment of the specimen to the test frame/stand/chamber. Such wood bucks will become part of the approval. In the case of storm panels, they must be tested in worst case scenarios where attachments are directly to Concrete Masonry Units (CMU). Figure 1, on the following page, shows the basic three (3) configurations that shall be required; one per each of the three (3) required specimens. Each storm panel specimen shall consist of minimum three (3) panels.

4.1.1 Locking mechanisms shall be permanently mounted on the specimen. Such locking mechanism shall require no tools to be latched in the locked position. Devices such as pins shall be permanently secured to the specimen through the use of chains or wires which must be of corrosion resistant material. This section does not apply to specimens referenced in Section 2413 of the Florida Building Code, Building.

4.1.2 Products that are not categorized as means of egress/escape and are provided with more than one single action locking mechanism, shall be provided with permanently posted instructions on latching for high wind pressures.

4.1.3 Doors and windows shall be operable after this test.

4.1.4 Specimen and fasteners, when used, shall not become disengaged during test procedure.

4.2 Procedure

4.2.1 Preparation—Remove from the test specimen any sealing or construction material that is not normally used when installed in or on a building. Fit the specimen with its structural framing into or against the chamber opening. The outdoor side of the specimen shall face the higher pressure side for positive loads; the indoor side shall face the higher pressure side for negative loads. Support and secure the specimen by the same number and type of anchors to be approved for normal installation of the specimen in the building.

4.2.2 Single Action Locking/Closing Procedure

4.2.2.1 All specimens which are required to comply with means of egress/escape, shall be tested for full static loads as required by Section 5.2.3 of this protocol with only one single action locking mechanism. Additionally, doors and windows that are not re-quired to comply with means of egress/escape requirement shall be tested as de-scribed in Sections 5.2.2.2 and 5.2.2.3 of this protocol.

4.2.2.2 In the case of doors and windows that are not required to comply with the means of egress/escape requirements which are provided with more than one single action hardware and comply with the test described in this protocol, shall also be successfully tested with a test load equal to a static air pressure based on wind velocity of 156 km/h using only one single action locking mechanism. Test pressures are permitted to be multiplied by 0.6 as specified in Section 1.1. Apply the corresponding positive test load and hold for 30 seconds. Release this test load across the specimen, and after a recovery period of not less than 1 minute nor more than 5 minutes, apply the corresponding reverse test load and hold for 30 seconds. Release the reverse test load and record observations. Such products must have all additional locking mechanisms permanently attached to the product by means of nonremovable and noncorrosive devices, and must comply with Section 5.1.1 of this protocol.

4.2.2.3 For product categories listed in 5.2.2.2 of this protocol, deliver and maintain water spray at a minimum rate of 204 L/h/m², applied at a pressure equal to not less than 15% of air pressure based on wind velocity of 121 km/h. Maintain this pressure and water spray for a period not less than 15 minutes. No water infiltration shall occur. For this portion of the test, the only specimen that will be excluded is garage doors.

4.2.3 Uniform Static Air Procedure

4.2.3.1 Check specimen for adjustment and engage all locks.

4.2.3.2 Install all required measurement devices.

4.2.4 Apply one half (0.5) of the test load and hold for 30 seconds (for plastic glazed skylights apply the full test load). Release the test load across the specimen, and after a recovery period of not less than 1 minute nor more than 5 minutes, apply one half the reverse test load (for plastic glazed skylights apply the reverse full test load) and hold for 30 seconds. Release reverse test load and after a recovery period of not less than 1 minute nor more than 5 minutes record all readings.

4.2.5 Apply full test load and hold for 30 seconds, (for plastic glazed skylights apply two times the test load). Release the test load across the specimen, and after a recovery period of not less than 1 minute nor more than 5 minutes, apply full reverse test load (for plastic skylights apply

two times the reverse test load) and hold for 30 seconds. Release reverse test load and after a recovery period of not less than 1 minute nor more than 5 minutes record all readings.

4.2.6 Deliver and maintain water spray at a minimum rate of 5 gph/sf, applied at a pressure equal to not less than 15% of design pressure, maintain this pressure and water spray for a period not less than 15 minutes. No water infiltration shall occur. For this portion of the test, the only systems that will be excluded are garage doors and storm shutters.

