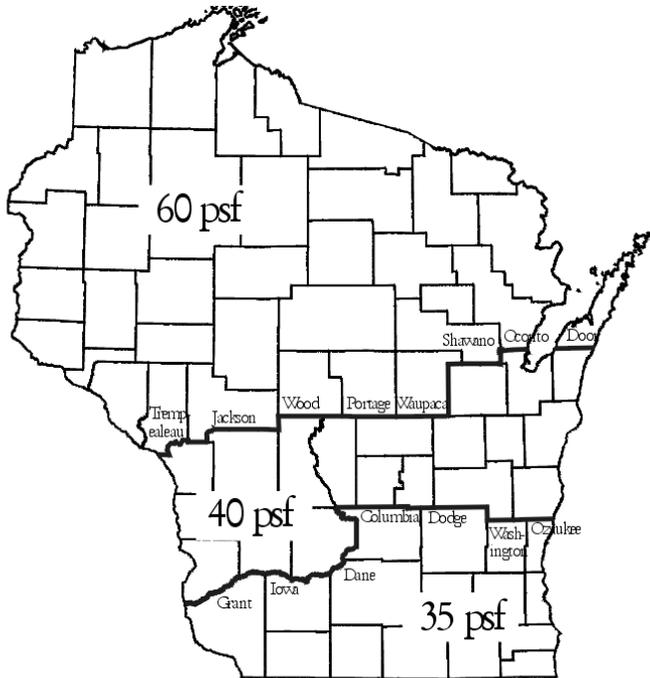




FIGURE 1608.2—continued  
GROUND SNOW LOADS,  $p_g$ , FOR THE UNITED STATES (psf)



**FIGURE 62.16-1  
GROUND SNOW LOAD ZONES**

**1608.7 Drifts on lower roofs.** In areas where the ground snow load,  $p_g$ , as determined by Section 1608.2, is equal to or greater than 5 pounds per square foot (0.240 kN/m<sup>2</sup>), roofs shall be designed to sustain localized loads from snow drifts in accordance with Section 7.7 of ASCE 7.

**1608.8 Roof projections.** Drift loads due to mechanical equipment, penthouses, parapets and other projections above the roof shall be determined in accordance with Section 7.8 of ASCE 7.

**1608.9 Sliding snow.** The extra load caused by snow sliding off a sloped roof onto a lower roof shall be determined in accordance with Section 7.9 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. Wind pressures shall be assumed to come from any horizontal direction and to act normal to the surfaces considered.

**1609.1.1 Determination of wind loads.** Wind loads on every building or structure shall be determined in accordance with Section 6 of ASCE 7.

**Exceptions:**

1. Wind loads determined by the provisions of Section 1609.6.
2. Subject to the limitations of Section 1609.1.1.1, the provisions of SBCCI SSTD 10 shall be permitted for applicable Group R2 and R3 buildings.
3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the *AF & PA Wood Frame Construction Manual for One and Two Family Dwellings, SBC High Wind Edition*.
4. Designs using NAAMM 1001 Guide Specifications for Design of Metal Flag Poles.

**Comm 62.1609 (1) Alternative determination of wind loads.** For buildings that meet all of the following conditions, wind

**TABLE 1608.3.1  
SNOW EXPOSURE FACTOR,  $C_e$**

TERRAIN CATEGORY <sup>a</sup>	EXPOSURE OF ROOF <sup>a,b</sup>		
	Fully exposed <sup>c</sup>	Partially exposed	Sheltered
A (see Section 1609.4)	N/A	1.1	1.3
B (see Section 1609.4)	0.9	1.0	1.2
C (see Section 1609.4)	0.9	1.0	1.1
D (see Section 1609.4)	0.8	0.9	1.0
Above the treeline in windswept mountainous areas	0.7	0.8	N/A
In Alaska, in areas where trees do not exist within a 2-mile radius of the site	0.7	0.8	N/A

For SI: 1 mile = 1609 344 m.

- a. The terrain category and roof exposure condition chosen shall be representative of the anticipated conditions during the life of the structure. An exposure factor shall be determined for each roof of a structure.
- b. Definitions of roof exposure are as follows:
  1. Fully exposed shall mean roofs exposed on all sides with no shelter afforded by terrain, higher structures or trees. Roofs that contain several large pieces of mechanical equipment, parapets which extend above the height of the balanced snow load,  $h_b$ , or other obstructions are not in this category.
  2. Partially exposed shall include all roofs except those designated as “fully exposed” or “sheltered.”
  3. Sheltered roofs shall mean those roofs located tight in among conifers that qualify as “obstructions.”
- c. Obstructions within a distance of  $10 h_o$  provide “shelter,” where  $h_o$  is the height of the obstruction above the roof level. If the only obstructions are a few deciduous trees that are leafless in winter, the “fully exposed” category shall be used except for terrain category “A.” Note that these are heights above the roof. Heights used to establish the terrain category in Section 1609.4 are heights above the ground.

