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An American National Standard

Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, Doors, Skylights and Doors Curtain Walls by Uniform Static Air Pressure Difference[1]

This standard is issued under the fixed designation E 330; 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.

ε1 Note—Editorial changes were made to this standard in August 1998.

[1] This test method is under the jurisdiction of ASTM Committee E-6 E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Component Performance of Windows, Curtain Walls, Doors, Skylights and Doors. Curtain Walls.

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1. Scope

1.1 This test method describes the determination of the structural performance of exterior windows, curtain walls, doors, skylights, and doors curtain walls under uniform static air pressure differences, using a test chamber. This test method is applicable to curtain wall assemblies including, but not limited to, metal, glass, masonry, and stone components.

1.2 This test method is intended only for evaluating the structural performance associated with the specified test specimen and not the structural performance of adjacent construction.

1.3 The proper use of this test method requires a knowledge of the principles of pressure and deflection measurement.

1.4 This test method describes the apparatus and the procedure to be used for applying uniformly distributed test loads to a specimen.

1.4.1 Procedure A (see section 11.2) shall be used when a load-deflection curve is not required.

1.4.2 Procedure B (see section 11.3) shall be used when a load-deflection curve is required.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *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.* For specific hazard statements, see Section 7.

1.7 The text of this standard references notes and footnotes which provide explanatory materials. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

2. Referenced Documents [2]

2.1 *ASTM Standards:*

E 631 Terminology of Building Constructions[3]

E 997 Test Method for Structural Performance of Glass in Exterior Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Destructive Methods[3]

E 998 Test Method for Structural Performance of Glass in Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Nondestructive Method[3]

E 1233 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential[3]

E 1300 Practice for Determining Load Resistance of Glass in Buildings[3]

E 1886 Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials[4]

[2] Additional information on curtain wall assemblies can be obtained from the American Architectural Manufacturers' Association, 1540 East Dundee, Palantine, 1827 Walden Office Square, Suite 550, Schaumburg, IL 60067. 60173.

[3] *Annual Book of ASTM Standards*, Vol 04.11.

[4] Available from the American Society

[4] *Annual Book* of *Civil Engineers, 345 E. 45th Street, New York, NY 10017-2398. ASTM Standards*, Vol 04.12.

E 1996 Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes[4]

2.2 *ASCE Standard:*

ASCE ~~7 (formerly ANSI A58.1) Minimum~~ 7 Minimum Design Loads for Buildings and Other Structures[5]

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology E 631, unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *design wind load*—the uniform static air pressure differences, inward and outward, for which the specimen would be designed under service load conditions using conventional wind engineering specifications and concepts, expressed in pascals (or pounds-force per square foot). This pressure is determined by either analytical or wind-tunnel procedures (such as are specified in ASCE 7).

3.2.2 *permanent deformation*, *n*—the displacement or change in dimension of the specimen after the applied load has been removed and the specimen has relaxed for the specified period of time.

3.2.3 *proof load*—a test load multiplied by a factor of safety.

3.2.4 *stick system*, *n*—a curtain wall assembly composed of individually framed continuous members, vertical mullions, and horizontal rails that are installed in a sequential, piece-by-piece process. The completed system is assembled entirely in the field.

3.2.~~3~~5 *structural distress*—a change in condition of the specimen indicative of deterioration or incipient failure, such as cracking, local yielding, fastener loosening, or loss of adhesive bond.

3.2.~~4~~6 *test load*—the specified difference in static air pressure (positive or negative) for which the specimen is to be tested, expressed in pascals (or pounds-force per square foot).

3.2.~~5~~7 *test specimen*, *n*—the entire assembled unit submitted for test (as described in Section 8).

3.2.~~6~~8 *unit/panel system*, *n*—a curtain wall assembly composed of pre-assembled groups of individual framing members. The completed system is designed to be modular, transportable, and installed as a finished assembly.

4. Summary of Test Method

4.1 This test method consists of sealing the test specimen into or against one face of a test chamber, supplying air to or exhausting air from the chamber according to a specific test loading program, at the rate required to maintain the test pressure difference across the specimen, and observing, measuring, and recording the deflection, deformations, and nature of any distress or failures of the specimen.

