

CHAPTER 17

SPECIAL INSPECTIONS AND TESTS

SECTION 1701 GENERAL

1701.1 Scope. The provisions of this chapter shall govern the quality, workmanship and requirements for materials covered. Materials of construction and tests shall conform to the applicable standards listed in this code.

1701.2 New materials. New building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this chapter and in the *approved* rules to determine character, quality and limitations of use.

1701.3 Used materials. The use of second-hand materials that meet the minimum requirements of this code for new materials shall be permitted.

SECTION 1702 DEFINITIONS

1702.1 Definitions. The following terms are defined in Chapter 2:

APPROVED AGENCY.

APPROVED FABRICATOR.

CERTIFICATE OF COMPLIANCE.

DESIGNATED SEISMIC SYSTEM.

FABRICATED ITEM.

■ **GARAGE DOOR MANUFACTURER.**

■ **INSPECTION CERTIFICATE.**

INTUMESCENT FIRE-RESISTANT COATINGS.

MAIN WINDFORCE-RESISTING SYSTEM.

MASTIC FIRE-RESISTANT COATINGS.

■ **SPECIAL INSPECTION. Reserved.**

■ **Continuous special inspection. Reserved.**

■ **Periodic special inspection. Reserved.**

■ **SPECIAL INSPECTOR. Reserved.**

SPRAYED FIRE-RESISTANT MATERIALS.

■ **STRUCTURAL OBSERVATION. Reserved.**

SECTION 1703 APPROVALS

1703.1 Approved agency. An *approved agency* shall provide all information as necessary for the *building official* to determine that the agency meets the applicable requirements.

1703.1.1 Independence. An *approved agency* shall be objective, competent and independent from the contractor

responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed.

1703.1.2 Equipment. An *approved agency* shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

1703.1.3 Personnel. An *approved agency* shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections.

1703.2 Written approval. Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be *approved* in writing after satisfactory completion of the required tests and submission of required test reports.

1703.3 Approved record. For any material, appliance, equipment, system or method of construction that has been *approved*, a record of such approval, including the conditions and limitations of the approval, shall be kept on file in the *building official's* office and shall be open to public inspection at appropriate times.

1703.4 Performance. Specific information consisting of test reports conducted by an *approved* testing agency in accordance with the appropriate referenced standards, or other such information as necessary, shall be provided for the *building official* to determine that the material meets the applicable code requirements.

1703.4.1 Research and investigation. Sufficient technical data shall be submitted to the *building official* to substantiate the proposed use of any material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the *building official* shall approve the use of the material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the applicant.

1703.4.2 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

1703.5 Labeling. Where materials or assemblies are required by this code to be *labeled*, such materials and assemblies shall be *labeled* by an *approved agency* in accordance with Section 1703. Products and materials required to be labeled shall be labeled in accordance with the procedures set forth in Sections 1703.5.1 through 1703.5.4.

1703.5.1 Testing. An *approved agency* shall test a representative sample of the product or material being *labeled* to the relevant standard or standards. The *approved agency* shall maintain a record of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

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1703.5.2 Inspection and identification. The *approved agency* shall periodically perform an inspection, which shall be in-plant if necessary, of the product or material that is to be *labeled*. The inspection shall verify that the labeled product or material is representative of the product or material tested.

1703.5.3 Label information. The *label* shall contain the manufacturer's or distributor's identification, model number, serial number or definitive information describing the product or material's performance characteristics and *approved agency's* identification.

1703.5.4 Method of labeling. Information required to be permanently identified on the product shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

1703.6 Evaluation and follow-up inspection services. Where structural components or other items regulated by this code are not visible for inspection after completion of a prefabricated assembly, the applicant shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the *building official* to determine conformance to this code. Such a report shall be *approved* by the *building official*.

1703.6.1 Follow-up inspection. **Reserved.**

1703.6.2 Test and inspection records. Copies of necessary test and inspection records shall be filed with the *building official*.