**TABLE 1608.3.2  
THERMAL FACTOR,  $C_t$**

THERMAL CONDITION <sup>a</sup>	$C_t$
All structures except as indicated below	1.0
Structures kept just above freezing and others with cold, ventilated roofs in which the thermal resistance ( $R$ -value) between the ventilated space and the heated space exceeds $25 \text{ ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}/\text{Btu}$	1.1
Unheated structures	1.2
Continuously heated greenhouses <sup>b</sup> with a roof having a thermal resistance ( $R$ -value) less than $2.0 \text{ ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}/\text{Btu}$	0.85

For SI:  $^\circ\text{C} = [(\text{°F}) - 32]/1.8$ , 1 British thermal unit per hour = 0.2931W.

- a. The thermal condition shall be representative of the anticipated conditions during winters for the life of the structure.
- b. A continuously heated greenhouse shall mean a greenhouse with a constantly maintained interior temperature of  $50^\circ\text{F}$  or more during winter months. Such greenhouse shall also have a maintenance attendant on duty at all times or a temperature alarm system to provide warning in the event of a heating system failure.

loads may be determined by applying only Table 6-2 in ASCE 7-98:

- (a) The total building volume is less than 50,000 cubic feet.
- (b) The building height is less than 30 feet (9144 mm).
- (c) The wind exposure is Category C.
- (d) Roof overhangs are designed to resist an uplift load of at least 30 pounds per square foot.

**1609.1.1.1 Applicability.** The provisions of SSTD 10 and the *AF & PA Wood Frame Construction Manual for One and Two Family Dwellings, SBC High Wind Edition* are applicable only to buildings located within Exposure A, B or C as defined in Section 1609.4. The provisions 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 Minimum wind loads.** The wind loads used in the design of the main wind-force-resisting system shall not be less than 10 pounds per square foot ( $0.479 \text{ kN}/\text{m}^2$ ) multiplied by the area of the building or structure projected on a vertical plane normal to the wind direction. In the calculation of design wind loads for components and cladding for buildings, the algebraic sum of the pressures acting on opposite faces shall be taken into account. The design pressure for components and cladding of buildings shall not be less than 10 pounds per square foot ( $0.479 \text{ kN}/\text{m}^2$ ) acting in either direction normal to the surface. The design force for open buildings and other structures shall not be less than 10 pounds per square foot ( $0.479 \text{ kN}/\text{m}^2$ ) multiplied by the area  $A_f$ .

**1609.1.3 Anchorage against overturning, uplift and sliding.** Structural members and systems, and components and cladding in a building or structure shall be anchored to resist wind-induced overturning, uplift and sliding and to provide continuous load paths for these forces to the foundation.

Where a portion of the resistance to these forces is provided by dead load, the dead load shall be taken as the minimum dead load likely to be in place during a design wind event. Where the alternate basic load combinations of Section 1605.3.2 are used, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used.

**1609.1.4 Protection of openings.** In wind-borne debris regions, glazing in the lower 60 feet (18 288 mm) in buildings shall be assumed to be openings unless such glazing is impact resistant or protected with an impact-resistant covering meeting the requirements of an approved impact-resisting standard or ASTM E 1996 and of ASTM E 1886 referenced therein as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade shall meet the requirements of the Large Missile Test of ASTM E 1996.
2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the Small Missile Test of ASTM E 1996.

**Exception:** Wood structural panels with a minimum thickness of  $7/16$  inch (11.1 mm) and maximum panel span of 8 feet (2438 mm) are permitted for opening protection in one- and two-story buildings. Panels shall be precut to cover the glazed openings with attachment hardware provided. Attachments shall be designed to resist the components and cladding loads determined in accordance with the provisions of Section 1609.6.5. Attachment in accordance with Table 1609.1.4 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where wind speeds (3-second gust) do not exceed 130 miles per hour.

**TABLE 1609.1.4  
WINDBORNE DEBRIS PROTECTION FASTENING  
SCHEDULE FOR WOOD STRUCTURAL PANELS<sup>a,b,c</sup>**

FASTENER TYPE	FASTENER SPACING (inches)			
	Panel span $\leq 2$ feet	2 feet $\leq$ Panel span $\leq 4$ feet	4 feet $<$ Panel span $\leq 6$ feet	6 feet $<$ Panel span $\leq 8$ feet
$2\frac{1}{2}$ #6 Wood Screws	16	16	12	9
$2\frac{1}{2}$ #8 Wood Screws	16	16	16	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 mile per hour = 0.44 m/s.

- a. This table is based on a maximum wind speed (3-second gust) of 130 mph and mean roof height of 33 feet or less.
- b. Fasteners shall be installed at opposing ends of the wood structural panel.
- c. Where screws are attached to masonry or masonry/stucco, they shall be attached utilizing vibration-resistant anchors having a minimum withdrawal capacity of 490 pounds.

**1609.1.5 Wind and seismic detailing.** Lateral-force-resisting systems shall meet seismic detailing requirements and limitations prescribed in this code, even when wind code prescribed load effects are greater than seismic load effects.

**1609.2 Definitions.** The following words and terms shall, for the purposes of Section 1609.6, have the meanings shown herein.

