

Sections 2410-2415 HVHZ

SECTION 2410 HIGH-VELOCITY HURRICANE ZONES — GENERAL

2410.1 Exterior wall cladding, surfacing and glazing, where provided, shall be as set forth in Sections 2410 through 2415.

2410.2 Exterior wall cladding, surfacing and glazing shall be designed and constructed to sufficiently resist the full pressurization from the wind loads prescribed in Chapter 16 (High-Velocity Hurricane Zones) and the concentrated loads that result from hurricane-generated wind-borne debris.

1. Exterior wall cladding, surfacing and glazing, within the lowest 30 feet (9.1 m) of the exterior building walls shall be of sufficient strength to resist large missile impacts as outlined in Chapter 16 (High-Velocity Hurricane Zones).

2. Exterior wall cladding, surfacing and glazing located above the lowest 30 feet (9.1 mm) of the exterior building walls shall be of sufficient strength to resist small missile impacts as outlined in Chapter 16 (High-Velocity Hurricane Zones).

Exception: Exterior wall cladding, surfacing and glazing when protected by fixed, operable or portable shutters or screens which have product approval to resist full pressurization from wind loads as well as large and small missile impacts as outlined in the high-velocity hurricane provisions of Chapter 16, without deforming to the point where the substrate being protected is compromised.

2410.3 Workmanship. Cladding and glazing shall be in conformance with the tolerances, quality and methods of construction as set forth in the standard referenced in Chapter 35.

2410.4 All exterior wall cladding, surfacing, garage doors, skylights, operative and inoperative windows shall have Product Approval.

SECTION 2411 HIGH-VELOCITY HURRICANE ZONES—WINDOWS, DOORS, GLASS AND GLAZING

2411.1 General.

2411.1.1 Windows, doors, glass and glazing shall be as set forth in this section.

2411.1.2 Glass shall comply with ASTM C 1036 requirements for flat glass Type I and II and GSA DD-G-451c Standard for Glass, Flat and Corrugated, for Glazing Mirrors and Other Uses.

2411.1.3 Tempered glass shall comply with 16 CFR 1201.

2411.1.4 Transparent and obscure safety glazing shall conform to the Performance Specifications and Methods of Test for Transparent Safety Glazing Materials Used in Buildings, ANSI Z 97.1.

2411.1.5 Heat-strengthened and ceramic-coated spandrel glass shall comply with ASTM C 1048.

2411.1.6 Wired glass shall comply with ANSI Z 97.1 and shall only be used in fire doors and in glazed panels where safety glazing is not required.

2411.1.7 Installed glass shall not be less than Single-Strength B quality unless otherwise approved by the building official, and where edges are exposed they shall be seamed or ground.

2411.1.8 Where a light of glass is of such height above grade that the top 50 percent or more is in a zone of greater wind load, the area of the entire light shall be limited as for the greater height above grade.

2411.1.9 Replacement of any glazing or part thereof shall be designed and constructed in accordance with Chapter 34, Existing Buildings Provisions for High-Velocity Hurricane Zones.

~~2411.1.10 Replacement of glazing of more than one light or more than 30 percent of the total area glazed shall conform to the requirements of the section. [3470]~~

2411.1.10 14 Fixed glazing used as an exterior component shall require product approval. ~~Comparative Rational~~ analysis in compliance with 2411.3.2.6 by a Florida-registered engineer or architect may be accepted when the actual pressure and geometry conditions differ from the conditions shown in the approval. [3668]

2411.1.11 12 Exterior lite of glass in an insulated glass unit shall be safety glazed.

Exceptions:

1. Large missile impact-resistant glazed assemblies.

2. Nonmissile impact units protected with shutters. [3580]

2411.2 Fixed glass in exterior walls.

2411.2.1 Limits of size of glass.

2411.2.1.1 The minimum thickness of annealed float glazing materials used in exterior walls shall be determined and shall not be less than as set forth in ASTM E 1300.

2411.2.1.2 For glazing materials other than annealed float use the glazing material resistance factors used in ASTM E 1300.

