

CHAPTER 10

MEANS OF EGRESS

SECTION 1001 ADMINISTRATION

1001.1 General. Buildings or portions thereof shall be provided with a means of egress system as required by this chapter. The provisions of this chapter shall control the design, construction and arrangement of means of egress components required to provide an approved means of egress from structures and portions thereof.

1001.2 Minimum requirements. It shall be unlawful to alter a building or structure in a manner that will reduce the number of exits or the capacity of the means of egress to less than required by this code.

[F] **1001.3 Maintenance.** Means of egress shall be maintained in accordance with the *International Fire Code*.

SECTION 1002 DEFINITIONS

1002.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

ACCESSIBLE MEANS OF EGRESS. A continuous and unobstructed way of egress travel from any point in a building or facility that provides an accessible route to an area of refuge, a horizontal exit or a public way.

AISLE ACCESSWAY. That portion of an exit access that leads to an aisle.

ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

AREA OF REFUGE. An area where persons unable to use stairways can remain temporarily to await instructions or assistance during emergency evacuation.

BLEACHERS. A grandstand where the seats are not provided with backrests.

COMMON PATH OF EGRESS TRAVEL. That portion of exit access which the occupants are required to traverse before two separate and distinct paths of egress travel to two exits are available. Paths that merge are common paths of travel. Common paths of egress travel shall be included within the permitted travel distance.

CORRIDOR. An enclosed exit access component that defines and provides a path of egress travel to an exit.

DOOR, BALANCED. A door equipped with double-pivoted hardware so designed as to cause a semi-counter-balanced swing action when opening.

EGRESS COURT. A court or yard which provides access to a public way for one or more exits.

EMERGENCY ESCAPE AND RESCUE OPENING. An operable window, door or other similar device that provides for a means of escape and access for rescue in the event of an emergency.

EXIT. That portion of a means of egress system which is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives as required to provide a protected path of egress travel between the exit access and the exit discharge. Exits include exterior exit doors at ground level, exit enclosures, exit passageways, exterior exit stairs, exterior exit ramps and horizontal exits.

EXIT ACCESS. That portion of a means of egress system that leads from any occupied point in a building or structure to an exit.

EXIT DISCHARGE. That portion of a means of egress system between the termination of an exit and a public way.

EXIT DISCHARGE, LEVEL OF. The horizontal plane located at the point at which an exit terminates and an exit discharge begins.

EXIT ENCLOSURE. An exit component that is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives, and provides for a protected path of egress travel in a vertical or horizontal direction to the exit discharge or the public way.

EXIT, HORIZONTAL. A path of egress travel from one building to an area in another building on approximately the same level, or a path of egress travel through or around a wall or partition to an area on approximately the same level in the same building, which affords safety from fire and smoke from the area of incidence and areas communicating therewith.

EXIT PASSAGEWAY. An exit component that is separated from all other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives, and provides for a protected path of egress travel in a horizontal direction to the exit discharge or the public way.

FIRE EXIT HARDWARE. Panic hardware that is listed for use on fire door assemblies.

FLOOR AREA, GROSS. The floor area within the inside perimeter of the exterior walls of the building under consideration, exclusive of vent shafts and courts, without deduction for corridors, stairways, closets, the thickness of interior walls, columns or other features. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above. The gross floor area shall not include shafts with no openings or interior courts.

FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

FOLDING AND TELESCOPIC SEATING. A structure that is used for tiered seating of occupants, and has an overall shape

and size that, for purposes of moving or storing, is capable of being reduced without being dismantled.

FOOTBOARDS. The walking surface of aisle accessways in reviewing stands, grandstands and bleachers.

GRANDSTAND. A structure providing tiered or stepped seating.

GUARD. A building component or a system of building components located at or near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to a lower level.

HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support.

MEANS OF EGRESS. A continuous and unobstructed path of vertical and horizontal egress travel from any point in a building or structure to a public way. A means of egress consists of three separate and distinct parts: the exit access, the exit and the exit discharge.

NOSING. The leading edge of treads of stairs and of landings at the top of stairway flights.

OCCUPANT LOAD. The number of persons for which the means of egress of a building or portion thereof is designed.

OPEN AIR SEATING GRANDSTANDS AND BLEACHERS. Seating facilities that are located so that the side toward which the audience faces is unroofed and without an enclosing wall.

PANIC HARDWARE. A door-latching assembly incorporating a device that releases the latch upon the application of a force in the direction of egress travel.

PUBLIC WAY. A street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet (3048 mm).

RAMP. A walking surface that has a running slope steeper than one unit vertical in 20 units horizontal (5-percent slope).

REVIEWING STANDS. Elevated platforms that accommodate not more than 50 persons.

SMOKE-PROTECTED ASSEMBLY SEATING. Seating served by means of egress that is not subject to smoke accumulation within or under a structure.

STAIR. A change in elevation, consisting of one or more risers.

STAIRWAY. One or more flights of stairs, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

STAIRWAY, EXTERIOR. A stairway that is open on at least one side, except for required structural columns, beams, handrails, and guards. The adjoining open areas shall be either yards, courts or public ways. The other sides of the exterior stairway need not be open.

STAIRWAY, INTERIOR. A stairway not meeting the definition of an exterior stairway.

STAIRWAY, SPIRAL. A stairway having a closed circular form in its plan view with uniform section-shaped treads at-

tached to and radiating about a minimum-diameter supporting column.

SECTION 1003 GENERAL MEANS OF EGRESS

1003.1 General requirements. The general requirements specified in this section shall apply to all three elements of the means of egress system, in addition to those specific requirements for the exit access, the exit and the exit discharge detailed elsewhere in this chapter.

1003.2 System design requirements. The means of egress system shall comply with the design requirements of Sections 1003.2.1 through 1003.2.13.7.1.

1003.2.1 Multiple occupancies. Where a building contains two or more occupancies, the means of egress requirements shall apply to each portion of the building based on the occupancy of that space. Where two or more occupancies utilize portions of the same means of egress system, those egress components shall meet the more stringent requirements of all occupancies that are served.

1003.2.2 Design occupant load. In determining means of egress requirements, the number of occupants for whom means of egress facilities shall be provided shall be established by the largest number computed in accordance with Sections 1003.2.2.1 through 1003.2.2.3.

1003.2.2.1 Actual number. The actual number of occupants for whom each occupied space, floor or building is designed.

1003.2.2.2 Number by Table 1003.2.2.2. The number of occupants computed at the rate of one occupant per unit of area as prescribed in Table 1003.2.2.2.

**TABLE 1003.2.2.2
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

OCCUPANCY	FLOOR AREA IN SQ. FT. PER OCCUPANT
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	100 gross
Baggage handling	15 gross
Concourse	20 gross
Waiting areas	300 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Assembly with fixed seats	See Section 1003.2.2.9
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	100 gross
Courtrooms—other than fixed seating areas	40 net
Dormitories	50 gross

(continued)

TABLE 1003.2.2.2—continued
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

OCCUPANCY	FLOOR AREA IN SQ. FT. PER OCCUPANT
Educational	
Classroom area	20 net
Shops and other vocational room areas	50 net
Exercise rooms	50 gross
H-5 Fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas	
Inpatient treatment areas	240 gross
Outpatient areas	100 gross
Sleeping areas	120 gross
Kitchens, commercial	200 gross
Library	
Reading rooms	50 net
Stack area	100 gross
Locker rooms	50 gross
Mercantile	
Areas on other floors	60 gross
Basement and grade floor areas	30 gross
Storage, stock, shipping areas	300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools	
Rink and pool	50 gross
Decks	15 gross
Stages and platforms	15 net
Accessory storage areas, mechanical equipment room	300 gross
Warehouses	500 gross

For SI: 1 square foot = 0.0929 m².

1003.2.2.3 Number by combination. Where occupants from accessory spaces egress through a primary area, the calculated occupant load for the primary space shall include the total occupant load of the primary space plus the number of occupants egressing through it from the accessory space.

