

the site using a value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval). Snow loads are zero for Hawaii, except in mountainous regions as approved by the building official.

**1608.3 Ponding instability.** Susceptible bays of roofs shall be evaluated for ponding instability in accordance with Section 7.11 of ASCE 7.

## SECTION 1609 WIND LOADS

**1609.1 Applications.** Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures. 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 1609.1.1. Manufactured soffits shall be labeled in accordance with Section 1709.10 of this code.

**1609.1.1 Determination of wind loads.** Wind loads on every building or structure shall be determined in accordance with Chapters 26 to 30 of ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

### Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of ICC 600 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AWC WFCM.
3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AISI S230.
4. Designs using NAAMM FP 1001, *Guide Specifications for Design of Metal Flagpoles*.
5. Designs using TIA-222 for antenna-supporting structures and antennas. Design using this standard shall be permitted for communication tower and steel antenna support structures.
6. Wind tunnel tests in accordance with ASCE 49 and Sections 31.4 and 31.5 of ASCE 7.
7. Wind loads for screen enclosures shall be determined in accordance with Section 2002.4.
8. Exposed mechanical equipment or appliances fastened to a roof or installed on the ground in compliance with the code using rated stands, platforms, curbs, slabs, walls, or other means are deemed to comply with the wind resistance

requirements of the 2007 *Florida Building Code*, as amended. Further support or enclosure of such mechanical equipment or appliances is not required by a state or local official having authority to enforce the *Florida Building Code*.

The wind speeds in Figures 1609.3(1), 1609.3(2), 1609.3(3) and 1609.3(4) are ultimate design wind speeds,  $V_{ult}$  and shall be converted in accordance with Section 1609.3.1 to nominal design wind speeds,  $V_{asd}$ , when the provisions of the standards referenced in Exceptions 4 and 5 are used.

**1609.1.1.1 Applicability.** The provisions of ICC 600 are applicable only to buildings located within Exposure B or C as defined in Section 1609.4. The provisions of ICC 600, AWC WFCM and AISI S230 shall not apply to buildings sited on the upper half of an isolated hill, ridge or escarpment meeting the following conditions:

1. The hill, ridge or escarpment is 60 feet (18 288 mm) or higher if located in Exposure B or 30 feet (9144 mm) or higher if located in Exposure C;
2. The maximum average slope of the hill exceeds 10 percent; and
3. The hill, ridge or escarpment is unobstructed upwind by other such topographic features for a distance from the high point of 50 times the height of the hill or 1 mile (1.61 km), whichever is greater.

**\* 1609.1.2 Protection of openings.** In *wind-borne debris regions*, glazed openings in buildings shall be impact resistant or protected with an impact-resistant covering meeting the requirements of ANSI/DASMA 115 (for garage doors and rolling doors) or TAS 201, 202 and 203, AAMA 506, ASTM E1996 and ASTM E1886 referenced herein, or an approved impact-resistant standard as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade shall meet the requirements of the large missile test of ASTM E1996.
2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the small missile test of ASTM E1996.
3. Storage sheds that are not designed for human habitation and that have a floor area of 720 square feet (67 m<sup>2</sup>) or less are not required to comply with the mandatory windborne debris impact standards of this code.
4. Openings in sunrooms, balconies or enclosed porches constructed under existing roofs or decks are not required to be protected provided the spaces are separated from the building interior by a wall and all openings in the separating wall are protected

simulates applicable loading and deformation conditions. For components that are not a part of the seismic force-resisting system, at a minimum the test load shall be equal to the specified factored design loads. For materials such as wood that have strengths that are dependent on load duration, the test load shall be adjusted to account for the difference in load duration of the test compared to the expected duration of the design loads being considered. For statically loaded components, the test load shall be left in place for a period of 24 hours. For components that carry dynamic loads (e.g., machine supports or fall arrest anchors), the load shall be left in place for a period consistent with the component's actual function. 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 1709 PRECONSTRUCTION LOAD TESTS

**1709.1 General.** 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 1709. 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.

**1709.2 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 1709.3 shall apply.

**1709.3 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 1709.3.1. Load tests shall simulate the applicable loading conditions specified in Chapter 16.

**1709.3.1 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 1709.3.2 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 1709.3.2, 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 1709.3.2.
2. The failure load divided by 2.5.
3. The maximum load applied divided by 2.5.

**1709.3.2 Deflection.** The deflection of structural members under the design load shall not exceed the limitations in Section 1604.3. The HVHZ shall comply with Section 1616.3.1.

**1709.4 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.

**1709.5 Exterior window and door assemblies.** The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1709.5.1 or 1709.5.2. For the purposes of this section, the required design pressure shall be determined using the allowable stress design load combinations of Section 1605.3.