2411.2.1.3 Corrugated glass and other special glass shall be limited to spans determined by analysis and test to resist the loads set forth in Chapter 16 (High Wind Zones) based on fiber stresses not exceeding 4000 psi (27.58 MPa).

2411.2.1.4 Glass block shall have product approval.

2411.3 Doors and operative windows in exterior walls.

2411.3.1 Design and approval.

2411.3.1.1 The design and approval of sliding doors, swinging doors and operative windows in exterior walls, including the supporting members shall be based on the proposed use-height above grade in accordance with Chapter 16 (High-Velocity Hurricane Zones).

2411.3.1.2 Maximum glass sizes shall comply with ASTM E 1300.

2411.3.1.3 Glazing in sliding and in swinging doors shall be safety-glazing complying with 16 CFR 1201, Safety Standard for architectural glazing Materials, Consumer Product Safety Commission, and as described in Sections 2411.3.1.3.1 through 2411.3.1.3.5.

2411.3.1.3.1 Doors containing glazing material not greater than 9 square feet (0.84 m²) in surface area shall be classified as Category I glazing products.

2411.3.1.3.2 Doors, bath and shower enclosures, and sliding glass doors containing glazing material greater than 9 square feet (0.84 m²) in surface area shall be classified as Category II glazing products.

2411.3.1.3.3 Category I glazing products shall be capable of withstanding a 150 foot-pound (102 N-m) impact test.

2411.3.1.3.4 Category II glazing products shall be capable of withstanding a 400 foot-pound (542 N-m) impact test.

2411.3.1.3.5 Doors shall be designed to be readily operative without contact with the glass.

2411.3.1.4 The architect or professional engineer of record shall be required to specify the design wind pressure, determined in accordance with Chapter 16 (High- Velocity Hurricane Zones), for all garage doors, skylights operative windows and fixed glazing. The design wind pressure for each component of the exterior building surface, shall be incorporated into the building design drawing so as to allow the respective manufacturer to size the prefabricated assembly for the proper wind pressures.

2411.3.1.5 Exterior garage doors shall be designed and constructed to actively or passively lock in the closed position when subjected to a uniform lateral pressure in excess of 50 percent of the design wind pressure as prescribed in Chapter 16 (High-Velocity Hurricane Zones).

2411.3.1.6 The architect or professional engineer of record shall be required to detail on the drawings submitted for permit, rough opening dimensions, supporting framework, method of attachment and waterproofing procedures for all garage doors, passage doors, skylights, operative and inoperative windows in exterior walls. Said framework and method of attachment shall be designed and constructed so as to sufficiently resist the design wind pressures as outlined in Chapter 16 (High-Velocity Hurricane Zones).

Exception: When detailed engineered shop drawings, along with the notices of product approval, produced by the manufacturer's specialty engineer and approved by the architect or professional engineer of record, are admitted at the time of permit application, which completely identifies rough openings, supporting framework, method of attachment and waterproofing procedures are prepared and bear the signature and seal of a professional engineer.

2411.3.2 Tests.

2411.3.2.1 Operative window and door assemblies shall be tested in accordance with the requirements of this section, TAS 202 and provisions from ANSI/AAMA/MWWDA 101/IS 2, and the forced entry prevention requirements of the American Architectural Manufacturers Association (AAMA) Sections 1302.5 and 1303.5.

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'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. 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.

2411.3.2.1.1 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, following test load sequence and test load duration in TAS 202.

2411.3.2.2 Such assemblies with permanent muntin bars shall be tested with muntin bars in place.

2411.3.2.3 Such assemblies shall be installed in accordance with the conditions of test and approval.

2411.3.2.4 Test loads for inward and outward pressures shall be equal to the velocity pressures for the appropriate height in accordance with Chapter 16 (High-Velocity Hurricane Zones) as further modified by a factor of 1.5.

2411.3.2.5 Comparative analysis of operative windows and glazed doors may be made provided the proposed unit complies with the following:

1. Shall always be compared with a tested and currently approved unit.
2. Varies only in width, height and/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 conform as to extruded members, reinforcement and in all other ways with the tested approved unit.
5. Shall not exceed 100 percent of the concentrated load at the juncture of the intermediate members and the frame of the approved unit.