1003.2.2.4 Increased occupant load. The occupant load permitted in any building or portion thereof is permitted to be increased from that number established for the occupancies in Table 1003.2.2.2 provided that all other requirements of the code are also met based on such modified number and the occupant load shall not exceed one occupant per 5 square feet (0.47 m²) of occupiable floor space. Where required by the building official, an approved aisle, seating or fixed equipment diagram substantiating any increase in occupant load shall be submitted. Where required by the building official, such diagram shall be posted.

1003.2.2.5 Posting of occupant load. Every room or space that is an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space. Posted signs shall be of an approved legi-

ble permanent design and shall be maintained by the owner or authorized agent.

1003.2.2.6 Exiting from multiple levels. Where exits serve more than one floor, only the occupant load of each floor considered individually shall be used in computing the required capacity of the exits at that floor, provided that the exit capacity shall not decrease in the direction of egress travel.

1003.2.2.7 Egress convergence. Where means of egress from floors above and below converge at an intermediate level, the capacity of the means of egress from the point of convergence shall not be less than the sum of the two floors.

1003.2.2.8 Mezzanine levels. The occupant load of a mezzanine level with egress onto a room or area below shall be added to that room or area's occupant load, and the capacity of the exits shall be designed for the total occupant load thus established.

1003.2.2.9 Fixed seating. For areas having fixed seats and aisles, the occupant load shall be determined by the number of fixed seats installed therein.

For areas having fixed seating without dividing arms, the occupant load shall not be less than the number of seats based on one person for each 18 inches (457 mm) of seating length.

The occupant load of seating booths shall be based on one person for each 24 inches (610 mm) of booth seat length measured at the backrest of the seating booth.

1003.2.2.10 [Comm 62.1003 (1)] Outdoor areas. Yards, patios, courts and similar outdoor areas accessible to and usable by the building occupants shall be provided with means of egress as required by this chapter. The occupant load of such outdoor areas shall be based on the anticipated use. Where outdoor areas are to be used by persons in addition to the occupants of the building, and the path of egress travel from the outdoor areas passes through the building, means of egress requirements for the building shall be based on the sum of the occupant loads of the building plus the outdoor areas.

Exceptions:

1. Outdoor areas used exclusively for service of the building need only have one means of egress.
2. Both outdoor areas associated with Group R-3 and individual dwelling units of Group R-2, as applicable in Section 101.2.

1003.2.3 Egress width. The means of egress width shall not be less than required by this section. The total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by the factors in Table 1003.2.3 and not less than specified elsewhere in this code. Multiple means of egress shall be sized such that the loss of any one means of egress shall not

TABLE 1003.2.3
EGRESS WIDTH PER OCCUPANT SERVED

OCCUPANCY	WITHOUT SPRINKLER SYSTEM		WITH SPRINKLER SYSTEM ^a	
	Stairways (inches per occupant)	Other egress components (inches per occupant)	Stairways (inches per occupant)	Other egress components (inches per occupant)
Occupancies other than those listed below	0.3	0.2	0.2	0.15
Hazardous: H-1, H-2, H-3 and H-4	0.7	0.4	0.3	0.2
Institutional: I-2	0.4	0.2	0.3	0.2

For SI: 1 inch = 25.4 mm.

a. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.

reduce the available capacity to less than 50 percent of the required capacity. The maximum capacity required from any story of a building shall be maintained to the termination of the means of egress.

Exception: Means of egress complying with Section 1008.

1003.2.3.1 Door encroachment. Doors opening into the path of egress travel shall not reduce the required width to less than one-half during the course of the swing. When fully open, the door shall not project more than 7 inches (178 mm) into the required width.

Exception: The restrictions on a door swing shall not apply to doors within individual dwelling units of Groups R-2 and R-3.

1003.2.4 Ceiling height. The means of egress shall have a ceiling height of not less than 7 feet (2134 mm).

Exceptions:

1. Sloped ceilings in accordance with Section 1207.2.
2. Ceilings of dwelling units within residential occupancies in accordance with Section 1207.2.
3. Allowable projections in accordance with Section 1003.2.5.
4. Stair headroom in accordance with Section 1003.3.3.2.
5. Door height in accordance with Section 1003.3.1.1.

1003.2.5 Protruding objects. Protruding objects shall comply with the requirements of Sections 1003.2.5.1 through 1003.2.5.4.

1003.2.5.1 Headroom. Protruding objects are permitted to extend below the minimum ceiling height required by Section 1003.2.4 provided a minimum headroom of 80 inches (2032 mm) shall be provided for any walking surface, including walks, corridors, aisles and passageways. Not more than 50 percent of the ceiling area of a means of egress shall be reduced in height by protruding objects.

Exception: Door closers and stops shall not reduce headroom to less than 78 inches (1981 mm).

A barrier shall be provided where the vertical clearance is less than 80 inches (2032 mm) high. The leading

edge of such a barrier shall be located 27 inches (686 mm) maximum above the floor.

1003.2.5.2 Free-standing objects. A free-standing object mounted on a post or pylon shall not overhang that post or pylon more than 12 inches (305 mm) where the lowest point of the leading edge is more than 27 inches (686 mm) and less than 80 inches (2032 mm) above the walking surface.

1003.2.5.3 Horizontal projections. Structural elements, fixtures or furnishings shall not project horizontally from either side more than 4 inches (102 mm) over any walking surface between the heights of 27 (686 mm) and 80 inches (2032 mm) above the walking surface.

Exception: Handrails serving stairs and ramps are permitted to protrude 4.5 inches (114 mm) from the wall.

1003.2.5.4 Clear width. Protruding objects shall not reduce the minimum clear width of accessible routes as required in Section 1104.

1003.2.6 Floor surface. Walking surfaces of the means of egress shall have a slip-resistant surface and be securely attached.

1003.2.7 Elevation change. Where changes in elevation of less than 12 inches (305 mm) exist in the means of egress, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), ramps complying with Section 1003.3.4 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the ramp shall be equipped with either handrails or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

1. A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2 and R-3 as applicable in Section 101.2, and Groups S and U at exterior doors not required to be accessible by Chapter 11.
2. A stair with a single riser or with two risers and a tread is permitted at locations not required to be accessible by Chapter 11, provided that the risers and treads comply with Section 1003.3.3.3, the minimum depth of the tread is 13 inches (330 mm), and

at least one handrail complying with Section 1003.3.3.11 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the stair.

3. An aisle serving seating that has a difference in elevation less than 12 inches (305 mm) is permitted at locations not required to be accessible by Chapter 11, provided that the risers and treads comply with Section 1008.9 and the aisle is provided with a handrail complying with Section 1008.11.

Any change in elevation in a corridor serving nonambulatory persons in a Group I-2 occupancy shall be by means of a ramp or sloped walkway.

1003.2.8 Means of egress continuity. The path of egress travel along a means of egress shall not be interrupted by any building element other than a means of egress component as specified in this chapter. Obstructions shall not be placed in the required width of a means of egress except projections permitted by this chapter. The required capacity of a means of egress system shall not be diminished along the path of egress travel.

1003.2.9 Elevators, escalators, and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required means of egress from any other part of the building.

Exception: Elevators used as an accessible means of egress in accordance with Section 1003.2.13.3.

1003.2.10 Exit signs. Exit signs shall comply with Sections 1003.2.10.1 through 1003.2.10.5.

1003.2.10.1 Where required. Exits and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel. Access to exits shall be marked by readily visible exit signs in cases where the exit or the path of egress travel is not immediately visible to the occupants. Exit sign placement shall be such that no point in an exit access corridor is more than 100 feet (30 480 mm) from the nearest visible exit sign.

Exceptions:

1. Exit signs are not required in rooms or areas which require only one exit or exit access.
2. Main exterior exit doors or gates which obviously and clearly are identifiable as exits need not have exit signs where approved by the building official.
3. Exit signs are not required in occupancies in Group R-3 as applicable in Section 101.2, Group U, guestrooms in Group R-1, dwelling units in Group R-2 as applicable in Section 101.2 and sleeping rooms.
4. Exit signs are not required in sleeping room areas in occupancies in Group I-3.
5. In occupancies in Groups A-4 and A-5 that include grandstand seating arrangements, exit signs are not required on the seating side of vomitories or openings into seating areas where

exit signs are provided in the concourse that are readily apparent from the vomitories and egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.