5. Significance and Use

5.1 This test method is a standard procedure for determining structural performance under uniform static air pressure difference. This typically is intended to represent the effects of a wind load on exterior building surface elements. ~~This standard is not intended to account for the effect of windborne debris.~~ The actual loading on building surfaces is quite complex, varying with wind direction, time, height above ground, building shape, terrain, surrounding structures, and other factors. The resistance of many windows, curtain walls, and door assemblies to wind loading is also complex and depends on the complete history of load, magnitude, duration, and repetition. These factors are discussed in ASCE 7 and in the literature **~~(1,2,3)~~(1-8)**.[6]

5.2 Design wind velocities are selected for particular geographic locations and probabilities of occurrence based on data from wind velocity maps such as are ~~prepared by the National Weather Service. The approach~~ provided in ~~collecting data for these maps is to measure the fastest average wind during finite time periods within each hour. The finite time duration used is given by the equation *t* = 5800/ *V* (3600/*V*), where *t* is the time span in seconds and *V* is the wind velocity in kilometres (miles) per hour. Wind velocity maps therefore show isotachs of the fastest average wind velocities during time spans which become shorter as the wind velocity increases. For example, a 144.8 km/h (90 mph) wind is actually the highest sustained average wind for a 40-s time span and a 289.6 km/h (180 mph) wind is actually the highest sustained average wind for a 20-s time span. Measurements obtained in this way are known as the fastest kilometre (fastest mile) of wind because the procedure is actually to measure the time required for a 1.609 km (1 mile) long sample of air to pass a fixed point.~~ ASCE ~~7 provides additional information on this subject. The~~ 7. These wind ~~velocity maps of ASCE 7 are based on a 2 % per year probability of being exceeded. Map~~ velocities are ~~increased or decreased, where appropriate, through an importance factor, *I*, to reflect a design criterion accepting lesser or greater risk than the ordinary annual risk of 0.02. Importance factors are also applied to hurricane-prone regions within 160.9 km (100 miles) of a coastline.~~

~~5.3 The person specifying the test must translate anticipated wind velocities and durations~~ translated into uniform static air pressure differences and durations acting inward and outward. Complexities of wind pressures, as related to building design, wind intensity versus duration, frequency of occurrence, and other factors must be considered. Superimposed on sustained winds are

~~[5] The boldface numbers in parentheses refer to the list~~

[5] Available from The American Society of ~~references appended to this test method.~~ Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191.

[6] The boldface numbers in parentheses refer to the list of references appended to this test method.

gusting winds which, for short periods of time from a fraction of a second to a few seconds, are capable of moving at considerably higher velocities than the sustained winds. W The analytical procedures in ASCE 7, wind tunnel studies, computer simulations, and model analyses are helpful in determining the appropriate design wind pressures loads on buildings by showing how a particular building acts under exterior surface elements of buildings. Generally, wind velocities established by others.

5.3.1 If a 144.8 km/h (90 mph) wind storm is considered, the average velocity during at least one 40-s time period is 144.8 km/h. Studies reveal that there load durations obtained from ASCE 7 are also 2-s average velocities of 193.1 km/h (120 mph), 10-s average velocities of 170.6 km/h (106 mph), 2 to 10 s and 1-h average velocities of 86.9 km/h (54 mph) in the same storm. Reference **(4)** gives information on these studies. For a 144.8 km/h fastest kilometre (fastest mile) wind, it is apparent that there are other velocities that may be considered for dependent upon the purpose of testing exterior window, wall, and door products. If the 144.8 km/h fastest kilometre wind has been selected as appropriate for a particular location, the specific time duration at 144.8 km/h would be 40 s. This period of time is considered as the time duration for a test at a load equivalent to the design pressure for the 144.8 km/h wind. Following the line of reasoning reference employed in determining the example above pressure coefficients.

5.3 Some materials have strength or deflection characteristics that the test load and time duration of tests are related, if a 10-s time duration is used, dependent. Therefore, the test should be conducted at a load equivalent to the design pressure for a 107.6 km/h wind which is 39 % greater than for a 144.8 km/h wind. If structural performance under both sustained and gust loads is to be checked, testing should be conducted at both the sustained and gust load static pressure differences and for the time duration appropriate to each.