6. Shall not permit more air and water infiltration than the approved unit based on the height above grade.
7. Compared unit shall not exceed the maximum cyclic pressure when tested per TAS 203.

2411.3.2.6 Comparative analysis of fixed glass windows may be made provided the proposed unit complies with the following:

1. Shall always be compared with a tested and currently approved unit.
2. Varies only in width, height and/or load requirements.
3. The design is identical in all respects. e.g., extrusions, glazing system, joinery, fasteners, etc.
4. Shall not permit more air and water infiltration than the approved unit based on height above grade.
5. The maximum uniform load distribution (ULD) of any side is equal to the uniform load carried by the side divided by the length of the side.
6. The ULD of any member must not exceed the ULD of the corresponding member of the tested window.
7. The uniform load distribution on each member shall be calculated in accordance to Section 2, Engineering Design Rules, of the AAMA 103.3 Procedural Guide .
8. Compared unit shall not exceed the maximum cyclic pressure when tested per TAS 203.

2411.3.3 Construction details. Construction details for fixed glass shall comply with the requirements of this paragraph except that structural glazing as defined in Section 202 need not comply with this section, but shall comply with Section 2415.

2411.3.3.1 Each light of fixed glass more than 3 feet (914 mm) in width shall have two approved setting blocks or approved suspension clamps. Setting blocks shall be Neoprene 70-90 Shore A durometer hardness or approved equal.

2411.3.3.2 Fixed glass lights shall be set in corrosion-resistant metal frames and shall comply with applicable requirements of Chapter 16 (High-Velocity Hurricane Zones) for wind loads, allowable stresses and load tests. Fixed glass lights may be set in wood, metal or concrete frames as permitted for the types of construction by Chapter 3 through Chapter 6.

2411.3.3.3 Wood shall have been preservative treated or shall be of a durable species as defined in Section 2326.2.

2411.3.3.4 Attachment shall be as set forth in Chapter 16 (High-Velocity Hurricane Zones) and shall be corrosion-resistant.

2411.3.3.5 Glass in fixed lights shall be securely and continuously supported at the perimeter of each sheet unless the design is based on one or more unsupported edges. Supporting members such as division bars and mullions shall be designed by rational analysis to support the wind pressures set forth in Chapter 16 (High-Velocity Hurricane Zones). Supporting bars shall be attached at the ends to resist the loads set forth in Chapter 16 (High-Velocity Hurricane Zones).

2411.3.3.6 The depth of the glazing rabbet and depth of engagement in the rabbet, for fixed glass, shall be based on consideration of the dimensional reduction from deflection and the dimensional changes caused by temperature.

~~2411.3.3.7 Exterior lite of glass in an insulated glass unit shall be safety glazed.~~

Exceptions:

~~1. Large missile impact-resistant glazed assemblies.~~

~~2. Nonmissile impact units protected with shutters.~~

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2411.3.3.7 Exterior lite of glass in an insulated glass unit shall be safety glazed.

Exceptions:

1. Large missile impact-resistant glazed assemblies.
2. Nonmissile impact units protected with shutters.

2411.3.4 Gaskets used in glazing systems shall comply with the following standards as applicable:

1. ASTM C 864, Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
2. ASTM C 509, Elastomeric Cellular Preformed Gaskets and Sealing Material.
3. ASTM C 1115, Dense Elastomeric Silicone Rubber Gaskets and Accessories.
4. ASTM E 2203, Dense Thermoplastic Elastomers Used for Compression Seals, Gaskets, Setting Blocks, Spacers and Accessories.

2411.4 Glazed panel safeguards. Glazed panels shall be protected in accordance with this section.

2411.4.1 Where there is a drop of 4 feet (1219 mm) or more on the far side of fixed glazed panel 24 inches (610 mm) or more in width, the bottom of which is less than 36 inches (914 mm) above the near side walking surface, safeguards as set forth in Section 1618.4 shall be provided.