**BUILDINGS AND OTHER STRUCTURES, FLEXIBLE.** Slender buildings and other structures that have a fundamental natural frequency less than 1 Hz.

**BUILDING, ENCLOSED.** A building that does not comply with the requirements for open or partially enclosed buildings.

**BUILDING, LOW-RISE.** Enclosed or partially enclosed buildings that comply with the following conditions:

1. Mean roof height,  $h$ , less than or equal to 60 feet (18 288 mm).
2. Mean roof height,  $h$ , does not exceed least horizontal dimension.

**BUILDING, OPEN.** A building having each wall at least 80 percent open. This condition is expressed for each wall by the equation:

$$A_o \geq 0.8A_g \quad \text{(Equation 16-11)}$$

where:

$A_o$  = Total area of openings in a wall that receives positive external pressure, in square feet ( $m^2$ ).

$A_g$  = The gross area of that wall in which  $A_o$  is identified, in square feet ( $m^2$ ).

**BUILDING, PARTIALLY ENCLOSED.** A building that complies with both of the following conditions:

1. The total area of openings in a wall that receives positive external pressure exceeds the sum of the areas of openings in the balance of the building envelope (walls and roof) by more than 10 percent; and
2. The total area of openings in a wall that receives positive external pressure exceeds 4 square feet ( $0.37 m^2$ ) or 1 percent of the area of that wall, whichever is smaller, and the percentage of openings in the balance of the building envelope does not exceed 20 percent.

These conditions are expressed by the following equations:

$$A_o > 1.10A_{oi} \quad \text{(Equation 16-12)}$$

$$A_o > 4 \text{ square feet } (0.37 m^2) \text{ or } > 0.01A_g, \text{ whichever is smaller, and } A_{oi}/A_{gi} \leq 0.20 \quad \text{(Equation 16-13)}$$

where:

$A_o$ ,  $A_g$  are as defined for an open building.

$A_{oi}$  = The sum of the areas of openings in the building envelope (walls and roof) not including  $A_o$ , in square feet ( $m^2$ ).

$A_{gi}$  = The sum of the gross surface areas of the building envelope (walls and roof) not including  $A_g$ , in square feet ( $m^2$ ).

**BUILDING, SIMPLE DIAPHRAGM.** A building that complies with all of the following conditions:

1. Enclosed building,
2. Mean roof height  $h$  less than or equal to 60 feet (18 288 mm),
3. Mean roof height  $h$  does not exceed least horizontal dimension,
4. Building has an approximately symmetrical cross section,
5. Building has no expansion joints or structural separations within the building,
6. Wind loads are transmitted through floor and roof diaphragms to the vertical lateral-force-resisting systems,
7. If the building has moment resisting frames, roof slopes do not exceed 30 degrees ( $0.5235 \text{ rad}$ ).

**COMPONENTS AND CLADDING.** Elements of the building envelope that do not qualify as part of the main windforce-resisting system.

**EFFECTIVE WIND AREA.** The area used to determine  $GC_p$ . For component and cladding elements, the effective wind area in Tables 1609.6.2.1(2) and 1609.6.2.1(3) is the span length multiplied by an effective width that need not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.

**HURRICANE-PRONE REGIONS.** Areas vulnerable to hurricanes defined as:

1. The U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 mph and
2. Hawaii, Puerto Rico, Guam, Virgin Islands and American Samoa.

**IMPORTANCE FACTOR,  $I$ .** A factor that accounts for the degree of hazard to human life and damage to property.

**MAIN WINDFORCE-RESISTING SYSTEM.** An assemblage of structural elements assigned to provide support and stability for the overall structure. The system generally receives wind loading from more than one surface.

**MEAN ROOF HEIGHT.** The average of the roof eave height and the height to the highest point on the roof surface, except that eave height shall be used for roof angle of less than or equal to 10 degrees ( $0.1745 \text{ rad}$ ).

**WIND-BORNE DEBRIS REGION.** Areas within hurricane-prone regions within 1 mile (1.61 km) of the coastal mean high water line where the basic wind speed is 110 miles (48.4 m/s) per hour or greater; or where the basic wind speed is 120 miles (52.8 m/s) per hour or greater; or Hawaii.

**1609.3 Basic wind speed.** The basic wind speed, in miles per hour, for the determination of the wind loads shall be determined by Figure 1609 or by ASCE 7 Figure 6-1 when using the provisions of ASCE 7. Basic wind speed for the special wind regions indicated, near mountainous terrain, and near gorges, shall be in accordance with local jurisdiction requirements. Basic wind speeds determined by the local jurisdiction shall be in accordance with Section 6.5.4 of ASCE 7.

**1609.3.1 Wind speed conversion.** When required, the 3-second gust wind velocities of Figure 1609 shall be converted to fastest mile wind velocities using Table 1609.3.1.

**1609.4 Exposure category.** For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. **Exposure A.** Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 356 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. **Exposure B.** Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. **Exposure C.** Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457.2 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (182.9 m). This category includes flat open country, grasslands and shorelines in hurricane-prone regions.
4. **Exposure D.** Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane-prone regions) for a distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed

to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1,500 feet (460 m) or 10 times the height of the building or structure, whichever is greater.