SECTION 1704 SPECIAL INSPECTIONS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATIONS **RESERVED**

SECTION 1705 REQUIRED VERIFICATION AND INSPECTION **RESERVED**

SECTION 1706 DESIGN STRENGTHS OF MATERIALS

1706.1 Conformance to standards. The design strengths and permissible stresses of any structural material that are identified by a manufacturer's designation as to manufacture and grade by mill tests, or the strength and stress grade is otherwise confirmed to the satisfaction of the *building official*, shall conform to the specifications and methods of design of accepted engineering practice or the *approved* rules in the absence of applicable standards.

1706.2 New materials. For materials that are not specifically provided for in this code, the design strengths and permissible

stresses shall be established by tests as provided for in Section 1707.

SECTION 1707 ALTERNATIVE TEST PROCEDURE

1707.1 General. In the absence of *approved* rules or other *approved* standards, the *building official* shall make, or cause to be made, the necessary tests and investigations; or the *building official* shall accept duly authenticated reports from *approved agencies* in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11. The cost of all tests and other investigations required under the provisions of this code shall be borne by the applicant.

SECTION 1708 TEST SAFE LOAD

1708.1 Where required. Where proposed construction is not capable of being designed by *approved* engineering analysis, or where proposed construction design method does not comply with the applicable material design standard, the system of construction or the structural unit and the connections shall be subjected to the tests prescribed in Section 1710. The *building official* shall accept certified reports of such tests conducted by an *approved* testing agency, provided that such tests meet the requirements of this code and *approved* procedures.

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SECTION 1709 IN-SITU LOAD TESTS

1709.1 General. Whenever there is a reasonable doubt as to the stability or load-bearing capacity of a completed building, structure or portion thereof for the expected loads, an engineering assessment shall be required. The engineering assessment shall involve either a structural analysis or an in-situ load test, or both. The structural analysis shall be based on actual material properties and other as-built conditions that affect stability or load-bearing capacity, and shall be conducted in accordance with the applicable design standard. If the structural assessment determines that the load-bearing capacity is less than that required by the code, load tests shall be conducted in accordance with Section 1709.2. If the building, structure or portion thereof is found to have inadequate stability or load-bearing capacity for the expected loads, modifications to ensure structural adequacy or the removal of the inadequate construction shall be required.

1709.2 Test standards. Structural components and assemblies shall be tested in accordance with the appropriate referenced standards. In the absence of a standard that contains an applicable load test procedure, the test procedure shall be developed by a *registered design professional* and *approved*. The test procedure shall simulate loads and conditions of application that the completed structure or portion thereof will be subjected to in normal use.

1709.3 In-situ load tests. In-situ load tests shall be conducted in accordance with Section 1709.3.1 or 1709.3.2 and

shall be supervised by a *registered design professional*. The test shall simulate the applicable loading conditions specified in Chapter 16 as necessary to address the concerns regarding structural stability of the building, structure or portion thereof.

1709.3.1 Load test procedure specified. Where a referenced standard contains an applicable load test procedure and acceptance criteria, the test procedure and acceptance criteria in the standard shall apply. In the absence of specific load factors or acceptance criteria, the load factors and acceptance criteria in Section 1709.3.2 shall apply.

1709.3.2 Load test procedure not specified. In the absence of applicable load test procedures contained within a standard referenced by this code or acceptance criteria for a specific material or method of construction, such *existing structure* shall be subjected to a test procedure developed by a *registered design professional* that simulates applicable loading and deformation conditions. For components that are not a part of the seismic load-resisting system, the test load shall be equal to two times the unfactored design loads. The test load shall be left in place for a period of 24 hours. The structure shall be considered to have successfully met the test requirements where the following criteria are satisfied:

1. Under the design load, the deflection shall not exceed the limitations specified in Section 1604.3.
2. Within 24 hours after removal of the test load, the structure shall have recovered not less than 75 percent of the maximum deflection.
3. During and immediately after the test, the structure shall not show evidence of failure.

SECTION 1710 PRECONSTRUCTION LOAD TESTS

1710.1 General. In evaluating the physical properties of materials and methods of construction that are not capable of being designed by *approved* engineering analysis or do not comply with the applicable referenced standards, the structural adequacy shall be predetermined based on the load test criteria established in this section.