5.4 The duration of the applied test load are capable of imposing serious effects may have a significant impact on the performance of materials used in the test specimen. M The most common examples of materials have strength or deflection with time-dependent response characteristics that are time dependent. used are glass, plastics, and composites that employ plastics. For this reason, the strength of an assembly is tested for the actual time duration to which an assembly will it would be exposed to a sustained or a gust load, or both, as discussed in 5.3. above. Generally, U.S. practice in the past for wind load testing has been to require a minimum test period of 10 s for specific test loads equal to the design wind load and proof loads equal to 1.5 times the design pressure, unless requirements have been otherwise specified. wind load. Thus a safety factor was is incorporated in the testing. With higher test loads for wind higher than those determined by ASCE 7 or of longer time duration than 10 s, the designer must also consider what safety factors are essential, particularly with regard to gust wind loads. Gust wind appropriate. For test loads are of relatively short duration, so that c represent design loads other than wind, such as snow load, consideration shall be givexn to establish an appreopriate test period for both design and proof load testing.

5.4 This standard is not intended to specify unnecessarily long duration loads account for purposes of testing the adequacy effect of th windborne debrist oru cyclic loads. Consideration of cyclic air pressure differentials is addressed in Test Method E 1233. Consideration of windborne debris in combination with cyclic air pressure differential represendting extreme wind gusts. events is addressed in Test Method E 1886 and Specification E 1996.

5.5 This test method is not intended for use in evaluating the structural adequacy of glass for a particular application. When the structural performance of glass is to be evaluated, the procedure described in Test Method E 997 or E 998 shall be used.

5.6 Further information on the subjects covered above is available in the literature **(4,5,6,7,8)** .

NOTE 1—In applying the results of tests by this test method, it should be borne in mind note that the performance of a wall or its components, or both, may be a function of fabrication, installation, and adjustment, and that the adjustment. The specimen may or may not truly represent every aspect of the actual structure. In service, the performance will also depend on the rigidity of supporting construction, temperature, and on the resistance of components to deterioration by various other causes, including vibration, thermal expansion and contraction, and so forth. etc.

6. Apparatus

6.1 The description of the apparatus is general in nature; any equipment capable of performing the test procedure within the allowable tolerances is permitted.

6.2 *Major Components* (see Fig. 1):

6.2.1 *Test Chamber*, or a box with an opening, a removable mounting panel, or one open side in which or against which the specimen is installed. Provide a static pressure tap to measure the pressure difference across the test specimen. Locate the tap so that the reading is unaffected by the velocity of air supplied to or from the chamber or by any other air movements. The air supply opening into the chamber shall be arranged so that the air does not impinge directly on the test specimen with any significant velocity. A means shall be provided to facilitate test specimen adjustments and observations. The test chamber or the specimen mounting frame, or both, must not deflect under the test load in such a manner that the performance of the specimen will be affected.

6.2.2 *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.

NOTE 2—It is convenient to use a reversible blower or a separate pressure and exhaust system to provide the required air-pressure difference so that the test specimen can be tested for the effect of wind blowing against the wall (positive pressure) or for the effect of suction on the lee side of the building (negative pressure) without removing, reversing, and reinstalling the test specimen. If an adequate air supply is available, a completely airtight seal need not be provided around the perimeter of the test specimen and the mounting panel, although it is preferable. However, substantial air leakage will require

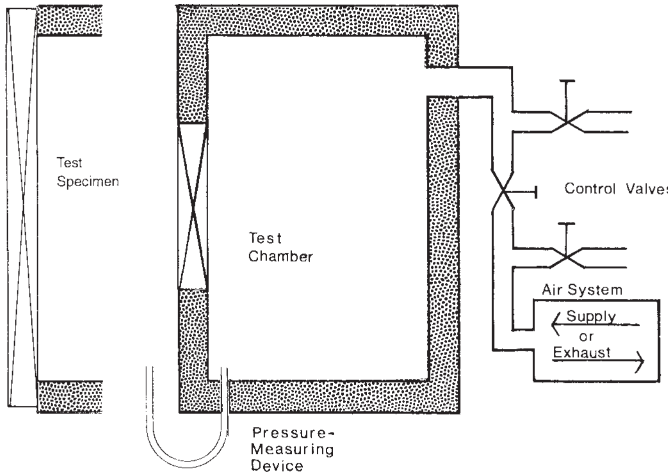


FIG. 1 General Arrangement of Testing Apparatus

an air supply of much greater capacity to maintain the required pressure differences.