1003.2.10.2 Graphics. Every exit sign and directional exit sign shall have plainly legible letters not less than 6 inches (152 mm) high with the principal strokes of the letters not less than 0.75 inch (19.1 mm) wide. The word "EXIT" shall have letters having a width not less than 2 inches (51 mm) wide except the letter "I", and the minimum spacing between letters shall not be less than 0.375 inch (9.5 mm). Signs larger than the minimum established in this section shall have letter widths, strokes and spacing in proportion to their height.

The word "EXIT" shall be in high contrast with the background and shall be clearly discernible when the exit sign illumination means is or is not energized. If an arrow is provided as part of the exit sign, the construction shall be such that the arrow direction cannot be readily changed.

1003.2.10.3 Stairway exit signs. A tactile sign stating "EXIT" and complying with Chapter 11 shall be provided adjacent to each door to an egress stairway.

1003.2.10.4 Exit sign illumination. Exit signs shall be internally or externally illuminated. The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 foot-candles (54 lux). Internally illuminated signs shall provide equivalent luminance and be listed for the purpose.

Exceptions:

1. Approved self-luminous exit signs that provide evenly illuminated letters shall have a minimum luminance of 0.06 foot-lamberts (0.21 cd/m²).
2. Tactile signs required by Section 1003.2.10.3 need not be provided with illumination.

1003.2.10.5 Power source. Exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the exit signs shall be connected to an emergency electrical system provided from storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with the ICC *Electrical Code*.

Exception: Approved exit signs that provide continuous illumination independent of external power sources for a duration of not less than 90 minutes, in case of primary power loss, are not required to be connected to an emergency electrical system.

1003.2.11 Means of egress illumination. The means of egress, including the exit discharge, shall be illuminated at all times the building space served by the means of egress is occupied.

Exceptions:

1. Occupancies in Group U.

2. Aisle accessways in Group A.
3. Guestrooms in Group R-1, dwelling units and sleeping rooms in Groups R-2 and R-3 as applicable in Section 101.2.
4. Sleeping rooms and areas of Group I occupancies.

1003.2.11.1 Illumination level. The means of egress illumination level shall not be less than 1 foot-candle (11 lux) at the floor level.

Exception: For auditoriums, theaters, concert or opera halls and similar assembly occupancies, the illumination at the floor level is permitted to be reduced during performances to not less than 0.2 foot-candle (2.15 lux) provided that the required illumination is automatically restored upon activation of a premise's fire alarm system where such system is provided.

1003.2.11.2 Illumination emergency power. The power supply for means of egress illumination shall normally be provided by the premise's electrical supply.

In the event of power supply failure, an emergency system shall automatically illuminate all of the following areas:

1. Exit access corridors, passageways, and aisles in rooms and spaces which require two or more means of egress.
2. Exit access corridors and exit stairways located in buildings required to have two or more exits.
3. Interior exit discharge elements, as permitted in Section 1006.1, in buildings required to have two or more exits.
4. The portion of the exterior exit discharge immediately adjacent to exit discharge doorways in buildings required to have two or more exits.

The emergency power system shall provide power for a duration of not less than 90 minutes and shall consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with the ICC *Electrical Code*.

1003.2.11.3 Performance of system. Emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level. Illumination levels shall be permitted to decline to 0.6 foot-candle (6 lux) average and a minimum at any point of 0.06 foot-candle (0.6 lux) at the end of the emergency lighting time duration. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded.

1003.2.12 Guards. Guards shall be located along open-sided walking surfaces, mezzanines, industrial equipment platforms, stairways, ramps and landings which are located more than 30 inches (762 mm) above the floor or grade below. Guards shall be adequate in strength and attachment in accordance with Section 1607.7. Guards shall also be located along glazed sides of stairways, ramps and landings that are located more than 30 inches (762 mm) above the floor or grade below where the glazing provided does not

meet the strength and attachment requirements in Section 1607.7.

Exception: Guards are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of stages and raised platforms, including steps leading up to the stage and raised platforms.
3. On raised stage and platform floor areas such as runways, ramps and side stages used for entertainment or presentations.
4. At vertical openings in the performance area of stages and platforms.
5. At elevated walking surfaces appurtenant to stages and platforms for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating where guards in accordance with Section 1008.12 are permitted and provided.

1003.2.12.1 Height. Guards shall form a protective barrier not less than 42 inches (1067 mm) high, measured vertically above the leading edge of the tread, adjacent walking surface or adjacent seatboard.

Exception: For occupancies in Group R-3, and within individual dwelling units in occupancies in Group R-2, both as applicable in Section 101.2, guards whose top rail also serves as a handrail shall have a height not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from the leading edge of the stair tread nosing.

1003.2.12.2 Opening limitations. Open guards shall have balusters or ornamental patterns such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening up to a height of 34 inches (864 mm). From a height of 34 inches (864 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, a sphere 8 inches (203 mm) in diameter shall not pass.

Exceptions:

1. The triangular openings formed by the riser, tread and bottom rail at the open side of a stairway shall be of a maximum size such that a sphere of 6 inches (152 mm) in diameter cannot pass through the opening.
2. At elevated walking surfaces for access to and use of electrical, mechanical, or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches (533 mm) cannot pass through any opening.
3. In occupancies in Group I-3, F, H or S, balusters, horizontal intermediate rails or other construction shall not permit a sphere with a diameter of 21 inches (533 mm) to pass through any opening.

4. In assembly seating areas, guards at the end of aisles where they terminate at a fascia of boxes, balconies, and galleries shall have balusters or ornamental patterns such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening up to a height of 26 inches (660 mm). From a height of 26 inches (660 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, a sphere 8 inches (203 mm) in diameter shall not pass.

1003.2.12.3 Screen porches. Porches and decks which are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

1003.2.12.4 Mechanical equipment. Guards shall be provided where appliances, equipment, fans or other components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere.

1003.2.13 Accessible means of egress. Accessible means of egress shall comply with Sections 1003.2.13.1 through 1003.2.13.7.1. Accessible spaces shall be provided with not less than one accessible means of egress. Where more than one means of egress is required from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress.

Exception: Accessible means of egress are not required in alterations to existing buildings.

1003.2.13.1 General. Each required accessible means of egress shall be continuous to a public way and shall consist of one or more of the following components:

1. Accessible routes complying with Section 1104.
2. Stairways within exit enclosures complying with Sections 1003.2.13.2 and 1005.3.2.
3. Elevators complying with Section 1003.2.13.3.
4. Horizontal exits.
5. Smoke barriers.

Exceptions:

1. Where the exit discharge is not accessible, an exterior area for assisted rescue must be provided in accordance with Section 1003.2.13.7.
2. Where the exit stairway is open to the exterior, the accessible means of egress shall include either an area of refuge in accordance with Section 1003.2.13.5 or an exterior area for assisted rescue in accordance with Section 1003.2.13.7.

1003.2.13.1.1 Buildings with four or more stories. In buildings where a required accessible floor is four or more stories above or below a level of exit discharge, at least one required accessible means of

egress shall be an elevator complying with Section 1003.2.13.3.

Exceptions:

1. In buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a horizontal exit and located at or above the level of exit discharge.
2. In buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a ramp conforming to the provisions of Section 1003.3.4.

1003.2.13.2 Enclosed stairways. An enclosed stairway, to be considered part of an accessible means of egress, shall have a clear width of 48 inches (1219 mm) minimum between handrails and shall either incorporate an area of refuge within an enlarged floor-level landing or shall be accessed from either an area of refuge complying with Section 1003.2.13.5 or a horizontal exit.

Exceptions:

1. Stairways serving a single guestroom or dwelling unit.
2. Stairways in buildings or facilities equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
3. The clear width of 48 inches (1219 mm) between handrails is not required for enclosed stairways accessed from a horizontal exit.
4. Stairways serving open parking garages.