2411.4.2 Where there is a drop of less than 4 feet (1219 mm) on opposite sides of an operable or nonoperable glazed panel 24 inches (610 mm) or more in width and 9 square feet (0.84 m²) or more in area, one of the following safeguards shall be provided where persons might walk into or through such glazing:

1. Safety glazing conforming to federal standard 16 CFR 1201.
2. An opaque bulkhead not less than 18 inches (457 mm) higher than the upper level.
3. A single horizontal bar of handrail strength requirements not less than 1 1/2 inches (38 mm) in width measured parallel to the plane of the glazing and located between 24 inches and 36 inches (610 and 914 mm) above the upper level.
4. A planter with plantings not less than 18 inches (457 mm) higher than the upper level.

2411.4.3 Glazed panels located adjacent to, or in doors, shall be of safety glazing, in accordance with the following:

1. All glazed panels through which a 3-inch-diameter (76 mm) sphere is able to pass.
2. In all occupancies, any glazing material adjacent to door within 48 inches (1219 mm) of the door in the closed position and below the top of the door.

Exceptions:

1. Wired glass in fire doors.
2. Leaded glass of 30 square inches (.02 m²) or less.

3. Curved glass in revolving doors.
4. Commercial refrigerated cabinet doors.
5. A solar screen may serve as a safeguard where such screen complies with strength requirements of railings.

2411.5 Operable window safeguards. Operable windows shall be protected in accordance with this section.

2411.5.1 Where there is a drop of more than 4 feet (1219 mm) on the far side of such windows and the sill is less than 36 inch (914 mm) above the near side walking surface, safeguards shall be provided to prevent the fall of persons when such windows are open as set forth in Section 1618.4.

Exceptions:

1. Where the vent openings are 12 inches (305 mm) or less in least dimension and are restricted in operation to reject objects as required for safeguard in Section 1618.4.
2. Slats or grillwork constructed to comply with Standard OSHA-1910, set forth in Section 1618.4 or other construction approved by the building official, may be provided in lieu of other safeguards.
3. Where the near side of such windows is less than 4 inches (102 mm) above the floor and falling objects could present a hazard, toeboards shall be provided as required by 29 CFR 1910.
4. Alternate approved designs.

2411.5.2 Where the drop from such windows is less than 4 feet (1219 mm) or where such windows are adjacent to a door, the glazing shall comply with the Sections 2411.4.2 and 2411.4.3.

2411.6 Interior locations.

2411.6.1 Swinging or sliding doors of glass without a continuous frame shall be of only fully tempered glass not less than 3/8 inch (9.5 mm) in thickness.

2411.6.2 Safeguards. The glazing in sliding and swinging doors and in shower to tub enclosures, including any glazing within 60 inches (1.5 m) of the finished floor surface in walls surrounding any tub or shower enclosure, shall be safety glazing as set forth in Section 2411.3.1.3 for Category II glazing products.

2411.6.3 Glass or mirrors immediately surrounding a bathtub or shower enclosure shall be safety glazing where the glass or mirrors are less than 60 inches (1.5 m) above the floor of the tub or the shower.

2411.6.4 The glazing in fixed panels adjacent to paths of egress shall comply with Section 2411.4.3.

2411.6.5 Glass shall not be solid painted or otherwise concealed where such painted glass may be mistaken for other construction materials.

2411.6.6 Glass mirrors of more than 9 square feet (0.84 m²) in area that are used as surface finish material on walls in public spaces shall be directly secured to supports and shall not be hung.

2411.7 Safety glazing.

2411.7.1 Safety glazing, where required, shall be as set forth in this section.

2411.7.2 Safety glazing shall comply with the standard set forth in Section 2411.1.4 for transparent and obscure safety-glazing materials, and plastic glazing shall in addition comply with the specifications of Section 2411.7.3.

2411.7.3 Plastics, with or without reinforcing or acrylic modifiers shall comply with Section 2612, and consideration of dimension reduction caused by deflection and/or dimensional instability of the materials shall be given in the determination of the depth of the glazing rabbet and engagement of the plastic in the rabbet. Plastics shall be limited to spans determined by analysis and test to resist the loads set forth in Chapter 16 (High-Velocity Hurricane Zones).