6.2.3 *Pressure-Measuring Apparatus*, to measure the test pressure difference within a tolerance of ±2 % or ±2.5 Pa (±0.01 in. of water column), whichever is greater.

6.2.4 *Deflection-Measuring System*, to measure deflections within a tolerance of ±0.25 mm (±0.01 in.).

6.2.4.1 For Procedure A, any locations at which deflections are to be measured shall be stated by the specifier.

6.2.4.2 For Procedure B, maximum and end deflections of at least one of each type of principal member not directly and continuously supported by surrounding construction shall be measured. Additional locations for deflection measurements, if required, shall be stated by the specifier.

6.2.4.3 When deflections are to be measured, the deflection gages shall be installed so that the deflections of the components can be measured without being influenced by possible movements of, or movements within, the specimen or member supports.

6.2.4.4 For ~~tests to determine the ultimate performance of a specimen. Permanent~~ proof load tests, permanent deformation can be determined by the use of a straightedge-type gage applied to the members after preloading and again after the test load has been removed.

7. Hazards

7.1 Take proper precautions to protect the observers in the event of any failure. Considerable energy and hazard are involved at the pressures used in this test method. ~~**WARNING:** At~~ (**Warning—**At the pressure used in this test method, considerable hazards are involved. Do not permit personnel in negative pressure chambers during tests.)

8. Test Specimens

8.1 Curtain wall test specimens shall be of sufficient size and configuration to determine the performance of all typical parts of the system and to provide full loading on each typical vertical and horizontal framing member, including building corner details and end joints, if applicable. For multistory systems, the specimen height shall not be less than two full building stories plus the height necessary to include at least one full horizontal joint accommodating vertical expansion. If water testing is to be performed on the test specimens, at least one full horizontal joint accommodating vertical expansion shall be included and located in the bottom third of the specimen. The specimen shall include all typical expansion joints, connections, anchorages, and supporting elements including those at the top, bottom, and both sides of the specimen. Where the largest system or building wall is smaller than that required herein, the largest system or full size building wall shall be tested. (See Figs. 2 and 3 for optional specimen configurations.)

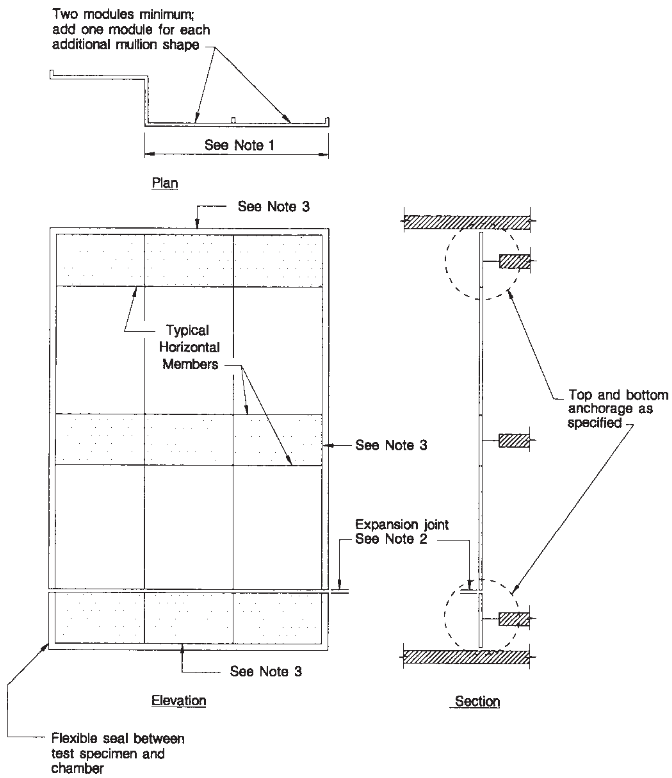
8.1.1 All parts of the curtain wall test specimen shall be full size, using the same materials, details and methods of construction, and anchorage as used on the actual building.

8.1.2 Conditions of structural support shall simulate, as accurately as possible, the structural conditions of the actual building. Separate tests of anchorage systems using the actual anchor substrates shall be conducted when specified.