4.2.7 Air Infiltration—Shall comply with ASTM E283.

4.3 Specimens successfully tested shall qualify assemblies with material thicker and of the same type and construction, provided the anchorage of the product is proportionally changed according to the wind pressure test.

4.4 Specimens successfully tested shall qualify assemblies of a smaller size and of the same type and construction, provided the anchorage of the product remains unchanged.

5. Apparatus:

5.1 The description of the apparatus is general in nature. Any equipment, properly certified, calibrated, and approved by the Authority Having Jurisdiction capable of performing this test within the allowable tolerance is permitted.

5.2 Test Chamber—The test chamber, to which the specimen is mounted, shall be provided with pressure taps to measure the pressure difference across the test specimen and shall be so located that the reading is unaffected by the velocity of air supplied to or from the chamber. The specimen mounting frame (including the mullion and transom) must not deflect under test load in such manner that the performance of the specimen will be affected.

5.2.1 Pressure-Measuring Apparatus—The pressure-measuring apparatus shall measure the test pressure difference within a tolerance of $\pm 2\%$.

5.2.2 Deflection-Measuring System—The deflection-measuring system shall measure the deflection within a tolerance of 0.25 mm (0.01 inch).

5.2.3 Air System—A controllable blower, a compressed-air supply, an exhaust system, or reversible controllable blower designed to provide the required maximum air pressure difference across the specimen. The system shall provide an essentially constant air-pressure difference for the required test period.

5.2.4 Water-Spray System—The water-spray system shall deliver water uniformly against the exterior surface of the test specimen at a minimum rate of 204 L/h/m². The water-spray system shall have nozzles spaced at a uniform grid, located at uniform distance, and be adjustable to provide the specified quantity of water in such a manner as to wet the test specimen uniformly and to wet those areas vulnerable to water leakage.

5.3 Calibration of Equipment - The pressure-measuring apparatus and the deflection-measuring system shall be calibrated and certified annually by an independent qualified agency approved by the Authority Having Jurisdiction.

5.3.1 The calibration report shall include: the date of the calibration, the name of the agency conducting the calibration, methods and equipment used in the calibration process, the equipment being calibrated and any pertinent comments.

6. Hazards:

Testing facilities must take all necessary precautions to protect the observers during the entire test procedure. All observers shall always be at a safe distance away from specimen and apparatus. Safety regulations must be followed in order to avoid any injuries to all observers.

7. Testing Facilities (for a more detailed description refer to TAS 301-94).

7.1 Any testing facility wishing to perform this test must first obtain the approval of the Authority Having Jurisdiction. Such approval shall only be given to those facilities which show that they are properly equipped to perform the complete test, including the cyclic loading and the small and large missile impact test. Testing facilities shall request, in writing, approval of their facilities. Such request shall contain the ability of the facility to perform all aspects of the test, all equipment used in the performance of the test, name of independent agency calibrating their equipment, location of facilities, personnel involved in the testing, a quality control program, a safety program and any other pertinent information which will clearly indicate that such facility is in the business of performing independent testing. The Authority Having Jurisdiction will visit the site and reserve the right to order any changes necessary to accept the facility for testing.

7.2 Approval of facilities to perform the test described in this protocol, does not constitute an approval of such facilities to perform other tests not specifically mentioned in this protocol.

8. Format of Test:

The manufacturer shall notify the Authority Having Jurisdiction fourteen (14) working days prior to the performance of the test. The Authority Having Jurisdiction reserves the right to observe the test. The Authority Having Jurisdiction must be notified of the place and time the test will take place. The test must be recorded on video and retained by the laboratory per TAS 301.

9. Test Reports:

The following minimum information shall be included in the submitted report:

- a) Date of the test and the report, and report number.
- b) Name and location of facilities performing the test.
- c) Name and address of requester of the test.