1003.2.13.3 Elevators. An elevator to be considered part of an accessible means of egress shall comply with the emergency operation and signaling devices requirements of Section 211 of ASME A17.1. Standby power shall be provided in accordance with Sections 2702 and 3003. The elevator shall be accessed from either an area of refuge complying with Section 1003.2.13.5 or a horizontal exit.

Exceptions:

1. Elevators are not required to be accessed from an area of refuge or horizontal exit in open parking garages.
2. Elevators are not required to be accessed from an area of refuge or horizontal exit in buildings and facilities equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

1003.2.13.4 Platform lifts. Platform (wheelchair) lifts shall not serve as part of an accessible means of egress,

except where allowed as part of a required accessible route in Section 1108.7. Platform lifts shall be installed in accordance with ASME A17.1.

1003.2.13.5 Areas of refuge. Every required area of refuge shall be accessible from the space it serves by an accessible means of egress. The maximum travel distance from any accessible space to an area of refuge shall not exceed the travel distance permitted for the occupancy in accordance with Section 1004.2.4. Every required area of refuge shall have direct access to an enclosed stairway complying with Sections 1003.2.13.2 and 1005.3.2 or an elevator complying with Section 1003.2.13.3. Where an elevator lobby is used as an area of refuge, the shaft and lobby shall comply with Section 1005.3.2.5 for smokeproof enclosures except where the elevators are in an area of refuge formed by a horizontal exit or smoke barrier.

1003.2.13.5.1 Size. Each area of refuge shall be sized to accommodate one wheelchair space of 30 inches (762 mm) by 48 inches (1219 mm) for each 200 occupants or portion thereof, based on the occupant load of the area of refuge and areas served by the area of refuge. Such wheelchair spaces shall not reduce the required means of egress width. Access to any of the required wheelchair spaces in an area of refuge shall not be obstructed by more than one adjoining wheelchair space.

1003.2.13.5.2 Separation. Each area of refuge shall be separated from the remainder of the story by a smoke barrier complying with Section 709. Each area of refuge shall be designed to minimize the intrusion of smoke.

Exceptions:

1. Areas of refuge located within a stairway enclosure.
2. Areas of refuge where the area of refuge and areas served by the area of refuge are equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

1003.2.13.5.3 Two-way communication. Areas of refuge shall be provided with a two-way communication system between the area of refuge and a central control point. If the central control point is not constantly attended, the area of refuge shall also have controlled access to a public telephone system. Location of the central control point shall be approved by the fire department. The two-way communication system shall include both audible and visible signals.

1003.2.13.5.4 Instructions. In areas of refuge that have a two-way emergency communications system, instructions on the use of the area under emergency conditions shall be posted adjoining the communications system. The instructions shall include all of the following:

1. Directions to find other means of egress.
2. Persons able to use the exit stairway do so as soon as possible, unless they are assisting others.
3. Information on planned availability of assistance in the use of stairs or supervised operation of elevators and how to summon such assistance.

4. Directions for use of the emergency communications system.

1003.2.13.5.5 Identification. Each door providing access to an area of refuge from an adjacent floor area shall be identified by a sign complying with ICC A117.1, stating: AREA OF REFUGE, and including the International Symbol of Accessibility. Where exit sign illumination is required by Section 1003.2.10.4, the area of refuge sign shall be illuminated. Additionally, tactile signage complying with ICC A117.1 shall be located at each door to an area of refuge.

1003.2.13.6 Signage. At exits and elevators serving a required accessible space but not providing an approved accessible means of egress, signage shall be installed indicating the location of accessible means of egress.

1003.2.13.7 Exterior area for assisted rescue. The exterior area for assisted rescue must be open to the outside air and meet the requirements of Section 1003.2.13.5.1. Separation walls shall comply with the requirements of Section 704 for exterior walls. Where walls or openings are between the area for assisted rescue and the interior of the building, the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall be constructed as required for a minimum 1-hour fire-resistance rating with 0.75-hour opening protectives. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the floor level of the area for assisted rescue or to the roof line, whichever is lower.

Comm 62.1003 (2) Exterior area for assisted rescue.

- (a) **Exterior exit stairway.** Exterior exit stairways that are part of the means of egress for the exterior area for assisted rescue shall provide a clear width of 48 inches between handrails.
- (b) **Identification.** Exterior areas for assisted rescue shall comply with Section 1003.2.13.5.5.

1003.2.13.7.1 Openness. The exterior area of refuge shall be at least 50 percent open, and the open area above the guards shall be so distributed as to minimize the accumulation of smoke or toxic gases.

1003.3 Means of egress components. Doors, gates, stairways and ramps shall comply with the applicable requirements of Section 1003.

1003.3.1 Doors. Means of egress doors shall meet the requirements of this section. Doors serving a means of egress system shall meet the requirements of this section and Section 1005.3.1. Where additional doors are provided for egress purposes, they shall conform to the requirements of this section.

Means of egress doors shall be readily distinguishable from the adjacent construction such that the doors are easily recognizable as means of egress doors. Mirrors or similar reflecting materials shall not be used on means of egress doors. Means of egress doors shall not be concealed by curtains, drapes, decorations or similar materials.

1003.3.1.1 Size of doors. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 32 inches (813 mm). Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 32 inches (813 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. Means of egress doors in an occupancy in Group I-2 used for the movement of beds shall provide a clear width not less than 41.5 inches (1054 mm). The height of doors shall not be less than 80 inches (2032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in occupancies in Groups R-2 and R-3 as applicable in Section 101.2.
2. Door openings to resident sleeping rooms in occupancies in Group I-3 shall have a clear width of not less than 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum width.
4. Width of door leaves in revolving doors that comply with Section 1003.3.1.3.1 shall not be limited.
5. Door openings within a dwelling unit shall not be less than 78 inches (1981 mm) in height.
6. Exterior door openings in dwelling units, other than the required exit door, shall not be less than 76 inches (1930 mm) in height.
7. Interior egress door within a dwelling unit which is not required to be adaptable or accessible.
8. Door openings required to be accessible within Type B dwelling units shall have a minimum clear width of 31.75 inches (806 mm).

1003.3.1.1.1 Projections into clear width. There shall not be projections into the required clear width lower than 34 inches (864 mm) above the floor or ground. Projections into the clear opening width between 34 inches (864 mm) and 80 inches (2032 mm) above the floor or ground shall not exceed 4 inches (102 mm).

1003.3.1.2 Door swing. Egress doors shall be side-hinged swinging.

Exceptions:

1. Private garages, office areas, factory and storage areas with an occupant load of 10 or less.
2. Group I-3 occupancies used as a place of detention.
3. Doors within or serving a single dwelling unit in Groups R-2 and R-3 as applicable in Section 101.2.

4. In other than Group H occupancies, revolving doors complying with Section 1003.3.1.3.1.
5. In other than Group H occupancies, horizontal sliding doors complying with Section 1003.3.1.3.3 are permitted in a means of egress.
6. Power-operated doors in accordance with Section 1003.3.1.3.2.

Doors shall swing in the direction of egress travel where serving an occupant load of 50 or more persons or a high-hazard occupancy.

The opening force for interior side-swinging doors without closers shall not exceed a 5-pound (22 N) force. For other side-swinging, sliding and folding doors, the door latch shall release when subjected to a 15-pound (67 N) force. The door shall be set in motion when subjected to a 30-pound (133 N) force. The door shall swing to a full-open position when subjected to a 15-pound (67 N) force. Forces shall be applied to the latch side.

1003.3.1.3 Special doors. Special doors and security grilles shall comply with the requirements of Sections 1003.3.1.3.1 through 1003.3.1.3.5.