8.2 A window, door, or other wall component test specimen shall consist of the entire assembled unit, including frame and anchorage as supplied by the manufacturer for installation in the building, or as set forth in a referenced specification, if applicable.

8.2.1 If only one specimen is to be tested, the selection shall be determined by the specifying authority.

NOTE 3—Since performance is likely to be a function of size and geometry, select specimens covering the range of sizes to be used in a building. In general, it is recommended that the largest size or most heavily or critically loaded of a particular design, type, construction, or configuration ~~to~~ be ~~used should be~~ tested. ~~In general,~~ It is also recommended that the largest lite or panel ~~to be used~~ in a system or building ~~should~~ be used at each side of a horizontal or vertical framing member. The glass in a specimen should be of the same thickness and heat-treatment condition as to be used in the system



NOTE 1—Width of typical specimen if no corners are included in system or project.

NOTE 2—Include vertical expansion joint corners and end (jamb) conditions in test specimen if such items are part of system or project wall. If water testing is to be performed, place one expansion joint in lower third of specimen.

NOTE 3—See 8.1.2 for structural support requirements at specimen perimeter.

FIG. 2 Typical Stick-System Test Specimen Concept

or building. Glass stronger than that to be used in a system or building should not be used in a test specimen. Practice E 1300 should be used to verify that the selected glass will meet the specified loads. Fully sealed roof coping details do not have to be included in a specimen unless specified.

9. Calibration

9.1 All pressure and deflection measuring devices, except manometers and mechanical deflection measuring devices, shall be calibrated in accordance with the manufacturer's specification, in accordance with the tolerance provided in Section 6, but in any event, not more than six months prior to testing. Calibration of manometers and mechanical deflection measuring devices are normally not required, provided the instruments are used at a temperature near their design temperature.

10. Required Information

10.1 In specifying this test method, the following information shall be supplied by the specifying authority:

10.1.1 *Procedure A*:

10.1.1.1 The positive and negative test and proof loads,

10.1.1.2 The duration of ~~maximum load,~~ test and proof loads, and

10.1.1.3 The number and location of deflection measurements required, if any.

10.1.2 *Procedure B*:

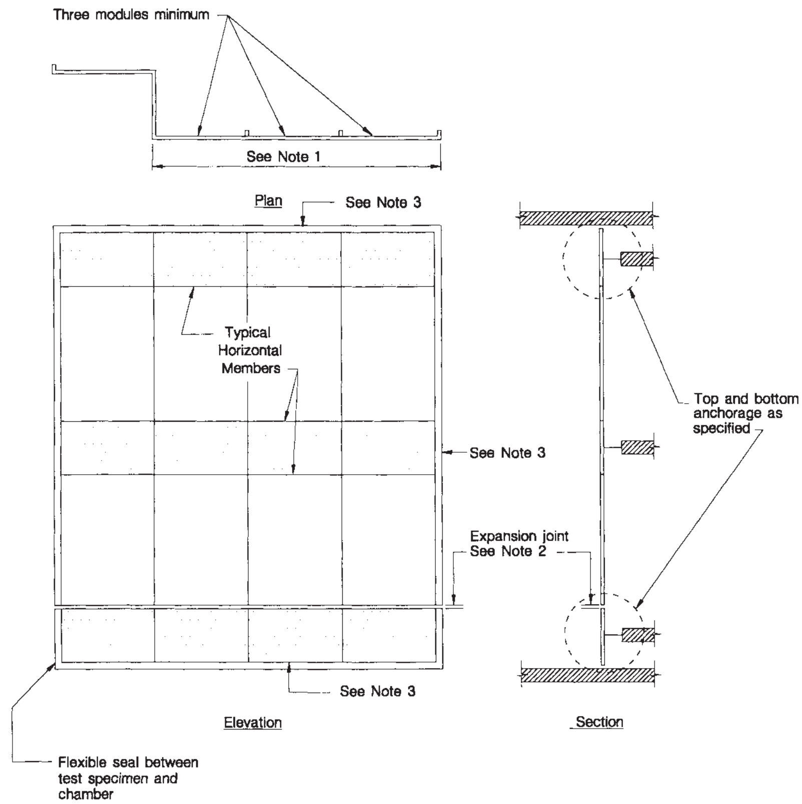
10.1.2.1 The number of incremental loads and the positive and negative test loads at these increments at which deflection measurements are required,

10.1.2.2 The duration of incremental and maximum test loads, and

10.1.2.3 The number and location of required deflection measurements.

11. Procedure

11.1 *Preparation*—Remove from the test specimen any sealing or construction material that is not to be used when the assembly is installed in or on a building. Fit the specimen into or against the chamber opening. The outdoor side of the specimen shall face



NOTE 1—Width of typical specimen if no corners are included in system or project.