1710.2 Load test procedures specified. Where specific load test procedures, load factors and acceptance criteria are included in the applicable referenced standards, such test procedures, load factors and acceptance criteria shall apply. In the absence of specific test procedures, load factors or acceptance criteria, the corresponding provisions in Section 1710.3 shall apply.

1710.3 Load test procedures not specified. Where load test procedures are not specified in the applicable referenced standards, the load-bearing and deformation capacity of structural components and assemblies shall be determined on the basis of a test procedure developed by a *registered design professional* that simulates applicable loading and deformation conditions. For components and assemblies that are not a part of the seismic force-resisting system, the test shall be as specified in Section 1710.3.1. Load tests shall simulate the applicable loading conditions specified in Chapter 16.

1710.3.1 Test procedure. The test assembly shall be subjected to an increasing superimposed load equal to not less than two times the superimposed design load. The test load shall be left in place for a period of 24 hours. The tested assembly shall be considered to have successfully met the test requirements if the assembly recovers not less than 75 percent of the maximum deflection within 24 hours after the removal of the test load. The test assembly shall then be reloaded and subjected to an increasing superimposed load until either structural failure occurs or the superimposed load is equal to two and one-half times the load at which the deflection limitations specified in Section 1710.3.2 were reached, or the load is equal to two and one-half times the superimposed design load. In the case of structural components and assemblies for which deflection limitations are not specified in Section 1710.3.2, the test specimen shall be subjected to an increasing superimposed load until structural failure occurs or the load is equal to two and one-half times the desired superimposed design load. The allowable superimposed design load shall be taken as the lesser of:

1. The load at the deflection limitation given in Section 1710.3.2.
2. The failure load divided by 2.5.
3. The maximum load applied divided by 2.5.

1710.3.2 Deflection. The deflection of structural members under the design load shall not exceed the limitations in Section 1604.3. **The High-Velocity Hurricane Zone (HVHZ) shall comply with Section 1616.3.1.**

1710.4 Wall and partition assemblies. *Load-bearing wall* and partition assemblies shall sustain the test load both with and without window framing. The test load shall include all design load components. Wall and partition assemblies shall be tested both with and without door and window framing.

1710.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1710.5.1 or 1710.5.2. **The design pressures, as determined from ASCE 7, are permitted to be multiplied by 0.6.**

1710.5.1 Exterior windows and doors. Exterior windows and doors shall be tested **by an approved independent testing laboratory, and shall be labeled to indicate compliance with the requirements of one of the following specifications: ANSI/AAMA/NWDA 101/I.S. 2 or ANSI/AAMA/WDMA/101/I.S.2/NAFS or AAMA/WDMA/CSA101/I.S.2/A440 or TAS 202 (HVHZ shall comply with TAS 202 utilizing ASTM E 1300 or Section 2404).**

1710.5.1.1 Exterior windows and doors shall be labeled with a permanent label, marking, or etching providing traceability to the manufacturer and product. The following shall also be required either on a permanent label or on a temporary supplemental label applied by the manufacturer: information identifying the manufacturer, the product model/series number, positive and negative design pressure rating, product maximum size, glazing thickness, impact-resistance rating if applicable, Florida product approval number or Miami-Dade

product approval number, applicable test standard(s), and approved product certification agency, testing laboratory, evaluation entity or Miami-Dade product approval.

The labels are limited to one design pressure rating per reference standard. The temporary supplemental label shall remain on the window or door until final approval by the building official.

Exceptions:

1. Door assemblies installed in nonhabitable areas where the door assembly and area are designed to accept water infiltration need not be tested for water infiltration.
2. Door assemblies installed where the overhang (OH) ratio is equal to or more than 1 need not be tested for water infiltration. The overhang ratio shall be calculated by the following equation:

$$\text{OH ratio} = \text{OH Length} / \text{OH Height}$$

Where:

OH length = The horizontal measure of how far an overhang over a door projects out from door surface.