- d) Identification of the specimen (manufacturer, source of supply, dimension, model types, material, procedure of selection and any other pertinent information).
- e) Detailed drawings of the specimen showing dimensioned section profiles, type of framing specimen was attached to, panel arrangement, installation and spacing of anchorage, locking arrangement, sealants, hardware, product markings and their location, and any other pertinent construction details. Any deviation from the drawings or any modifications made to the specimen to obtain the reported values shall be noted in the drawings and in the report.
- f) Maximum deflection recorded and mechanism used to make such determination.
- g) Permanent deformation (provide cross section diagram to show where it occurred).
- h) Name, address, signature and seal of a professional engineer, witnessing the test and preparing the report. Engineer shall be part of the laboratory's permanent staff or under laboratory's contract.
- i) A tabulation of pressure differences exerted across the specimen during the test and their duration.
- j) Maximum positive and negative pressures used in the cyclic wind pressure loading.
- k) A description of the condition of the test specimens after testing, including details of any damage and any other pertinent observations.
- l) When the tests are made to check conformity of the specimen to a particular specification, an identification or description of that specification.
- m) A statement that the tests were conducted in accordance with this test method.
- n) A statement of whether or not, upon completion of all testing, the specimens meet the requirements of Section 1620 of the Florida Building Code, Building and this protocol.
- o) A statement as to whether or not tape or film, or both were used to seal against air leakage, and whether in the judgment of the test engineer, the tape or film influenced the results of the test.
- p) Signatures of persons responsible for supervision of the tests and a list of official observers.
- q) All data not required herein, but useful to a better understanding of the test results, conclusions or recommendations, should be appended to the report.

10. Recording Deflections:

Maximum Deflection

Permanent Deformation

11. Additional Testing:

11.1 After successfully completing all parts of the test described in this protocol, the specimen shall be subjected to the forced entry test per ASTM F588, ASTM F842, or AAMA 1304 as applicable.

11.2 Any product, when installed that is subjected to weathering, where such weathering can affect the integrity of the product, the manufacturer shall contact the Authority Having Jurisdiction for additional testing requirements such as but not limited to moisture, U.V., accelerated aging, and other similar tests.

11.3 The Authority Having Jurisdiction reserves the right to require any additional testing necessary to assure full compliance.

12. Product Marking:

12.1 Any and all approved products shall be permanently labeled with the manufacturer's name, and location and the following statement: "Product Approved."

12.2 Permanently labeled shall be a metallic label fixed permanently to the frame of the specimen by rivets or permanent adhesive. See Section 13.2.1 of this protocol for storm panels.

12.2.1 Permanent label on storm panels could be printed directly on each panel at intervals not to exceed 91 cm (36 inches) with non-removable paint or ink.

12.3 Any instructions for operations shall be permanently mounted on the specimen in an area not subject to be painted or concealed. Storm panels may be excluded from this section.

Standards Council

The Standards Council is the controlling body of the Bureau of Standards Jamaica and is responsible for the policy and general administration of the Bureau.

The Council is appointed by the Minister in the manner provided for in the Standards Act, 1969. Using its powers in the Standards Act, the Council appoints committees for specified purposes.

The Standards Act, 1969 sets out the duties of the Council and the steps to be followed for the formulation of a standard.

Preparation of standards documents

The following is an outline of the procedure which must be followed in the preparation of documents:

1. The preparation of standards documents is undertaken upon the Standard Council's authorisation. This may arise out of representation from national organisations or existing Bureau of Standards' Committees of Bureau staff. If the project is approved it is referred to the appropriate sectional committee or if none exists a new committee is formed, or the project is allotted to the Bureau's staff.
2. If necessary, when the final draft of a standard is ready, the Council authorises an approach to the Minister in order to obtain the formal concurrence of any other Minister who may be responsible for any area which the standard may affect.
3. The draft document is made available to the general public for comments. All interested parties, by means of a notice in the Press, are invited to comment. In addition, copies are forwarded to those known, interested in the subject.
4. The Committee considers all the comments received and recommends a final document to the Standards Council
5. The Standards Council recommends the document to the Minister for publication.
6. The Minister approves the recommendation of the Standards Council.
7. The declaration of the standard is gazetted and copies placed on sale.
8. On the recommendation of the Standards Council the Minister may declare a standard compulsory.
9. Amendments to and revisions of standards normally require the same procedure as is applied to the preparation of the original standard.

Overseas standards documents

The Bureau of Standards Jamaica maintains a reference library which includes the standards of many overseas standards organisations. These standards can be inspected upon request.

The Bureau can supply on demand copies of standards produced by some national standards bodies and is the agency for the sale of standards produced by the International Organization for Standardization (ISO) members.

Application to use the reference library and to purchase Jamaican and other standards documents should be addressed to:

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