1003.3.1.3.1 Revolving doors. Revolving doors shall comply with the following:

1. Each revolving door shall be capable of collapsing into a bookfold position with parallel egress paths providing an aggregate width of 36 inches (914 mm).
2. A revolving door shall not be located within 10 feet (3048 mm) of the foot of or top of stairs or escalators. A dispersal area shall be provided between the stairs or escalators and the revolving doors.
3. The revolutions per minute (rpm) for a revolving door shall not exceed those shown in Table 1003.3.1.3.1.
4. Each revolving door shall have a side-hinged swinging door which complies with Section 1003.3.1 in the same wall and within 10 feet (3048 mm) of the revolving door.

**TABLE 1003.3.1.3.1
REVOLVING DOOR SPEEDS**

INSIDE DIAMETER (feet-inches)	POWER-DRIVEN-TYPE SPEED CONTROL (rpm)	MANUAL-TYPE SPEED CONTROL (rpm)
6-6	11	12
7-0	10	11
7-6	9	11
8-0	9	10
8-6	8	9
9-0	8	9
9-6	7	8
10-0	7	8

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

1003.3.1.3.1.1 Egress component. A revolving door used as a component of a means of egress shall comply with Section 1003.3.1.3.1 and the following three conditions:

1. Revolving doors shall not be given credit for more than 50 percent of the required egress capacity.
2. Each revolving door shall be credited with no more than a 50-person capacity.
3. Each revolving door shall be capable of being collapsed when a force of not more than 130 pounds (578 N) is applied within 3 inches (76 mm) of the outer edge of a wing.

1003.3.1.3.1.2 Other than egress component. A revolving door used as other than a component of a means of egress shall comply with Section 1003.3.1.3.1. The collapsing force of a revolving door not used as a component of a means of egress shall not be more than 180 pounds (801 N).

Exception: A collapsing force in excess of 180 pounds (801 N) is permitted if the collapsing force is reduced to not more than 130 pounds (578 N) when at least one of the following conditions is satisfied:

1. There is a power failure or power is removed to the device holding the door wings in position.
2. There is an actuation of the automatic sprinkler system where such system is provided.
3. There is an actuation of a smoke detection system which is installed in accordance with Section 907 to provide coverage in areas within the building which are within 75 feet (22 860 mm) of the revolving doors.
4. There is the actuation of a manual control switch, in an approved location and clearly defined, which reduces the holding force to below the 130-pound (578 N) force level.

1003.3.1.3.2 Power-operated doors. Where means of egress doors are operated by power, such as doors with a photoelectric-actuated mechanism to open the door upon the approach of a person, or doors with power-assisted manual operation, the design shall be such that in the event of power failure, the door is capable of being opened manually to permit means of egress travel or closed where necessary to safeguard means of egress. The forces required to open these doors manually shall not exceed those specified in Section 1003.3.1.2, except that the force to set the door in motion shall not exceed 50 pounds (220 N). The door shall be capable of swinging from any position to the full width of the opening in which such door is installed when a force is applied to the door on the side from which egress is made. Full-power-operated doors shall comply with BHMA A156.10.

Power-assisted and low-energy doors shall comply with BHMA A156.19.

Exceptions:

1. Occupancies in Group I-3.
2. Horizontal sliding doors complying with Section 1003.3.1.3.3.
3. For a bi-parting door in the emergency break-out mode, a door leaf located within a multiple-leaf opening shall be exempt from the minimum 32-inch (813 mm) single-leaf requirement of Section 1003.3.1.1, provided a minimum 32-inch (813 mm) clear opening is provided when the two bi-parting leaves meeting in the center are broken out.

1003.3.1.3.3 Horizontal sliding doors. In other than Group H occupancies, horizontal sliding doors permitted to be a component of a means of egress in accordance with Exception 5 to Section 1003.3.1.2 shall comply with all of the following criteria:

1. The doors shall be power operated and shall be capable of being operated manually in the event of power failure.
2. The doors shall be openable by a simple method from both sides without special knowledge or effort.
3. The force required to operate the door shall not exceed 30 pounds (133 N) to set the door in motion and 15 pounds (67 N) to close the door or open it to the minimum required width.
4. The door shall be openable with a force not to exceed 15 pounds (67 N) when a force of 250 pounds (1100 N) is applied perpendicular to the door adjacent to the operating device.
5. The door assembly shall comply with the applicable fire protection rating and, where rated, shall be self-closing or automatic closing by smoke detection, shall be installed in accordance with NFPA 80, and shall comply with Section 714.
6. The door assembly shall have an integrated standby power supply.
7. The door assembly power supply shall be electrically supervised.
8. The door shall open to the minimum required width within 10 seconds after activation of the operating device.

1003.3.1.3.4 Access-controlled egress doors. The entrance doors in a means of egress in buildings with an occupancy in Group A, B, E, M, R-1 or R-2 and entrance doors to tenant spaces in occupancies in Groups A, B, E, M, R-1 and R-2 are permitted to be equipped with an approved entrance and egress access control system which shall be installed in accordance with all of the following criteria:

1. A sensor shall be provided on the egress side arranged to detect an occupant approaching the

doors. The doors shall be arranged to unlock by a signal from or loss of power to the sensor.

2. Loss of power to that part of the access control system which locks the doors shall automatically unlock the doors.
3. The doors shall be arranged to unlock from a manual unlocking device located 40 inches (1016 mm) to 48 inches (1219 mm) vertically above the floor and within 5 feet (1524 mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign. When operated, the manual unlocking device shall result in direct interruption of power to the lock—independent of the access control system electronics—and the doors shall remain unlocked for a minimum of 30 seconds.
4. Activation of the building fire alarm system, if provided, shall automatically unlock the doors, and the doors shall remain unlocked until the fire alarm system has been reset.
5. Activation of the building automatic sprinkler or fire detection system, if provided, shall automatically unlock the doors. The doors shall remain unlocked until the fire alarm system has been reset.
6. Entrance doors in buildings with an occupancy in Group A, B, E or M shall not be secured from the egress side during periods that the building is open to the general public.

1003.3.1.3.5 Security grilles. In Groups B, F, M and S, horizontal sliding or vertical security grilles are permitted at the main exit and shall be openable from the inside without the use of a key or special knowledge or effort during periods that the space is occupied. The grilles shall remain secured in the full-open position during the period of occupancy by the general public. Where two or more means of egress are required, not more than one-half of the exits or exit access doorways shall be equipped with horizontal sliding or vertical security grilles.

1003.3.1.4 Floor elevation. There shall be a floor or landing on each side of a door. Such floor or landing shall be at the same elevation on each side of the door. Landings shall be level except for exterior landings, which are permitted to have a slope not to exceed 0.25 unit vertical in 12 units horizontal (2-percent slope).

Exceptions:

1. Group R-3 more than three stories high and individual units of Group R-2 where the following apply:
 - 1.1. A door is permitted to open at the top step of an interior flight of stairs, provided the door does not swing over the top step.
 - 1.2. Screen doors and storm doors are permitted to swing over stairs or landings.

2. Exterior doors as provided for in Section 1003.2.7, Exception 1, and Section 1005.3.1, which are not on an accessible route.
3. Variations in elevation due to differences in finish materials, but not more than 0.5 inch (12.7 mm).
4. Exterior decks, patios, or balconies that are part of Type B dwelling units and have impervious surfaces, and that are not more than 4 inches (102 mm) below the finished floor level of the adjacent interior space of the dwelling unit.

1003.3.1.5 Landings at doors. Landings shall have a width not less than the width of the stairway or the width of the door, whichever is the greater. Doors in the fully open position shall not reduce a required dimension by more than 7 inches (178 mm). When a landing serves an occupant load of 50 or more, doors in any position shall not reduce the landing to less than one-half its required width. Landings shall have a length measured in the direction of travel of not less than 44 inches (1118 mm).

Exception: Landing length in the direction of travel in Group R-3 as applicable in Section 101.2 and Group U and within individual units of Group R-2 as applicable in Section 101.2, need not exceed 36 inches (914 mm).

1003.3.1.6 Thresholds. Thresholds at doorways shall not exceed 0.75 inch (19.1 mm) in height for sliding doors serving dwelling units or 0.5 inch (12.7 mm) for other doors. Raised thresholds and floor level changes greater than 0.25 inch (6.4 mm) at doorways shall be beveled with a slope not greater than one unit vertical in two units horizontal (50-percent slope).