OH height = The vertical measure of the distance from the door sill to the bottom of the overhang over a door.

3. Structural wind load design pressures for window and door units other than the size tested in accordance with Section 1710.5.1 shall be permitted to be different than the design value of the tested unit provided such different pressures are determined by accepted engineering analysis or validated by an additional test of the window or door unit to the different design pressure in accordance with Section 1710.5.1. All components of the alternate size unit shall be the same as the tested or labeled unit.
 - i. Operable windows and doors rated in this manner shall comply with the following:
 1. The frame area of the alternate size unit shall not exceed the frame area of the tested approved unit.
 2. Shall vary from the tested approved unit only in width, height or load requirements.
 3. Shall not exceed 100 percent of the proportional deflection for fiber stress of the intermediate members of the approved unit.
 4. Shall not exceed 100 percent of the concentrated load at the juncture of the intermediate members and the frame of the approved unit.

5. Shall not exceed the air and water infiltration resistance of the tested approved unit.
6. Shall not exceed the maximum cyclic pressure of the tested approved unit when tested per TAS 201 and TAS 203 or ASTM E 1886 and ASTM E 1996, where applicable.
- ii. Nonoperable windows and doors rated in this manner shall comply with the following:
 1. The frame area of the alternate size unit shall not exceed the frame area of the tested approved unit.
 2. Shall vary from the tested approved unit only in width, height or load requirements.
 3. The maximum uniform load distribution (ULD) of any side shall be equal to the uniform load carried by the side divided by the length of the side.
 4. The ULD of any member shall not exceed the ULD of the corresponding member of the tested approved unit.
 5. The ULD of each member shall be calculated in accordance with standard engineering analysis.
 6. Shall not exceed the air and water infiltration resistance of the tested approved unit.
 7. Shall not exceed the maximum cyclic pressure of the tested approved unit when tested per TAS 201 and 203 or ASTM E 1886 and ASTM E 1996, where applicable.
4. For window and door units tested in accordance with Section 1710.5.2, structural wind load design pressures for window and door units other than the size tested in accordance with Section 1710.5.2 shall be permitted to be different than the design value of the tested unit provided such different pressures are determined by accepted engineering analysis or validated by an additional test of the window or door unit to the different design pressure in accordance with Section 1710.5.2. All components of the alternate size unit shall be the same as the tested unit. Where engineering analysis is used, the glass shall comply with Section 2403, and subsection i and ii of Exception 3, above.
5. Pass-through windows for serving from a single-family kitchen, where protected by a roof overhang of 5 feet (1.5 m) or more shall be exempted from the requirements of the water infiltration test.

1710.5.1.2 Glass strength. Products tested and labeled as conforming to ANSI/AAMA/NWDA 101/I.S.2 or ANSI/AAMA/WDMA/101/I.S.2/NAFS or AAMA/WDMA/CSA 101/I.S.2/A440 or TAS 202 shall not be subject to the requirements of Section 2403.2, 2403.3 or 2404.1. Determination of load resistance of glass for specific loads of products not tested and certified in accordance with Section 1710.5.1 shall be designed to comply with ASTM E 1300 in accordance with Section 2404.

1710.5.2 Exterior windows and door assemblies not provided for in Section 1710.5.1. Exterior window and door assemblies shall be tested in accordance with ASTM E 330 or TAS 202. HVHZ shall comply with TAS 202. Exterior window and door assemblies containing glass shall comply with Section 2403. The design pressure for testing shall be calculated in accordance with Chapter 16. Each assembly shall be tested for 10 seconds at a load equal to 1.5 times the design pressure (HVHZ shall comply with TAS 202).

Exceptions:

1. Door assemblies installed in nonhabitable areas where the door assembly and area are designed to accept water infiltration, need not be tested for water infiltration.
2. Door assemblies installed where the overhang (OH) ratio is equal to or more than 1 need not be tested for water infiltration. The overhang ratio shall be calculated by the following equation:
OH ratio = OH Length/OH Height
where:
OH Length = The horizontal measure of how far an overhang over a door projects out from the door's surface.
OH Height = The vertical measure of the distance from the door's sill to the bottom of the overhang over a door.
3. Custom doors. Custom (one-of-a-kind) exterior door assemblies shall be tested by an approved testing laboratory or be engineered in accordance with accepted engineering practices.