**1609.5 Importance factor.** Buildings and other structures shall be assigned a wind load importance factor,  $I_w$ , in accordance with Table 1604.5.

**1609.6 Simplified provisions for low-rise buildings.**

**1609.6.1 Scope.** The procedures in Section 1609.6 shall be used for determining and applying wind pressures in the design of simple diaphragm buildings with flat, gabled and hipped roofs and having a mean roof height not exceeding the least horizontal dimension or 60 feet (18 288 mm), whichever is less, subject to the following limitations:

The provisions of Section 1609.6 shall not apply to buildings sited on the upper half of an isolated hill or escarpment meeting all the following conditions:

1. The hill 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.
3. The hill 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 less.

**1609.6.2 Wind pressures.**

**1609.6.2.1 Load determination.** Structural members, cladding, fasteners and systems providing for the structural integrity of the building shall be designed for the loads from Tables 1609.6.2.1(1), 1609.6.2.1(2) and 1609.6.2.1(3) using Figure 1609, multiplied by the appropriate height and exposure coefficient from Table 1609.6.2.1(4) and importance factor from Table 1604.5.

**1609.6.2.2 Load case.** Members that act as both part of the main windforce-resisting system and as components and cladding shall be designed for each separate load case.

**1609.6.3 Edge strips and end zones.** The width of edge strips (a) shall be 10 percent of the least horizontal dimension or 40 percent of the eave height, whichever is less but not less than either 4 percent of the least horizontal dimension or 3 feet (914 mm). End zones as shown in Figure 1609.6.(1) shall be twice the width of the edge strip (a).

**TABLE 1609.3.1**  
**EQUIVALENT BASIC WIND SPEEDS<sup>a,b,c</sup>**

$V_{3s}$	85	90	100	105	110	120	125	130	140	145	150	160	170
$V_{fm}$	70	75	80	85	90	100	105	110	120	125	130	140	150

For SI: 1 mile per hour = 0.44 m/s.

a. Linear interpolation is permitted.

b.  $V_{3s}$  is the second gust wind speed (mph).

c.  $V_{fm}$  is the fastest mile wind speed (mph).

TABLE 1609.6.2.1(1)  
 MAIN WINDFORCE-RESISTING SYSTEM LOADS FOR A BUILDING WITH MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B<sup>a</sup> (psf)