**Exception:** Custom doors. Custom (one-of-a-kind) exterior door assemblies shall be tested by an approved testing laboratory or be designed and engineered in accordance with accepted engineering practices by a Florida registered design professional. Signed and sealed copies of the rational analysis and calculations shall be provided to the building official upon permit application.

**1709.5.1 Exterior windows and doors.** Exterior windows and sliding doors shall be tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440 or TAS 202 (HVHZ shall comply with TAS 202 and ASTM E1300 or Section 2404). Exterior side-hinged doors shall be tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440 or comply with Section 1709.5.2. Products tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 shall not be subject to the requirements of Sections 2403.2 and 2403.3. 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

## CHAPTER 24

# GLASS AND GLAZING

### SECTION 2401 GENERAL

**2401.1 Scope.** The provisions of this chapter shall govern the materials, design, construction and quality of glass, light-transmitting ceramic and light-transmitting plastic panels for exterior and interior use in both vertical and sloped applications in buildings and structures.

**Exception:** Buildings and structures located within the high-velocity hurricane zone shall also comply with the provisions of Sections 2410 through 2415, excluding Section 2405.5.

**2401.2 Glazing replacement.** The installation of replacement glass shall be as required for new installations.

### SECTION 2402 DEFINITIONS

**2402.1 Definitions.** The following terms are defined in Chapter 2:

**DALLE GLASS.**

**DECORATIVE GLASS.**

### SECTION 2403 GENERAL REQUIREMENTS FOR GLASS

**2403.1 Identification.** Each pane shall bear the manufacturer's *mark* designating the type and thickness of the glass or glazing material. The identification shall not be omitted unless *approved* and an affidavit is furnished by the glazing contractor certifying that each light is glazed in accordance with *approved construction documents* that comply with the provisions of this chapter. Safety glazing shall be identified in accordance with Section 2406.3.

Each pane of tempered glass, except tempered spandrel glass, shall be permanently identified by the manufacturer. The identification *mark* shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

Tempered spandrel glass shall be provided with a removable paper marking by the manufacturer.

**2403.2 Glass supports.** Where one or more sides of any pane of glass are not firmly supported, or are subjected to unusual load conditions, detailed *construction documents*, detailed shop drawings and analysis or test data ensuring safe performance for the specific installation shall be prepared by a *registered design professional*.

**2403.3 Framing.** To be considered firmly supported, the framing members for each individual pane of glass shall be designed so the deflection of the edge of the glass perpendicular to the glass pane shall not exceed  $1/175$  of the glass edge length or  $3/4$  inch (19.1 mm), whichever is less, when sub-

jected to the larger of the positive or negative load where loads are combined as specified in Section 1605.

**2403.4 Interior glazed areas.** Where interior glazing is installed adjacent to a walking surface, the differential deflection of two adjacent unsupported edges shall be not greater than the thickness of the panels when a force of 50 pounds per linear foot (plf) (730 N/m) is applied horizontally to one panel at any point up to 42 inches (1067 mm) above the walking surface.

**2403.5 Louvered windows or jalousies.** Float, wired and patterned glass in louvered windows and jalousies shall be no thinner than nominal  $3/16$  inch (4.8 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

Wired glass with wire exposed on longitudinal edges shall not be used in louvered windows or jalousies.

Where other glass types are used, the design shall be submitted to the *building official* for approval.

### SECTION 2404 WIND, SNOW, SEISMIC AND DEAD LOADS ON GLASS

**2404.1 Vertical glass.** Glass sloped 15 degrees (0.26 rad) or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind loads due to ultimate design wind speed,  $V_{ult}$  in Section 1609 for components and cladding. Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet the seismic requirements of ASCE 7, Section 13.5.9. The load resistance of glass under uniform load shall be determined in accordance with ASTM E1300.

The design of vertical glazing shall be based on Equation 24-1.

$$0.6F_{gw} \leq F_{ga} \quad \text{(Equation 24-1)}$$

where:

$F_{gw}$  = Wind load on the glass due to ultimate design wind speed,  $V_{ult}$ , computed in accordance with Section 1609.

$F_{ga}$  = Short duration load on the glass as determined in accordance with ASTM E1300.

**2404.2 Sloped glass.** Glass sloped more than 15 degrees (0.26 rad) from vertical in skylights, sunrooms, sloped roofs and other exterior applications shall be designed to resist the most critical combinations of loads determined by Equations 24-2, 24-3 and 24-4.

$$F_g = 0.6W_o - D \quad \text{(Equation 24-2)}$$

$$F_g = 0.6W_i + D + 0.5S \quad \text{(Equation 24-3)}$$

$$F_g = 0.3W_i + D + S \quad \text{(Equation 24-4)}$$

where:

$D$  = Glass dead load, psf (kN/m<sup>2</sup>).