1710.5.2.1 Sectional garage doors and rolling doors. Sectional garage doors and rolling doors shall be tested for determination of structural performance under uniform static air pressure difference in accordance with ANSI/DASMA 108, ASTM E 330 Procedure A, or TAS 202. For sectional garage doors and rolling doors tested in accordance with ASTM E 330, acceptance criteria shall be in accordance with ANSI/DASMA 108. (HVHZ shall comply with TAS 202.) Design pressures shall be determined from Table 1609.7(1) or ASCE 7. The design pressures, as determined from ASCE 7, are permitted to be multiplied by 0.6.

1710.5.2.1.1 Garage door labeling. Garage doors shall be labeled with a permanent label provided by the garage door manufacturer. The label shall iden-

tify the garage door manufacturer, the garage door model/series number, the positive and negative design pressure rating; indicate impact rated if applicable; the installation instruction drawing reference number; the Florida product approval or Miami-Dade product approval number if applicable; and the applicable test standards. The required garage door components for an approved garage door assembly may be indicated using a checklist form on the label. If a checklist format is used on the label, the door installer or the garage door manufacturer shall mark the selected components on the checklist that are required to assemble an approved garage door system. The installation instructions shall be provided and available on the job site.

1710.5.3 Mullions. Mullions or mullioned fenestration assemblies shall be tested by an approved testing laboratory in accordance with either ASTM E 330, or TAS 202 (HVHZ shall comply with TAS 202), or shall be engineered using accepted engineering practice such as AAMA 450. Mullions tested as stand-alone units or qualified by engineering shall use performance criteria cited in Sections 1710.5.3.1, 1710.5.3.2 and 1710.5.3.3.

1710.5.3.1 Load transfer. Mullions shall be designed to transfer the design pressure loads applied by the window and door assemblies to the rough opening substrate.

1710.5.3.2 Deflection. Mullions shall be capable of resisting the design pressure loads applied by the window and door assemblies to be supported without deflecting more than $L/175$, where L is the span of the mullion in inches.

1710.5.3.3 Structural safety factor. Mullions that are tested by an approved testing laboratory shall be capable of resisting a load of 1.5 times the design pressure loads applied by the window and door assemblies to be supported. The design pressures, as determined from ASCE 7, are permitted to be multiplied by 0.6. Mullions that are qualified by engineering shall be capable of resisting the design pressure loads applied by the window and door assemblies to be supported without exceeding the allowable stress of the mullion elements.

1710.5.4 Glazed curtain wall, window wall and storefront systems shall be tested in accordance with the requirements of this section and the laboratory test requirements of the American Architectural Manufacturers Association (AAMA) Standard 501, HVHZ shall comply with Section 2411.3.2.1.1.

1710.5.5 Door components evaluated by an approved product evaluation entity, certification agency, testing laboratory or engineer may be interchangeable in exterior door assemblies provided that the door components provide equal or greater structural performance as demonstrated by accepted engineering practices.

1710.6 Skylights and sloped glazing. Skylights and sloped glazing shall comply with the requirements of Chapter 24. All skylights and sloped glazing in the HVHZ shall comply with TAS 202.

1710.7 Test specimens. Test specimens and construction shall be representative of the materials, workmanship and details normally used in practice. The properties of the materials used to construct the test assembly shall be determined on the basis of tests on samples taken from the load assembly or on representative samples (when TAS 202 is used, a minimum of three specimens) of the materials used to construct the load test assembly. Required tests shall be conducted or witnessed by an *approved agency*.