2411.7.4 Glass louvered doors need not be safety glazed.

2411.8 Sloped glazing.

2411.8.1 Sloped glazing includes any installation of glass or other transparent, translucent or opaque glazing material installed at a slope of 15 degrees (0.26 rad) or more from the vertical plane. Glazing materials in skylights, roofs and sloped walls are included with this definition.

2411.8.2 Allowable glazing materials. Sloped glazing shall be any of the following materials subject to the limitations specified in Section 2411.8.3.

2411.8.2.1 For monolithic glazing systems, the glazing material of the single light or layer shall be laminated with a minimum 30 mil polyvinyl butyryl (or equivalent) interlayer, wire glass, approved plastic material meeting the requirements of this chapter, heat strengthened glass or fully tempered glass.

2411.8.2.2 For multiple glazing systems, each light or layer shall consist of any glazing materials specified in Section 2411.8.2.1.

2411.8.2.3 See Section 2612 for additional requirements for plastic skylights.

2411.8.3 Limitations. Heat strengthened and fully tempered glass when used in monolithic glazing systems shall have screens installed below the glazing material to protect building occupants from falling glass should breakage occur. The screens shall be capable of supporting the weight of the glass and shall be substantially supported below and installed within 4 inches (102 mm) of the glass. They shall be constructed of a noncombustible material not thinner than 0.0808 inch (2 mm) (12 B and S gauge) diameter with a mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). In a corrosive atmosphere structurally equivalent corrosion-resistant screening materials shall be used. Heat-strengthened glass, fully tempered glass and wire glass, when used in multiple glazing systems as the bottom layer over the walking surface, shall be equipped with screening meeting the requirements for monolithic glazing systems.

Exceptions:

1. In monolithic and multiple-layer sloped glazing systems, any glazing material, including annealed glass, may be installed without required screens if the walking surface below the glazing material is permanently protected from the risk of falling glass or if the area below the glazing material is not a walking surface.

2. In monolithic and multiple layer sloped glazing systems, any glazing material, including annealed glass, may be installed in the sloped glazing systems of greenhouses (structures used primarily for growing plants) without screens provided the height of the penthouse at the ridge does not exceed 20 feet (6.1 m) above grade. Frames may be of wood construction in greenhouses located outside the fire district if the height of the sloped glazing does not exceed 20 feet (6.1 m) above grade. In other cases, noncombustible frames shall be used.

2411.8.4 Sloped glazed framing. In other than Types IV II-B and III-B construction, all sloped glazing skylight frames shall be constructed of noncombustible materials. In foundries or buildings where acid fumes deleterious to metal are incidental to the use of the building, approved pressure treated woods or other approved noncombustible material shall be permitted for sash and frames. All sloped glazing and skylights shall be designed for the roof and wind loads in Chapter 16 (High-Velocity Hurricane Zones). All skylights set at an angle of less than 45 degrees (0.79 rad) from the horizontal shall be mounted at least 4 inches (102 mm) above the planer of the roof on a curb construction as required for the frame. Sloped glazing may be installed in the plane of the roof where the roof pitch is greater than 45 degrees (0.79 rad) from the horizontal.

SECTION 2412 HIGH-VELOCITY HURRICANE ZONES—GLASS VENEER

2412.1 Glass veneer shall be as set forth in this section.

2412.2 Dimension. Glass veneer units shall be not less than 11/32 inch (8.7 mm) in thickness. No unit shall be larger in area than 10 square feet (0.93 m²) where 15 feet (4.6 m) or less above the grade directly below, nor larger than 6 square feet (0.56 m²) where more than 15 feet (4.6 m) above the grade directly below.

2412.3 Attachment. Every glass veneer unit shall be attached to the backing with approved mastic cement and corrosion-resistant ties and shall be supported on shelf angles.

2412.3.1 Where more than 6 feet (1829 mm) above grade, veneer shall be supported by shelf angles, and ties shall be used in both horizontal and vertical joints.