NOTE 2—Include vertical expansion joint corners and end (jamb) conditions in test specimen if such items are part of system or project wall. If water testing is to be performed, place one expansion joint in lower third of specimen.

NOTE 3—See 8.1.2 for structural support requirements at specimen perimeter.

FIG. 3 Typical Unit/Panel System Test Specimen Concept

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 used in installing the unit in a building, or if this is impractical, by the same number of other comparable fasteners, located in the same way as in the intended installations.

11.1.1 If air flow through the test specimen is such that the specified pressure cannot be maintained (for example, flow in excess of blower equipment capacity), then the cracks and joints through which air leakage is occurring shall be sealed using tape or other means that will effectively stop the leakage of air. The means to stop air leakage shall not restrict any relative movement between specimen components. As an alternative, cover the entire specimen and mounting panel with a single thickness of polyethylene film no thicker than 0.05 mm (0.002 in.). The technique of application is important to ensure that the maximum load is transferred to the specimen and that the membrane does not prevent movement or failure of the specimen. Apply the film loosely with extra folds of material at each corner and at all offsets and recesses. When the load is applied, there shall be no fillet caused by tightness of plastic film.

11.2 *Procedure A*—Use the following procedure when a load-deflection curve is not required:

11.2.1 Check the specimen for proper adjustment.~~ O~~ For operable specimens, open, close, and lock each ventilator, sash, or door five times after adjustments and prior to testing.

11.2.2 Install any required deflection-measuring devices at their specified locations.

11.2.3 Apply a pre-load of one half of the~~ maximum~~ test load and hold for 10 s. Release the pressure difference across the specimen and, after a recovery period to allow stabilization of the test specimen,~~ record initial readings.~~ zero-out deflection-measuring devices. The recovery period for stabilization shall not be less than 1 min nor more than 5 min at zero load.

11.2.4 Unless otherwise specified, apply and maintain the~~ maximum~~ test load for not less than 10 s. Record~~ pertinent~~ deflection readings.

11.2.5 Reduce the pressure difference to zero and, after a recovery period to allow stabilization of the test specimen, record permanent deformation. The recovery period for stabilization shall not be less than 1 min nor more than 5 min at zero load.

11.2.6 Repeat steps 11.2.3 through 11.2.5 for the test load in the opposite loading direction.

11.2.7 In the opposite direction of the previous test load, apply a pre-load of one half of the proof load and hold for 10 s. Release the pressure difference across the specimen and, after a recovery period to allow stabilization of the test specimen, zero-out deflection-measuring devices. The recovery period for stabilization shall not be less than 1 min nor more than 5 min at zero load.

11.2.8 Unless otherwise specified, apply and maintain the proof load for not less than 10 s.

11.2.9 Reduce the pressure difference to zero and, after a recovery period to allow stabilization of the test specimen, record permanent deformation. The recovery period for stabilization shall not be less than 1 min, nor more than 5 min at zero load.

11.2.10 Repeat steps 11.2.7 through 11.2.9 for the proof load in the opposite loading direction.

11.2.11 If glass breakage occurs ~~before the maximum~~ at any test ~~load is reached,~~ load, carefully examine the test specimen to determine the cause of the breakage. If the breakage was caused by deformation or failure of the supporting frame of the glass, by loosening or failure of any fasteners, or by damage to the glass caused by interaction between the glass and its supporting elements, record the findings and discontinue the test. If the breakage was not caused by any of the above named structural problems, replace the glass using the original fasteners and ~~repeat~~ continue the ~~maximum~~ test ~~load portion of~~ at the ~~test.~~ load where glass breakage occurred. If new structural elements or fasteners are used instead of the original ones, repeat the entire test.