1710.8 Impact resistant coverings.

1710.8.1 Labels. A permanent label shall be provided by the product approval holder on all impact-resistant coverings.

1710.8.2 The following information shall be included on the labels on impact-resistant coverings:

1. Product approval holder name and address.
2. All applicable methods of approval. Methods of approval include, but are not limited to Miami-Dade NOA; Florida Building Commission, TDI Product Evaluation; ICC-ES.
3. The test standard or standards specified in Section 1609.1.2, including standards referenced within the test standards specified in Section 1609.1.2 used to demonstrate code compliance.
4. For products with a Florida product approval number or a Miami-Dade County Building and Neighborhood Compliance Department Notice of Acceptance Number (NOA), such numbers shall be included on the label.

1710.8.3 Location of label. The location of the label on the impact-resistant covering shall be as follows:

1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.
2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.
3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the shutter.
4. Panels: For metal and plastic panels, the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the holder of the product approval and shall face the exterior or outside.
5. Framed products: The label shall be on the side or bottom facing the exterior or outside.
6. Labels on all other products shall face the exterior or outside.

1710.8.4 Installation. All impact-resistant coverings shall be installed in accordance with the manufacturer's installation instructions and in accordance with the product approval. Installation instructions shall be provided and shall be available to inspection personnel on the job site. Opening protection components, fasteners, and other parts evaluated by an approved product evaluation entity, certification agency, testing laboratory, architect, or engineer

and approved by the holder of the product approval may be interchangeable in opening protection assemblies provided that the opening protection component(s) provide equal or greater structural performance and durability as demonstrated by testing in accordance with approved test standards.

1710.9 Soffit.

1710.9.1 Product approval. Manufactured soffit materials and systems shall be subject to statewide or local product approval as specified in *Florida Administrative Code (FAC) Rule 61G-20-3* and *Section 553.8425, Florida Statutes*. The net free area of the manufactured soffit material or system shall be included in the product approval submittal documents.

1710.9.2 Labels. Individual manufactured soffit pieces shall be marked at not more than 4 feet (1.2 m) on center with a number or marking that ties the product back to the manufacturer.

1710.9.3 The following information shall be included on the manufactured soffit material packaging or on the individual manufactured soffit material or system pieces:

1. Product approval holder and/or manufacturer name and city and state of manufacturing plant.
2. Product model number or name.
3. Method of approval and approval numbers as applicable. Methods of approval include, but are not limited to: Florida Building Commission FL #; Miami-Dade NOA; TDI Product Evaluation; and ICC-ES.
4. The test standard or standards specified in Chapter 14 used to demonstrate code compliance.
5. The net free area shall be included on the packaging or label.

1710.9.4 Installation. All manufactured soffit materials shall be installed in accordance with the manufacturer's installation instructions and in accordance with the product approval. Installation instructions shall be provided and shall be available to inspection personnel on the job site. Soffit pieces, components, fasteners, and other parts evaluated by an approved product evaluation entity, certification agency, testing laboratory, architect, or engineer and approved by the holder of the product approval may be interchangeable in manufactured soffit systems provided that the soffit system component or components provide equal or greater structural performance and durability as demonstrated by testing in accordance with approved test standards.

All exterior wall coverings and soffits shall be capable of resisting the design pressures specified for walls for components and cladding loads in accordance with Section 1609.1. Manufactured soffits shall be tested at 1.5 times the design pressure. The design pressures, as determined from ASCE 7, are permitted to be multiplied by 0.6.

1710.10 Masonry, concrete or other structural substrate. Where the wood shim or buck thickness is less than 1½ inches (38 mm), window and door assemblies shall be anchored through the main frame or by jamb clip or subframe

system, in accordance with the manufacturer's published installation instructions. Anchors shall be securely fastened directly into the masonry, concrete or other structural substrate material. Unless otherwise tested, bucks shall extend beyond the interior face of the window or door frame such that full support of the frame is provided. Shims shall be made from materials capable of sustaining applicable loads, located and applied in a thickness capable of sustaining applicable loads. Anchors shall be provided to transfer load from the window or door frame to the rough opening substrate.