BASIC WIND SPEED V (mph-3-second gust)	LOAD DIRECTION	ROOF ANGLE	HORIZONTAL LOADS <sup>b</sup>						VERTICAL LOADS						MAXIMUM HORIZONTAL WALL LOADS <sup>c</sup>			
			End zone		Interior zone		End zone <sup>e</sup>		Interior zone		Windward overhang		Zone		1E	4E	1	4
			Wall	Roof <sup>f</sup>	Wall	Roof <sup>f</sup>	Windward roof	Leeward roof	Windward roof	Leeward roof	End zone	Interior zone						
85	Transverse	0 to 5°	11.5	-5.9	7.6	-3.5	-13.8	-7.8	-9.6	-6.1	-19.3	-15.1	8.7	-6.7	6.4	-5.2		
		20°	15.9	-4.2	10.6	-2.3	-13.8	-9.6	-9.6	-7.3	-19.3	-15.1	10.8	-9.0	7.8	-6.7		
		30° < angle ≤ 45°	12.9	8.8	10.2	7.0	5.0	-7.8	4.3	-6.7	-4.5	-5.2	9.6	-7.3	8.2	-6.1		
	Longitudinal	All angles	11.5	-5.9	7.6	-3.5	-13.8	-7.8	-9.6	-6.1	-19.3	-15.1	8.7	-6.7	6.4	-5.2		
		0 to 5°	12.8	-6.7	8.5	-4.0	-15.4	-8.8	-10.7	-6.8	-21.6	-16.9	9.8	-7.5	7.2	-5.8		
		20°	17.8	-4.7	11.9	-2.6	-15.4	-10.7	-10.7	-8.1	-21.6	-16.9	12.1	-10.1	8.8	-7.5		
90	Transverse	30° < angle ≤ 45°	14.4	9.9	11.5	7.9	5.6	-8.8	4.8	-7.5	-5.1	-5.8	10.7	-8.1	9.1	-6.8		
		All angles	12.8	-6.7	8.5	-4.0	-15.4	-8.8	-10.7	-6.8	-21.6	-16.9	9.8	-7.5	7.2	-5.8		
		0 to 5°	15.9	-8.2	10.5	-4.9	-19.1	-10.8	-13.3	-8.4	-26.7	-20.9	12.0	-9.3	8.8	-7.2		
	Longitudinal	20°	22.0	-5.8	14.6	-3.2	-19.1	-13.3	-13.3	-10.1	-26.7	-20.9	14.9	-12.5	10.8	-9.3		
		30° < angle ≤ 45°	17.8	12.2	14.2	9.8	6.9	-10.8	5.9	-9.3	-6.3	-7.2	13.3	-10.1	11.3	-8.4		
		All angles	15.9	-8.2	10.5	-4.9	-19.1	-10.8	-13.3	-8.4	-26.7	-20.9	12.0	-9.3	8.8	-7.2		
100	Transverse	0 to 5°	17.5	-9.1	11.6	-5.4	-21.0	-11.9	-14.6	-9.2	-29.4	-23.0	13.3	-10.3	9.7	-7.9		
		20°	24.2	-6.4	16.1	-3.5	-21.0	-14.6	-11.1	-11.1	-29.4	-23.0	16.5	-13.8	11.9	-10.3		
		30° < angle ≤ 45°	19.7	-13.4	15.6	10.8	7.6	-11.9	6.6	-10.3	6.6	-6.9	14.6	-11.1	12.4	-9.2		
	Longitudinal	All angles	17.5	-9.1	11.6	-5.4	-21.0	-11.9	-14.6	-9.2	-29.4	-23.0	13.3	-10.3	9.7	-7.9		
		0 to 5°	19.2	-10.0	12.7	-5.9	-23.1	-13.1	-16.0	-10.1	-32.3	-25.3	14.6	-11.3	10.7	-8.7		
		20°	26.6	-7.0	17.7	-3.9	-23.1	16.0	-16.0	-12.2	-32.3	-25.3	18.1	-15.1	13.1	-11.3		
110	Transverse	30° < angle ≤ 45°	21.6	14.8	17.2	11.8	8.3	-13.1	7.2	-11.3	-7.6	-8.7	16.0	-12.2	13.7	-10.1		
		All angles	19.2	-10.0	12.7	-5.9	-23.1	-13.1	-16.0	-10.1	-32.3	-25.3	14.6	-11.3	10.7	-8.7		
		0 to 5°	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	-38.4	-30.1	17.3	-13.4	12.7	-10.3		
	Longitudinal	20°	31.6	-8.3	21.1	-4.6	-27.4	-19.1	-19.1	-14.5	-38.4	-30.1	21.5	-18.0	15.6	-13.4		
		30° < angle ≤ 45°	25.7	17.6	20.4	14.0	9.9	-15.6	8.6	-13.4	-9.0	-10.3	19.1	-14.5	16.2	-12.1		
		All angles	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	-38.4	-30.1	17.3	-13.4	12.7	-10.3		
120	Transverse	0 to 5°	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2		
		20°	34.3	-9.1	22.9	-5.0	-29.8	-20.7	-20.7	-15.7	-41.7	-32.6	23.3	-19.5	16.9	-14.5		
		30° < angle ≤ 45°	27.9	19.1	22.2	15.2	10.7	-16.9	9.3	-14.5	-9.8	-11.2	20.7	-15.7	17.6	-13.1		
	Longitudinal	All angles	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2		
		0 to 5°	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2		
		20°	34.3	-9.1	22.9	-5.0	-29.8	-20.7	-20.7	-15.7	-41.7	-32.6	23.3	-19.5	16.9	-14.5		
125	Transverse	30° < angle ≤ 45°	27.9	19.1	22.2	15.2	10.7	-16.9	9.3	-14.5	-9.8	-11.2	20.7	-15.7	17.6	-13.1		
		All angles	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2		
		0 to 5°	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2		
	Longitudinal	20°	34.3	-9.1	22.9	-5.0	-29.8	-20.7	-20.7	-15.7	-41.7	-32.6	23.3	-19.5	16.9	-14.5		
		30° < angle ≤ 45°	27.9	19.1	22.2	15.2	10.7	-16.9	9.3	-14.5	-9.8	-11.2	20.7	-15.7	17.6	-13.1		
		All angles	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2		

(continued)

TABLE 1609.6.2.1(1)—continued  
 MAIN WINDFORCE-RESISTING SYSTEM LOADS FOR A BUILDING WITH MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B<sup>a</sup> (psf)