2412.3.2 Below a point 6 feet (1829 mm) above grade, glass veneer shall rest on shelf angles. Veneering shall not be supported on construction which is not an integral part of the wall, and over sidewalks shall be supported on a shelf angle not less than 1/4 inch (6.4 mm) above grade.

2412.3.3 All edges of glass veneer shall be ground.

2412.4 Mastic.

2412.4.1 The mastic shall cover not less than one-half of the area of the unit after the unit has been set in place and shall be neither less than 1/4 inch (6.4 mm) nor more than 1/2 inch (12.7 mm) in thickness.

2412.4.2 The mastic shall be insoluble in water and shall not lose its adhesive qualities when dry.

2412.4.3 Absorbent surfaces shall be sealed by a bonding coat before mastic is applied. The bonding coat shall be cohesive with the mastic.

2412.4.4 Glass veneer surfaces to which mastic is applied shall be clean and uncoated.

2412.4.5 Space between edges of glass veneer shall be filled uniformly with an approved type pointing compound.

2412.5 Shelf angles and ties.

2412.5.1 Shelf angles shall be of corrosion-resistant material capable of supporting four times the width of the supported veneer. The shelf angles shall be spaced vertically in alternate horizontal joints, but not more than 3 feet (914 mm) apart. Shelf angles shall be secured to the wall at intervals not exceeding 2 feet (610 mm) with corrosion-resistant bolts not less than 1/4 inch (6.4 mm) diameter. Bolts shall be set in masonry and secured by lead shields.

2412.5.2 Ties shall be of corrosion resistant metal as manufactured especially for holding glass-veneer sheets to masonry surfaces. There shall be not less than one such approved tie for each 2 square feet (0.19 m²) of veneer surface.

2412.6 Backing. Exterior glass veneer shall be applied only upon masonry, concrete or stucco.

2412.7 Expansion joints. Glass veneer units shall be separated from each other and from adjoining materials by an expansion joint at least 1/16 inch (1.6 mm) in thickness. There shall be at least 1/64 inch (0.4 mm) clearance between bolts and the adjacent glass.

SECTION 2413 HIGH-VELOCITY HURRICANE ZONES—STORM SHUTTERS/EXTERNAL PROTECTIVE DEVICES

2413.1 General. Unless exterior wall components including but not limited to structural glazing, doors and windows of enclosed buildings have specific Product Approval to preserve the enclosed building envelope against impact loads as set forth in Chapter 16 (High-Velocity Hurricane Zones), all such components shall be protected by product approved storm shutters.

2413.2 The storm shutters shall be designed and constructed to insure a minimum of 1 inch (25 mm) separation at maximum deflection with components and frames of components they are to protect unless the components and frame are specifically designed to receive the load of storm shutters, and shall be designed to resist the wind pressures as set forth in Chapter 16 (High-Velocity Hurricane Zones) by methods admitting of rational analysis based on established principles of design. Storm shutter shall also be designed to comply with the impact load requirements included within Chapter 16 (High-Velocity Hurricane Zones).

2413.3 The storm shutter design calculations and detailed drawings, including attachment to the main structure, shall be prepared by and bear the seal of a qualified Florida-registered delegated engineer, or if qualified to prepare such design, by the engineer or architect of record, which architect or engineer shall be proficient in structural design. The architect or engineer of record shall, in all instances, review and approve documents prepared by the delegated engineer.

2413.4 Storm shutters shall be approved by the certification agency and shall bear the name of the company engraved in every section of the system.

2413.5 Deflection shall not exceed the limits set forth in Chapter 16 (High-Velocity Hurricane Zones).

2413.6 Unless storm shutters are permanently attached to the main structure, all such storm shutters shall, where practicable, be neatly stored at all times in a designated and accessible area within the building.

2413.6.1 Shutters used to protect openings above the first story of any building or structure must be permanently installed and closable from the inside of the building or structure unless such openings are accessible without the use of a ladder or lift, or shutters can be installed from the interior of the building or structure.

Exception: Group R3 detached single-family residences not exceeding two stories.