Where the wood buck thickness is $1\frac{1}{2}$ inches (38 mm) or greater, the buck shall be securely fastened to transfer load to the masonry, concrete or other structural substrate and the buck shall extend beyond the interior face of the window or door frame. Window and door assemblies shall be anchored through the main frame or by jamb clip or subframe system or through the flange to the secured wood buck in accordance with the manufacturer's published installation instructions. Unless otherwise tested, bucks shall extend beyond the interior face of the window or door frame such that full support of the frame is provided. Shims shall be made from materials capable of sustaining applicable loads, located and applied in a thickness capable of sustaining applicable loads. Anchors shall be provided to transfer load from the window or door frame assembly to the secured wood buck.

SECTION 1711 MATERIAL AND TEST STANDARDS

1711.1 Joist hangers and connectors. Testing of joist hangers and similar connectors shall be in accordance with either Section 1711.1.1 or 1711.1.2, as applicable.

1711.1.1 Test procedure using ASTM D 7147. The allowable load of joist hangers and similar connectors shall be permitted to be determined using ASTM D 7147.

1711.1.2 Test procedure using ASTM D 1761. The allowable vertical load-bearing capacity, torsional moment capacity and deflection characteristics of joist hangers and similar connectors shall be permitted to be determined in accordance with ASTM D 1761 using lumber having a specific gravity of 0.49 or greater, but not greater than 0.55, as determined in accordance with AF&PA NDS for the joist and headers.

Exception: The joist length shall not be required to exceed 24 inches (610 mm).

1711.1.2.1 Vertical load capacity for joist hangers and similar connectors. The vertical load-bearing capacity for the joist hanger or connector shall be determined by testing a minimum of three joist hanger or connector assemblies as specified in ASTM D 1761. If the ultimate vertical load for any one of the tests varies more than 20 percent from the average ultimate vertical load, at least three additional tests shall be conducted. The allowable vertical load-bearing of the joist hanger

shall be the lowest value determined from the following:

1. The lowest ultimate vertical load for a single hanger or connector from any test divided by three (where three tests are conducted and each ultimate vertical load does not vary more than 20 percent from the average ultimate vertical load).
2. The average ultimate vertical load for a single hanger or connector from all tests divided by three (where six or more tests are conducted).
3. The average from all tests of the vertical loads that produce a vertical movement of the joist with respect to the header of $\frac{1}{8}$ inch (3.2 mm).
4. The sum of the allowable design loads for nails or other fasteners utilized to secure the joist hanger or connector to the wood members and allowable bearing loads that contribute to the capacity of the hanger.
5. The allowable design load for the wood members forming the connection.

1711.1.2.2 Design value modifications for joist hangers and connectors. Allowable design values for joist hangers and connectors that are determined by Item 4 or 5 in Section 1711.1.2.1 shall be permitted to be modified by the appropriate load duration factors as specified in AF&PA NDS but shall not exceed the direct loads as determined by Item 1, 2 or 3 in Section 1711.1.2.1. Allowable design values determined by Item 1, 2 or 3 in Section 1711.1.2.1 shall not be modified by load duration factors.

1711.1.2.3 Torsional moment capacity for joist hangers. The torsional moment capacity for the joist hanger shall be determined by testing at least three joist hanger assemblies as specified in ASTM D 1761. The allowable torsional moment of the joist hanger shall be the average torsional moment at which the lateral movement of the top or bottom of the joist with respect to the original position of the joist is $\frac{1}{8}$ inch (3.2 mm).

1711.2 Concrete and clay roof tiles. Testing of concrete and clay roof tiles shall be in accordance with Sections 1711.2.1 and 1711.2.2, as applicable.

1711.2.1 Overturning resistance. Concrete and clay roof tiles shall be tested to determine their resistance to overturning due to wind in accordance with SBCCI SSTD 11 or TAS 108 (High-Velocity Hurricane Zones shall comply with TAS 108) and Chapter 15.

1711.2.2 Wind tunnel testing. Where concrete and clay roof tiles do not satisfy the limitations in Chapter 16 for rigid tile, a wind tunnel test shall be used to determine the wind characteristics of the concrete or clay tile roof covering in accordance with SBCCI SSTD 11 or TAS 108 (High-Velocity Hurricane Zones shall comply with TAS 108) and Chapter 15.

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