BASIC WIND SPEED V (mph—3-second gust)	LOAD DIRECTION	ROOF ANGLE	HORIZONTAL LOADS <sup>b</sup>				VERTICAL LOADS						MAXIMUM HORIZONTAL WALL LOADS <sup>c</sup>			
			End zone		Interior zone		End zone		Interior zone		Windward overhang		Zone			
			Wall	Roof <sup>e</sup>	Wall	Roof <sup>e</sup>	Windward roof <sup>e</sup>	Leeward roof	Windward roof	Leeward roof	End zone	Interior zone	1E	4E	1	4
130	Transverse	0 to 5°	26.8	-13.9	17.8	-8.2	-32.3	-18.3	-22.4	-14.2	-45.1	-35.3	20.4	-15.7	14.9	-12.1
		20°	37.1	-9.8	24.7	-5.4	-32.2	-22.4	-17.0	-45.1	-35.3	25.2	-21.1	18.3	-15.7	
	Longitudinal	30° < angle ≤ 45°	30.1	20.6	24.0	16.5	11.6	-18.3	10.0	-15.7	-10.6	-12.1	22.4	-17.0	19.1	-14.2
		All angles	26.8	-13.9	17.8	-8.2	-32.2	-18.3	-22.4	-14.2	-45.1	-35.3	20.4	-15.7	14.9	-12.1
140	Transverse	0 to 5°	31.1	-16.1	20.6	-9.6	-37.3	-21.2	-26.0	-16.4	-52.3	-40.9	23.6	-18.2	17.3	-14.0
		20°	43.0	-11.4	28.7	-6.3	-37.3	-26.0	-19.7	-52.3	-40.9	29.3	-24.5	21.2	-18.2	
	Longitudinal	30° < angle ≤ 45°	35.0	23.9	27.8	19.1	13.4	-21.2	11.7	-18.2	-12.3	-14.0	26.0	-19.7	22.1	-16.4
		All angles	31.1	-16.1	20.6	-9.6	-37.3	-21.2	-26.0	-16.4	-52.3	-40.9	23.6	-18.2	17.3	-14.0
145	Transverse	0 to 5°	33.3	-17.3	22.1	-10.3	-40.1	-22.8	-27.9	-17.6	-56.1	-43.9	25.3	-19.6	18.6	-15.1
		20°	46.2	-12.2	30.8	-6.7	-40.1	-27.9	-21.2	-56.1	-43.9	31.4	-26.3	22.8	-19.6	
	Longitudinal	30° < angle ≤ 45°	37.5	25.6	29.8	20.5	14.4	-22.8	12.5	-19.6	-13.1	-15.1	27.9	-21.2	23.7	-17.6
		All angles	33.3	-17.3	22.1	-10.3	-40.1	-22.8	-27.9	-17.6	-56.1	-43.9	25.3	-19.6	18.6	-15.1
150	Transverse	0 to 5°	35.7	-18.5	23.7	-11.0	-42.9	-24.4	-29.8	-18.9	-60.0	-47.0	27.1	-20.9	19.9	-16.1
		20°	49.4	-13.0	32.9	-7.2	-42.9	-29.8	-22.6	-60.0	-47.0	33.6	-28.1	24.4	-20.9	
	Longitudinal	30° < angle ≤ 45°	40.1	27.4	31.9	22.0	15.4	-24.4	13.4	-20.9	-14.1	-16.1	29.8	-22.6	25.4	-18.9
		All angles	35.7	-18.5	23.7	-11.0	-42.9	-24.4	-29.8	-18.9	-60.0	-47.0	27.1	-20.9	19.9	-16.1
170	Transverse	0 to 5°	45.8	-23.8	30.4	-14.1	-55.1	-31.3	-38.3	-24.2	-77.1	-60.4	34.8	-26.9	25.6	-20.7
		20°	63.4	-16.7	42.3	-9.3	-55.1	-38.3	-29.1	-77.1	-60.4	43.2	-36.1	31.3	-26.9	
	Longitudinal	30° < angle ≤ 45°	51.5	35.2	41.0	28.2	19.8	-31.3	17.2	-26.9	-18.1	-20.7	38.3	-29.1	32.6	-24.2
		All angles	45.8	-23.8	30.4	-14.1	-55.1	-31.3	-38.3	-24.2	-77.1	-60.4	34.8	-26.9	25.6	-20.7

For SI: 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Pressures for roof angles between 5° and 20° and between 20° and 30° shall be interpolated from the table.

b. Pressures are the sum of the windward and leeward pressures and shall be applied to the windward elevation of the building in accordance with Figure 1609.6(3).

c. If pressure is less than 0, use 0.

d. "Max. Horizontal Wall Loads" are only for the design of wall elements which also support roof framing. As part of the MWFRS, these elements shall be designed for the interaction of vertical and horizontal loads or have independent mechanisms for each load. For interaction design of walls as MWFRS, the vertical roof loads shall be the "Vertical Loads" from Table 1609.6.2.1(1), and the horizontal loads shall be the "Max. Horizontal Wall Loads." The zone loads shall be applied as shown in Figure 1609.6(1) and as follows: 1E to the Windward Wall End Zone, 4E to the Leeward Wall End Zone, 1 to the Windward Wall Interior Zone, and 4 to the Leeward Wall Interior Zone.

e. Note that there are two load conditions between 20° and 30°. Negative pressure from 20° to 30° shall be interpolated using a pressure value of 0 for 30°. Positive pressures between 25° and 30° shall be interpolated using a pressure value of 0 for 25°.