2413.7 Storm shutters must completely cover an opening in all directions.

2413.7.1 On any side of an opening, the maximum side clearance between the shutter and a wall or inset surface shall be 1/4 inch (6.4 mm). Any distance in excess of 1/4 inch (6.4 mm) shall require end closure or shutter overlap, where applicable.

2413.7.2 Shutter overlap shall be a minimum of 1.5 times the side clearance between the shutter and wall.

2413.7.3 End closures shall be designed to resist wind loads specified in Chapter 16 (High-Velocity Hurricane Zones), based on rational analysis.

SECTION 2414 HIGH-VELOCITY HURRICANE ZONES—CURTAIN WALLS

2414.1 Scope. This section prescribes requirements for curtain walls of buildings or structures regulated by this code.

2414.2 Definition. A curtain wall is any prefabricated assembly of various components to enclose a building usually attached to and/or supported by the building frame other than a single door, or window, masonry units, poured in place concrete and siding of single membrane metal, wood or plastic.

2414.3 Curtain walls, as defined in Section 2414.2, shall be designed and constructed in accordance with the requirements of this section.

2414.4 Structural glazing in curtain walls shall also comply with the requirements of Section 2415.

2414.5 General.

2414.5.1 All structural elements of curtain wall systems and their attachments (including embedments) to the main structural frame shall be designed by and bear the seal of a qualified Florida-registered delegated engineer, or if qualified to prepare such design, by the engineer or

architect of record, which architect or engineer shall be proficient in structural design. The engineer of record shall, in all instances, review and approve documents prepared by the delegated engineer.

2414.5.2 Curtain wall systems supported from more than two adjacent floors shall be designed to withstand all imposed loads without exceeding allowable stresses in the event of destruction or failure of any single span within the system. Documents for the main building permit shall include sufficient details describing the curtain wall system attachment to the main structure. This portion of the contract documents, if not prepared by the qualified engineer or architect of record, shall bear the signature and seal of the qualified Florida-registered delegated engineer charged with the responsibility for the design of the curtain wall system.

2414.5.3 Individual mullions acting as a continuous member shall transfer loads through supports from no more than three adjacent floors.

2414.5.4 Materials. The materials used in any curtain wall shall comply with the applicable provisions of this code.

2414.6 Fire protection.

2414.6.1 Curtain wall supports, spandrel panels, anchors and the connections at the intersection of the floor and wall shall be fire protected based on building distance separation as required in this code.

2414.6.2 Irrespective of distance separation, anchors, embedded hardware, connections at the intersection of the wall and floor and other connectors used to attach the curtain wall framing system to the building frame shall be provided with fire protection from the floor below with fire-resistant materials having a fire rating equivalent to that of the floor.

2414.6.3 Reserved.

2414.6.4 Openings between curtain wall systems and fire resistive floors shall be protected against the passage of fire and smoke in accordance with Section 2414.6.2

2414.6.5 Where fire safing is used to achieve such protection, it shall be installed in such a manner that it will remain in place for at least a duration equivalent to the fire-resistive rating of the floor system,

2414.7 Inspection. Curtain wall systems and their attachments to the main structure shall be inspected by a special inspector at both the point of assembly and the point of installation.

SECTION 2415 HIGH-VELOCITY HURRICANE ZONES— STRUCTURAL GLAZING SYSTEMS

2415.1 Scope. This section prescribes requirements for structural glazing systems of buildings or structures regulated by this code.

2415.2 Application.

2415.2.1 Structural glazing, as defined in Section 2414.2, shall be designed and constructed in accordance with the requirements of this section.

2415.2.2 Structural glazing systems used in curtain walls shall also comply with the requirements of Section 2414.

2415.3 Definition. The terms used in this section shall be defined as set forth in Section 202.

2415.4 Standards. Adhesives and sealants used in structural glazing systems shall comply with following standards:

ASTM C 794, Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.

ASTM C 920, Specification for Elastomeric Joint Sealants.

ASTM D 412, Test Methods for Rubber Properties in Tension.

ASTM D 624, Test Method for Rubber Property-Tear Resistance.

ASTM D 2240, Test Method for Rubber Property-Durometer Hardness.