1003.3.1.7 Door arrangement. Space between two doors in series shall be 48 inches (1219 mm) minimum plus the width of a door swinging into the space. Doors in series shall swing either in the same direction or away from the space between doors.

Exceptions:

1. The minimum distance between horizontal sliding power-operated doors in a series shall be 48 inches (1219 mm).
2. Storm doors serving individual dwelling units in Groups R-2 and R-3 as applicable in Section 101.2 need not be spaced 48 inches (1219 mm) from the other door.
3. Doors within individual dwelling units in Groups R-2 and R-3 as applicable in Section 101.2 other than within Type A dwelling units.

1003.3.1.8 Locks and latches. Egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.

Exceptions:

1. Places of detention or restraint.
2. In buildings in occupancy Group A having an occupant load of 300 or less, Groups B, F, M, and S, and in churches, the main exterior door

or doors is permitted to be equipped with key-operated locking devices from the egress side provided:

- 2.1. The locking device is readily distinguishable as locked;
 - 2.2. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED. The sign shall be in letters 1 inch (25.4 mm) high on a contrasting background; and
 - 2.3. The use of the key-operated locking device is revokable by the building official for due cause.
3. Where egress doors are used in pairs, approved automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts has no doorknob or surface-mounted hardware. The unlatching of any leaf shall not require more than one operation.
 4. Doors from individual dwelling units and guestrooms of Group R occupancies having an occupant load of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.

1003.3.1.8.1 Bolt locks. Manually operated flush bolts or surface bolts are not permitted.

Exceptions:

1. On doors not required for egress in individual dwelling units.
2. Where a pair of doors serves a storage or equipment room, manually operated edge- or surface-mounted bolts are permitted on the inactive leaf.

1003.3.1.8.2 Delayed egress locks. Approved, listed, delayed egress locks shall be permitted to be installed on doors serving any occupancy except Group A, E and H occupancies in buildings which are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or an approved automatic smoke or heat detection system installed in accordance with Section 907, provided that the doors unlock in accordance with Items 1 through 6 below. A building occupant shall not be required to pass through more than one door equipped with a delayed egress lock before entering an exit.

1. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.
2. The doors unlock upon loss of power controlling the lock or lock mechanism.
3. The door locks shall have the capability of being unlocked by a signal from the fire command center.

4. The initiation of an irreversible process which will release the latch in not more than 15 seconds when a force of not more than 15 pounds (67 N) is applied for 1 second to the release device. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the door lock has been released by the application of force to the releasing device, relocking shall be by manual means only.

Exception: Where approved, a delay of not more than 30 seconds is permitted.

5. A sign shall be provided on the door located above and within 12 inches (305 mm) of the release device reading: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 SECONDS.
6. Emergency lighting shall be provided at the door.

1003.3.1.8.3 Hardware height. Door handles, pulls, latches, locks and other operating devices shall be installed 34 inches (864 mm) minimum and 48 inches (1219 mm) maximum above the finished floor.

Exception: Locks used only for security purposes and not used for normal operation are permitted at any height.

1003.3.1.8.4 Stairway doors. Interior stairway means of egress doors shall be openable from both sides without the use of a key or special knowledge or effort.

Exceptions:

1. Stairway discharge doors shall be openable from the egress side and shall only be locked from the opposite side.
2. This section shall not apply to doors arranged in accordance with Section 403.1.1.
3. In stairways serving not more than four stories, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side.

1003.3.1.9 Panic and fire exit hardware. Where panic and fire exit hardware is installed, it shall comply with the following:

1. The actuating portion of the releasing device shall extend at least one-half of the door leaf width.
2. A maximum unlatching force of 15 pounds (67 N).

Each door in a means of egress from an occupancy of Group A or E having an occupant load of 100 or more and any occupancy of Group H-1, H-2, H-3 or H-5 shall not be provided with a latch or lock unless it is panic hardware or fire exit hardware.

If balanced doors are used and panic hardware is required, the panic hardware shall be of the push-pad type and the pad shall not extend more than one-half the width of the door measured from the latch side.

1003.3.2 Gates. Gates serving the means of egress system shall comply with the requirements of this section. Gates used as a component in a means of egress shall conform to the applicable requirements for doors.

Exception: Horizontal sliding or swinging gates exceeding the 4-foot maximum (1219 mm) leaf width limitation are permitted in fences and walls surrounding a stadium.

1003.3.2.1 Stadiums. Panic hardware is not required on gates surrounding stadiums where such gates are under constant immediate supervision while the public is present, and further provided that safe dispersal areas based on 3 square feet (0.28 m²) per occupant are located between the fence and enclosed space. Such required safe dispersal areas shall not be located less than 50 feet (15 240 mm) from the enclosed space. See Section 1005 for means of egress from safe dispersal areas.

1003.3.2.2 Educational uses. School grounds are permitted to be fenced and gates therein are permitted to be equipped with locks, provided that safe dispersal areas based on 3 square feet (0.28 m²) per occupant are located between the school and the fence. Such required safe dispersal areas shall not be located less than 50 feet (15 240 mm) from school buildings. See Section 1005 for means of egress from safe dispersal areas.

1003.3.3 Stairways. Stairways shall comply with Sections 1003.3.3.1 through 1003.3.3.12.1.

1003.3.3.1 Stairway width. The width of stairways shall be determined as specified in Section 1003.2.3 but such width shall not be less than 44 inches (1118 mm). See Section 1003.2.13.2 for accessible means of egress stairways.

Exceptions:

1. Stairways serving an occupant load of 50 or less shall have a width of not less than 36 inches (914 mm).
2. Spiral stairways as provided for in Section 1003.3.3.9.
3. Aisle stairs complying with Section 1008.
4. Where a stairway lift is installed on stairways serving occupancies in Group R-3, or within dwelling units in occupancies in Group R-2, both as applicable in Section 101.2, a clear passage width not less than 20 inches (508 mm) shall be provided.

1003.3.3.2 Headroom. Stairways shall have a minimum headroom clearance of 80 inches (2032 mm) measured vertically from a line connecting the edge of the nosings. Such headroom shall be continuous above the stairway to the point where the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the stairway and landing.

Exception: Spiral stairways complying with Section 1003.3.3.9 are permitted a 78-inch (1981 mm) headroom clearance.

1003.3.3.3 Stair treads and risers. Stair riser heights shall be 7 inches (178 mm) maximum and 4 inches (102 mm) minimum. Stair tread depths shall be 11 inches (279 mm) minimum. The riser height shall be measured vertically between the leading edges of adjacent treads. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at right angle to the tread's leading edge.

Exceptions:

1. Circular stairways in accordance with Section 1003.3.3.7.
2. Winders in accordance with Section 1003.3.3.8.
3. Spiral stairways in accordance with Section 1003.3.3.9.
4. Aisle stairs in assembly seating areas where the stair pitch or slope is set, for sightline reasons, by the slope of the adjacent seating area in accordance with Section 1008.9.2.
5. In occupancies in Group R-3, as applicable in Section 101.2, within dwelling units in occupancies in Group R-2, as applicable in Section 101.2, and in occupancies in Group U, which are accessory to an occupancy in Group R-3, as applicable in Section 101.2, the maximum riser height shall be 7.75 inches (197 mm) and the minimum tread depth shall be 10 inches (254 mm). A nosing not less than 0.75 inch (19.1 mm) but not more than 1.25 inches (32 mm) shall be provided on stairways with solid risers where the tread depth is less than 11 inches (279 mm).
6. See Section 3402.4 for the replacement of existing stairways.

1003.3.3.3.1 Dimensional uniformity. Stair treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 0.375 inch (9.5 mm) in any flight of stairs.

Exceptions:

1. Nonuniform riser dimensions of aisle stairs complying with Section 1008.9.2.
2. Consistently shaped winders, complying with Section 1003.3.3.8, differing from rectangular treads in the same stairway flight.