TABLE 1609.6.2.1(2)  
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B<sup>a</sup> (psf)

ZONE PER FIGURE 1609.6(2)	EFFECTIVE WIND AREA <sup>b</sup> (ft <sup>2</sup> )	BASIC WIND SPEED V (mph-3-second gust)																								
		85	90	100	105	110	120	125	130	140	145	150	170													
Roof > 0 to 10 Degrees	1	10	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-19.8	10.0	-21.8	10.5	-25.9	11.4	-28.1	12.4	-30.4	14.3	-35.3	15.4	-37.8	16.5	-40.5	21.1	-52.0
	1	20	10.0	-12.7	10.0	-14.2	10.0	-17.5	10.0	-19.3	10.0	-21.2	10.0	-25.2	10.7	-27.4	11.6	-29.6	13.4	-34.4	14.4	-36.9	15.4	-39.4	19.8	-50.7
	1	50	10.0	-12.2	10.0	-13.7	10.0	-16.9	10.0	-18.7	10.0	-20.5	10.0	-24.4	10.0	-26.4	10.6	-28.6	12.3	-33.2	13.1	-35.6	14.1	-38.1	18.1	-48.9
	1	100	10.0	-11.9	10.0	-13.3	10.0	-16.5	10.0	-18.2	10.0	-19.9	10.0	-23.7	10.0	-25.7	10.4	-27.8	11.4	-32.3	12.2	-34.6	13.0	-37.0	16.7	-47.6
	2	10	10.0	-21.8	10.0	-24.4	10.0	-30.2	10.0	-33.3	10.0	-36.5	10.5	-43.5	11.4	-47.2	12.4	-51.0	14.3	-59.2	15.4	-63.5	16.5	-67.9	21.1	-87.2
	2	20	10.0	-19.5	10.0	-21.8	10.0	-27.0	10.0	-29.7	10.0	-32.6	10.0	-38.8	10.7	-42.1	11.6	-45.6	13.4	-52.9	14.4	-56.7	15.4	-60.7	19.8	-78.0
	2	50	10.0	-16.4	10.0	-18.4	10.0	-22.7	10.0	-25.1	10.0	-27.5	10.0	-32.7	10.0	-35.5	10.6	-38.4	12.3	-44.5	13.1	-47.8	14.1	-51.1	18.1	-65.7
	2	100	10.0	-14.1	10.0	-15.8	10.0	-19.5	10.0	-21.5	10.0	-23.6	10.0	-28.1	10.0	-30.5	10.0	-33.0	11.4	-38.2	12.2	-41.0	13.0	-43.9	16.7	-56.4
	3	10	10.0	-32.8	10.0	-36.8	10.0	-45.4	10.0	-50.1	10.0	-55.0	10.5	-65.4	11.4	-71.0	12.4	-76.8	14.3	-89.0	15.4	-95.5	16.5	-102.2	21.1	-131.3
	3	20	10.0	-27.2	10.0	-30.5	10.0	-37.6	10.0	-41.5	10.0	-45.5	10.0	-54.2	10.7	-58.8	11.6	-63.6	13.4	-73.8	14.4	-79.1	15.4	-84.7	19.8	-108.7
Roof > 10 to 30 Degrees	1	10	10.0	-11.1	10.0	-12.5	10.0	-15.4	10.0	-17.0	10.0	-18.6	10.0	-22.2	10.0	-24.1	10.6	-26.0	12.3	-32.4	13.1	-34.4	14.1	-36.5	18.1	-78.9
	1	20	10.0	-10.8	10.0	-12.1	10.0	-14.9	10.0	-16.5	10.0	-18.1	10.5	-21.5	11.4	-23.3	12.4	-25.2	14.3	-29.3	15.4	-31.4	16.5	-33.6	21.1	-43.2
	2	10	10.0	-25.1	10.0	-28.2	10.4	-34.8	11.4	-38.3	12.5	-42.1	14.9	-50.1	16.2	-54.3	17.5	-58.7	20.3	-68.1	21.8	-73.1	23.3	-78.2	30.0	-100.5
	2	20	10.0	-22.8	10.0	-25.6	10.0	-31.5	10.4	-34.8	11.4	-38.2	13.6	-45.4	14.8	-49.3	16.0	-53.3	18.5	-61.8	19.9	-66.3	21.3	-71.0	27.3	-91.2
	3	10	10.0	-19.7	10.0	-22.1	10.0	-27.3	10.0	-30.1	10.0	-33.0	11.9	-39.3	12.9	-42.7	13.9	-46.1	16.1	-53.5	17.3	-57.4	18.5	-61.4	23.8	-78.9
	3	20	10.0	-17.4	10.0	-19.5	10.0	-24.1	10.0	-26.6	10.0	-29.1	10.5	-34.7	11.4	-37.6	12.4	-40.7	14.3	-47.2	15.4	-50.6	16.5	-54.2	21.1	-69.6
	3	50	10.0	-14.7	10.0	-16.3	10.0	-20.1	10.0	-22.2	10.0	-24.3	11.9	-29.0	12.9	-31.4	13.9	-33.9	16.1	-41.2	17.3	-44.2	18.5	-47.3	23.8	-60.8
	3	100	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-20.8	10.0	-23.2	11.4	-28.1	12.4	-29.5	13.4	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	4	10	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-20.8	10.0	-23.2	11.4	-28.1	12.4	-29.5	13.4	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	4	20	10.0	-15.2	10.0	-17.0	10.0	-21.0	10.0	-23.2	10.0	-25.5	11.9	-30.3	12.9	-32.9	13.9	-34.9	16.1	-43.1	17.3	-45.4	18.5	-49.3	23.8	-60.8