NOTE 4—The probability of glass breakage is directly related to the duration of the load on the glass. To reduce the probability of glass breakage during the testing, the load application time (time to apply, maintain, and release load) should be minimized.

~~11.2.7 Repeat the procedure in the reverse loading direction.~~

11.3 *Procedure B*—Use the following procedure when the determination of a load-deflection curve is required:

11.3.1 Follow 11.2.1 and 11.2.2.

11.3.2 Apply a load of one half of the specified maximum test load and hold for 10 s unless otherwise specified. Release the pressure difference across the specimen and, after a recovery period to allow stabilization of the test specimen, ~~record initial readings.~~ zero-out deflection-measuring devices. The recovery period for stabilization shall not be less than 1 min nor more than 5 min at zero load.

11.3.3 Apply the load in the number of increments specified up to the specified maximum test load. The specifier shall determine the number of increments to be used in this test, not to be less than four approximately equal increments to maximum test load. At each increment, unless otherwise specified, apply and maintain the full test load for 10 s, unless otherwise specified, and record pertinent deflection readings.

11.3.4 Release the pressure difference and, after a recovery period to allow stabilization of the test specimen, record permanent deformation. The recovery period for stabilization shall not be less than 1 min nor more than 5 min at zero load.

11.3.5 When the behavior of the specimen under load indicates that sudden failure may occur and damage the measuring devices, the deflection measuring devices may be removed and the load continuously increased until the maximum test load or the maximum load that can be sustained is reached. At this point, release the load and after a recovery period to allow stabilization of the test specimen, record permanent deformation. The recovery period for stabilization shall not be less than 1 min nor more than 5 min at zero load.

11.3.6 If glass breakage occurs, follow the procedure described in 11.2.~~6~~11.

12. Report

12.1 Report the following information:

12.1.1 Date of the test and the report.

12.1.2 Identification of the specimen (manufacturer, source of supply, dimensions, model types, material, specimen selection procedure, and other pertinent information).

12.1.3 Detailed drawings of the specimen, showing dimensioned section profiles, sash or door dimensions and arrangement, framing location, panel arrangement, installation and spacing of anchorage, weatherstripping, locking arrangement, hardware, sealants, glazing details, test specimen sealing methods, 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 on the drawings and in the report.

12.1.4 For window and door components, a description of the type, quantity, and location(s) of the locking and operating hardware.

12.1.5 Glass thickness and type, and method of glazing. Include in the report a statement that, "No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen are to be drawn from the test."

12.1.6 *Procedure A*—A tabulation of pressure differences exerted across the specimen, their durations during all tests, and the deflections and permanent deformations at locations specified for each specimen tested.

12.1.7 *Procedure B*—A tabulation of the number of test load increments, the pressure differences exerted across the specimen at these increments, their durations, the pertinent deflections at these pressure differences, and permanent deformations at locations specified for each specimen tested.

12.1.8 The duration of maximum test loads, including incremental loads for Procedure B.

12.1.9 A record of visual observations of performance.

12.1.10 When the tests are made to check conformity of the specimen to a particular specification, an identification or description of that specification.

12.1.11 A statement that the tests were conducted in accordance with this test method, or a full description of any deviations from this test method.

12.1.12 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.

12.1.13 The name of the author of the report.

12.1.14 The names and addresses of both the testing agency that conducted the tests and the requester of the tests.

12.1.15 Ambient conditions, including temperature, before and during tests.

12.1.16 Signatures of persons responsible for supervision of the tests and a list of official observers.

12.1.17 Other data, useful to the understanding of the test report, as determined by the laboratory or specifier, shall either be included within the report or appended to the report.

12.2 If several essentially identical specimens of a component are tested, results for all specimens shall be reported, each specimen being properly identified, particularly with respect to distinguishing features or differing adjustments. A separate drawing for each specimen will not be required if all differences between them are noted on the drawings provided.

13. Precision and Bias

13.1 No statement is made either on the precision or bias of this test method for measuring structural performance, since this method merely states whether or not the test specimen sustained the loads applied and otherwise conformed to the criteria specified for success.

14. Keywords

14.1 curtain wall; deflection; deformation; distress; door; load; pressure chamber; specimen; support; window

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