Where the bottom or top riser adjoins a sloping public way, walkway or driveway having an established grade and serving as a landing, the bottom or top riser is permitted to be reduced along the slope to less than 4 inches (102 mm) in height with the variation in height of the bottom or top riser not to exceed one unit vertical in 12 units horizontal (8-percent slope) of stairway width. The nosings or leading edges of treads at such nonuniform height risers shall have a distinctive marking stripe, different from any other nosing marking provided on the stair flight. The

distinctive marking stripe shall be visible in descent of the stair and shall have a slip-resistant surface. Marking stripes shall have a width of at least 1 inch (25.4 mm) but not more than 2 inches (51 mm).

1003.3.3.3.2 Profile. The radius of curvature at the leading edge of the tread shall be not greater than 0.5 inch (12.7 mm). Beveling of nosings shall not exceed 0.5 inch (12.7 mm). Risers shall be solid and vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 degrees (0.52 rad) from the vertical. The leading edge (nosings) of treads shall project not more than 1.25 inches (32 mm) beyond the tread below and all projections of the leading edges shall be of uniform size, including the leading edge of the floor at the top of a flight.

Exceptions:

1. Solid risers are not required for stairways that are not required to comply with Section 1003.2.13.2, provided that the opening between treads does not permit the passage of a sphere with a diameter of 4 inches (102 mm).
2. Solid risers are not required for occupancies in Group I-3.

1003.3.3.4 Stairway landings. There shall be a floor or landing at the top and bottom of each stairway. The width of landings shall not be less than the width of stairways they serve. Every landing shall have a minimum dimension measured in the direction of travel equal to the width of the stairway. Such dimension need not exceed 48 inches (1219 mm) where the stairway has a straight run.

Exceptions:

1. Aisle stairs complying with Section 1008.
2. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing.

1003.3.3.5 Stairway construction. All stairways shall be built of materials consistent with the types permitted for the type of construction of the building, except that wood handrails shall be permitted for all types of construction.

1003.3.3.5.1 Stairway walking surface. The walking surface of treads and landings of a stairway shall not be sloped steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. Stairway landings shall have a solid surface. Finish floor surfaces shall be securely attached.

Exception: In Group F, H and S occupancies, other than areas of parking structures accessible to the public, openings in treads and landing platforms shall not be prohibited provided a sphere with a diameter of 1.125 inches (29 mm) cannot pass through the opening.

1003.3.3.5.2 Outdoor conditions. Outdoor stairways and outdoor approaches to stairways shall be designed so that water will not accumulate on walking surfaces. In other than occupancies in Group R-3, and occupancies in Group U that are accessory to an occupancy in Group R-3, treads, platforms and landings that are part of exterior stairways in climates subject to snow or ice shall be protected to prevent the accumulation of same.

1003.3.3.6 Vertical rise. A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.

Exception: Aisle stairs complying with Section 1008.

1003.3.3.7 Circular stairways. Circular stairways shall have a minimum tread depth and a maximum riser height in accordance with Section 1003.3.3.3 and the smaller radius shall not be less than twice the width of the stairway. The minimum tread depth measured 12 inches (305 mm) from the narrower end of the tread shall not be less than 11 inches (279 mm). The minimum tread depth at the narrow end shall not be less than 10 inches (254 mm).

Exception: For occupancies in Group R-3, and within individual dwelling units in occupancies in Group R-2, both as applicable in Section 101.2, the smaller radius restriction shall not apply and the minimum tread depth at the narrow end shall not be less than 6 inches (152 mm).

1003.3.3.8 Winders. Winders are not permitted in means of egress stairways except within a dwelling unit. Winders shall have a tread depth of not less than 11 inches (279 mm) at a point not more than 12 inches (305 mm) from the narrow edge. The minimum tread depth shall not be less than 6 inches (152 mm).

1003.3.3.9 Spiral stairways. Spiral stairways are permitted to be used as a component in the means of egress only within dwelling units or from a space not more than 250 square feet (23 m²) in area and serving not more than five occupants, or from galleries, catwalks, and gridirons in accordance with Section 1007.5.

A spiral stairway shall have a 7.5-inch (191 mm) minimum clear tread depth at a point 12 inches (305 mm) from the narrow edge. The risers shall be sufficient to provide a headroom of 78 inches (1981 mm) minimum, but riser height shall not be more than 9.5 inches (241 mm). The minimum stairway width shall be 26 inches (660 mm).

1003.3.3.10 Alternating tread devices. Alternating tread devices are limited to an element of a means of egress in buildings of Groups F, H and S from a mezzanine not more than 250 square feet (23 m²) in area and which serves not more than five occupants; in buildings of Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m²) in area; and for access to unoccupied roofs.

1003.3.3.10.1 Handrails of alternating tread devices. Handrails shall be provided on both sides of al-

ternating tread devices and shall conform to Section 1003.3.3.11.

1003.3.3.10.2 Treads of alternating tread devices.

Alternating tread devices shall have a minimum projected tread of 5 inches (127 mm), a minimum tread depth of 8.5 inches (216 mm), a minimum tread width of 7 inches (178 mm) and a maximum riser height of 9.5 inches (241 mm). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface.

Exception: Alternating tread devices used as an element of a means of egress in buildings from a mezzanine area not more than 250 square feet (23 m²) in area which serves not more than five occupants shall have a minimum projected tread of 8.5 inches (216 mm) with a minimum tread depth of 10.5 inches (267 mm). The rise to the next alternating tread surface should not be more than 8 inches (203 mm).

1003.3.3.11 Handrails. Stairways shall have handrails on each side. Handrails shall be adequate in strength and attachment in accordance with Section 1607.7.

Exceptions:

1. Aisle stairs provided with a center handrail need not have additional handrails.
2. Stairways within dwelling units, spiral stairways and aisle stairs serving seating only on one side are permitted to have a handrail on one side only.
3. Decks, patios, and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require handrails.
4. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require handrails.
5. Changes in room elevations of only one riser within dwelling units in Group R-2 and R-3 occupancies do not require handrails.

1003.3.3.11.1 Height. Handrail height, measured above stair tread nosings, or finish surface of ramp slope, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

1003.3.3.11.2 Intermediate handrails. Intermediate handrails are required so that all portions of the stairway width required for egress capacity are within 30 inches (762 mm) of a handrail. On monumental stairs, handrails shall be located along the most direct path of egress travel.

1003.3.3.11.3 Handrail graspability. Handrails with a circular cross section shall have an outside diameter of at least 1.25 inches (32 mm) and not greater than 2 inches (51 mm) or shall provide equivalent graspability. If the handrail is not circular, it shall have

a perimeter dimension of at least 4 inches (102 mm) and not greater than 6.25 inches (159 mm) with a maximum cross-section dimension of 2.25 inches (57 mm). Edges shall have a minimum radius of 0.125 inch (3.2 mm).

1003.3.3.11.4 Continuity. Handrail-gripping surfaces shall be continuous, without interruption by newel posts or other obstructions.

Exceptions:

1. Handrails within dwelling units are permitted to be interrupted by a newel post at a stair landing.
2. Within a dwelling unit, the use of a volute, turnout or starting easing is allowed on the lowest tread.
3. Handrail brackets or balusters attached to the bottom surface of the handrail that do not project horizontally beyond the sides of the handrail within 1.5 inches (38 mm) of the bottom of the handrail shall not be considered to be obstructions.

1003.3.3.11.5 Handrail extensions. Handrails shall return to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent stair flight. Where handrails are not continuous between flights, the handrails shall extend horizontally at least 12 inches (305 mm) beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser.

Exceptions:

1. Handrails within a dwelling unit that is not required to be accessible need extend only from the top riser to the bottom riser.
2. Aisle handrails in Group A occupancies in accordance with Section 1008.11.

1003.3.3.11.6 Clearance. Clear space between a handrail and a wall or other surface shall be a minimum of 1.5 inches (38 mm). A handrail and a wall or other surface adjacent to the handrail shall be free of any sharp or abrasive elements.