Roof > 30 to 45 Degrees	1	10	10.0	-14.5	10.0	-16.3	10.0	-20.1	10.0	-22.2	10.0	-24.3	11.9	-29.0	12.9	-31.4	13.9	-33.9	16.1	-41.2	17.3	-43.7	18.5	-47.3	23.8	-60.8
	1	20	10.0	-13.7	10.0	-15.3	10.0	-18.9	10.0	-20.8	10.0	-22.9	11.9	-27.2	12.9	-28.8	13.9	-30.2	15.4	-39.4	16.5	-41.5	17.3	-43.6	21.1	-54.6
	2	10	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-20.8	10.0	-23.2	11.4	-28.1	12.4	-29.5	13.4	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	2	20	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-20.8	10.0	-23.2	11.4	-28.1	12.4	-29.5	13.4	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	3	10	10.0	-15.2	10.0	-17.0	10.0	-21.0	10.0	-23.2	10.0	-25.5	11.9	-30.3	12.9	-32.9	13.9	-34.9	16.1	-43.1	17.3	-45.4	18.5	-49.3	23.8	-60.8
	3	20	10.0	-14.5	10.0	-16.3	10.0	-20.1	10.0	-22.2	10.0	-24.3	11.9	-29.0	12.9	-31.4	13.9	-33.9	16.1	-41.2	17.3	-43.7	18.5	-47.3	23.8	-60.8
	3	50	10.0	-13.7	10.0	-15.3	10.0	-18.9	10.0	-20.8	10.0	-22.9	11.9	-27.2	12.9	-28.8	13.9	-30.2	15.4	-39.4	16.5	-41.5	17.3	-43.6	21.1	-54.6
	4	10	10.0	-14.1	10.0	-15.8	10.0	-19.5	10.0	-21.5	10.0	-23.6	11.9	-28.1	12.9	-29.5	13.9	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	4	20	10.0	-13.5	10.0	-15.1	10.0	-18.7	10.0	-20.6	10.0	-22.6	11.9	-26.9	12.9	-27.2	13.9	-28.1	15.4	-36.7	16.5	-38.8	17.3	-40.5	21.1	-54.6
	4	50	10.0	-12.7	10.0	-14.3	10.0	-17.6	10.0	-19.4	10.0	-21.3	11.9	-25.4	12.9	-25.7	13.9	-26.3	16.1	-34.6	17.3	-37.1	18.5	-41.5	23.8	-58.1
Wall	1	10	10.0	-12.2	10.0	-13.6	10.0	-16.8	10.0	-18.5	10.0	-20.4	11.9	-24.2	12.9	-26.3	13.9	-28.4	16.1	-33.0	17.3	-35.4	18.5	-41.5	23.8	-58.1
	1	20	10.0	-11.7	10.0	-13.1	10.0	-16.1	10.0	-17.8	10.0	-19.5	11.9	-23.4	12.9	-25.1	13.9	-26.8	16.1	-32.4	17.3	-34.4	18.5	-41.5	23.8	-58.1
	2	10	10.0	-14.1	10.0	-15.8	10.0	-19.5	10.0	-21.5	10.0	-23.6	11.9	-28.1	12.9	-29.5	13.9	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	2	20	10.0	-13.5	10.0	-15.1	10.0	-18.7	10.0	-20.6	10.0	-22.6	11.9	-26.9	12.9	-27.2	13.9	-28.1	15.4	-36.7	16.5	-38.8	17.3	-40.5	21.1	-54.6
	3	10	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-20.8	10.0	-23.2	11.4	-28.1	12.4	-29.5	13.4	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	3	20	10.0	-13.7	10.0	-15.3	10.0	-18.9	10.0	-20.8	10.0	-22.9	11.9	-27.2	12.9	-28.8	13.9	-30.2	15.4	-39.4	16.5	-41.5	17.3	-43.6	21.1	-54.6
	3	50	10.0	-12.7	10.0	-14.3	10.0	-17.6	10.0	-19.4	10.0	-21.3	11.9	-25.4	12.9	-25.7	13.9	-26.3	16.1	-34.6	17.3	-37.1	18.5	-41.5	23.8	-58.1
	4	10	10.0	-14.1	10.0	-15.8	10.0	-19.5	10.0	-21.5	10.0	-23.6	11.9	-28.1	12.9	-29.5	13.9	-30.4	15.4	-37.1	17.3	-39.8	18.5	-42.5	23.8	-58.1
	4	20	10.0	-13.5	10.0	-15.1	10.0	-18.7	10.0	-20.6	10.0	-22.6	11.9	-26.9	12.9	-27.2	13.9	-28.1	15.4	-36.7	16.5	-38.8	17.3	-40.5	21.1	-54.6
	4	50	10.0	-12.7	10.0	-14.3	10.0	-17.6	10.0	-19.4	10.0	-21.3	11.9	-25.4	12.9	-25.7	13.9	-26.3	16.1	-34.6	17.3	-37.1	18.5	-41.5	23.8	-58.1

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.44 m/s, 1 degree = 0.01745 rad.

a. For effective areas between those given above, the load is permitted to be interpolated; otherwise, use the load associated with the lower effective area.