Federal Specifications TT-S-001543A and TT-S-00230C.

ASTM E 331, Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors.

ASTM E 330, Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors.

2415.5 Design.

2415.5.1 General. Structural glazing systems shall be designed by and bear the seal of a Florida-registered professional engineer.

2415.5.2 Materials.

2415.5.2.1 Identification. All materials shall be clearly identified as to manufacturer and manufacturer's product number.

2415.5.2.2 Adhesives and sealants.

2415.5.2.2.1 Only approved silicone elastomer adhesives and sealants shall be used for fastening glass lights and other panels to curtain wall framing.

2415.5.2.2.2 Such adhesives and sealants shall be of a polymer that is 100-percent silicone.

2415.5.2.2.3 Adhesives and sealants shall have been tested in accordance with the standards set forth in Section 2415.4.

2415.5.3 Manufacturer's testing, recommendation and approval.

2415.5.3.1 Compatibility of all components and fabrication procedures of structural glazing systems shall be tested, approved and recommended in writing by the manufacturer of the adhesive; the manufacturer of the coating; whether it is anodized, baked or otherwise applied and the manufacturer of the glass panel.

2415.5.3.2 Manufacturer's testing, recommendation and approval shall address, but shall not be limited in scope by the following sections.

2415.5.3.2.1 The compatibility of the sealant with metal, glazing materials, shims, spacers, setting blocks, backer rods, gaskets and other materials.

2415.5.3.2.2 Adhesion to the designated substrates and adhesion of the substrates to the base metal.

2415.5.3.2.3 The design and structural capability of silicone joints and cross sections.

2415.5.4 Structural requirements.

2415.5.4.1 Design of structural seals.

2415.5.4.1.1 The design stress of the structural silicone shall not exceed 20 psi (138 kPa) for materials having a minimum strength of 100 psi (690 kPa) at the weakest element in the line of stress.

2415.5.4.1.2 Such design stress shall also provide for a safety factor of not less than 5.0.

2415.5.4.1.3 Safety factors greater than 5.0 shall be specified by the engineer when required or recommended by the manufacturer.

2415.5.4.1.4 The silicone structural seal shall have a maximum modulus of elasticity to allow no more than 25 percent movement of the joint width at 20 psi (138 kPa) stress.

2415.5.4.1.5 In insulating glass units, the secondary silicone seal shall be designed to withstand a minimum of one-half the design negative wind load applicable to the outboard lights.

2415.5.4.2 Bonding limits. Structural glazing shall be limited to adhesive bonding on one side or on two opposing sides of an infill glass lights or panel.

Exception: Three- or four-side bonding shall be permitted only when structural glazing units are shop fabricated and shop glazed.

2415.5.4.3 Job-site reglazing.

2415.5.4.3.1 Job-site replacement reglazing shall be permitted only when performed following a procedure approved in writing by the applicable structural silicone manufacturer.

2415.5.4.3.2 Replacement shall be performed only by individuals or firms approved or certified by the silicone manufacturer.

2415.6 Fire protection. Structural glazing in curtain walls shall be fire protected as required by Section 2414.6.

2415.7 Inspections, testing and recertification.

2415.7.1 A minimum of 1 percent of the structurally glazed panels shall be tested for load carrying capacity and sealant adhesion in accordance with Chapter 16 (High-Velocity Hurricane Zones) and ASTM E 330.

2415.7.2 Structural glazed panels shall be inspected by a Florida-registered architect or professional engineer for conformance with the approved design and installation procedures determined by the authority having jurisdiction prior to the erection of such panels and after the seal curing period established by the silicone manufacturer.

2415.7.3 It shall be the responsibility of the contractor to verify the adhesion of the cured sealant periodically throughout the application to assure compliance with the manufacturer's specifications and quality of application.

2415.7.4 Structural glazing systems on threshold buildings shall be recertified by the owner as specified by the authority having jurisdiction at six month intervals for the first year after installation. Subsequently, such systems shall be recertified every five years at regular intervals.

2415.7.5 Such recertifications shall determine the structural condition and adhesion capacity of the silicone sealant.