1003.3.3.11.7 Stairway projections. Projections into the required width at each handrail shall not exceed 4.5 inches (114 mm) at or below the handrail height. Projections into the required width shall not be limited above the minimum headroom height required in Section 1003.3.3.2.

1003.3.3.12 Stairway to roof. In buildings four or more stories in height above grade, one stairway shall extend to the roof surface, unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope). In buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an alternating tread device.

1003.3.3.12.1 Roof access. Where a stairway is provided to a roof, access to the roof shall be provided through a penthouse complying with Section 1509.2.

Exception: In buildings without an occupied roof, access to the roof shall be permitted to be a roof hatch or trap door not less than 16 square feet (1.5 m²) in area and having a minimum dimension of 2 feet (610 mm).

1003.3.4 Ramps. Ramps used as a component of a means of egress shall conform to the provisions of Sections 1003.3.4.1 through 1003.3.4.9.

Exceptions:

1. Ramped aisles within assembly rooms or spaces shall conform to the provisions in Section 1008.9.
2. Curb ramps shall comply with ICC A117.1.

1003.3.4.1 Slope. Ramps used as part of a means of egress shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other ramps shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

Exception: Aisle ramp slope in occupancies of Group A shall comply with Section 1008.9.

1003.3.4.2 Cross slope. The slope measured perpendicular to the direction of travel of a ramp shall not be steeper than one unit vertical in 48 units horizontal (2-percent slope).

1003.3.4.3 Rise. The rise for any ramp shall be 30 inches (762 mm) maximum.

1003.3.4.4 Minimum dimensions. The minimum dimensions of means of egress ramps shall comply with Sections 1003.3.4.4.1 through 1003.3.4.4.3.

1003.3.4.4.1 Width. The minimum width of a means of egress ramp shall not be less than that required for corridors by Section 1004.3.2.2. The clear width of a ramp and the clear width between handrails, if provided, shall be 36 inches (914 mm) minimum.

1003.3.4.4.2 Headroom. The minimum headroom in all parts of the means of egress ramp shall not be less than 80 inches (2032 mm).

1003.3.4.4.3 Restrictions. Means of egress ramps shall not reduce in width in the direction of egress travel. Projections into the required ramp and landing width are prohibited. Doors opening onto a landing shall not reduce the clear width to less than 42 inches (1067 mm).

1003.3.4.5 Landings. Ramps shall have landings at the bottom and top of each ramp, points of turning, entrance, exits and at doors. Landings shall comply with Sections 1003.3.4.5.1 through 1003.3.4.5.5.

1003.3.4.5.1 Slope. Landings shall have a slope not steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. Changes in level are not permitted.

1003.3.4.5.2 Width. The landing shall be at least as wide as the widest ramp run adjoining the landing.

1003.3.4.5.3 Length. The landing length shall be 60 inches (1525 mm) minimum.

Exception: Landings in nonaccessible Group R-2 and R-3 individual dwelling units, as applicable in Section 101.2, are permitted to be 36 inches (914 mm) minimum.

1003.3.4.5.4 Change in direction. Where changes in direction of travel occur at landings provided between ramp runs, the landing shall be 60 inches (1524 mm) minimum by 60 inches (1524 mm) minimum.

Exception: Landings in nonaccessible Group R-2 and R-3 individual dwelling units, as applicable in Section 101.2, are permitted to be 36 inches (914 mm) by 36 inches (914 mm) minimum.

1003.3.4.5.5 Doorways. Where doorways are located adjacent to a ramp landing, maneuvering clearances required by ICC A117.1 are permitted to overlap the required landing area.

1003.3.4.6 Ramp construction. All ramps shall be built of materials consistent with the types permitted for the type of construction of the building; except that wood handrails shall be permitted for all types of construction. Ramps used as an exit shall conform to the applicable requirements of Sections 1005.3.2 and 1005.3.4 for vertical exit enclosures.

1003.3.4.6.1 Ramp surface. The surface of ramps shall be of slip-resistant materials that are securely attached.

1003.3.4.6.2 Outdoor conditions. Outdoor ramps and outdoor approaches to ramps shall be designed so that water will not accumulate on walking surfaces. In other than occupancies in Group R-3, and occupancies in Group U that are accessory to an occupancy in Group R-3, surfaces and landings which are part of exterior ramps in climates subject to snow or ice shall be designed to minimize the accumulation of same.

1003.3.4.7 Handrails. Ramps with a rise greater than 6 inches (152 mm) shall have handrails on both sides complying with Section 1003.3.3.11.

1003.3.4.8 Edge protection. Edge protection complying with Section 1003.3.4.8.1 or 1003.3.4.8.2 shall be provided on each side of ramp runs and at each side of ramp landings.

Exceptions:

1. Edge protection is not required on ramps not required to have handrails, provided they have flared sides that comply with the ICC A117.1 curb ramp provisions.
2. Edge protection is not required on the sides of ramp landings serving an adjoining ramp run or stairway.
3. Edge protection is not required on the sides of ramp landings having a vertical dropoff of not

more than 0.5 inch (12.7 mm) within 10 inches (254 mm) horizontally of the required landing area.

1003.3.4.8.1 Railings. A rail shall be mounted below the handrail 17 to 19 inches (432 to 483 mm) above the ramp or landing surface.

1003.3.4.8.2 Curb or barrier. A curb or barrier shall be provided that prevents the passage of a 4-inch-diameter (102 mm) sphere, where any portion of the sphere is within 4 inches (102 mm) of the floor or ground surface.

1003.3.4.9 Guards. Guards shall be provided where required by Section 1003.2.12 and shall be constructed in accordance with Section 1003.2.12.

1003.3.5 Turnstiles. Turnstiles or similar devices that restrict travel to one direction shall not be placed so as to obstruct any required means of egress.

Exception: Each turnstile or similar device shall be credited with no more than a 50-person capacity where all of the following provisions are met:

1. Each device shall turn free in the direction of egress travel when primary power is lost, and upon the manual release by an employee in the area.
2. Such devices are not given credit for more than 50 percent of the required egress capacity.
3. Each device is not more than 39 inches (991 mm) high.
4. Each device has at least 16.5 inches (419 mm) clear width at and below a height of 39 inches (991 mm) and at least 22 inches (559 mm) clear width at heights above 39 inches (991 mm).

Where located as part of an accessible route, turnstiles shall have at least 36 inches (914 mm) clear at and below a height of 34 inches (864 mm), at least 32 inches (813 mm) clear width between 34 inches (864 mm) and 80 inches (2032 mm) and shall consist of a mechanism other than a revolving device.

1003.3.5.1 High turnstile. Turnstiles more than 39 inches (991 mm) high shall meet the requirements for revolving doors.

1003.3.5.2 Additional door. Where serving an occupant load greater than 300, each turnstile that is not portable shall have a side-hinged swinging door which conforms to Section 1003.3.1 within 50 feet (15 240 mm).

SECTION 1004 EXIT ACCESS

1004.1 General. The exit access arrangement shall comply with Section 1004 and the applicable provisions of Section 1003.

1004.2 Exit access design requirements. The exit access portion of the means of egress system shall comply with the applicable design requirements of Sections 1004.2.1 through 1004.2.5.

1004.2.1 Exit or exit access doorways required. Two exits or exit access doorways from any space shall be provided where one of the following conditions exists:

1. The occupant load of the space exceeds the values in Table 1004.2.1.
2. The common path of egress travel exceeds the limitations of Section 1004.2.5.

Exception: Exit access doors required by Section 1004.2.3.2 for Group I-2 occupancies.

TABLE 1004.2.1
SPACES WITH ONE MEANS OF EGRESS

OCCUPANCY	MAXIMUM OCCUPANT LOAD
A, B, E, F, M, U	50
H-1, H-2, H-3	3
H-4, H-5, I-1, I-3, I-4, R	10
S	30

1004.2.1.1 Three or more exits. Access to three or more exits shall be provided from a floor area where required by Section 1005.2.1.

1004.2.2 Exit or exit access doorway arrangement. Required exits shall be located in a manner that makes their availability obvious. Exits shall be unobstructed at all times. Exit and exit access doorways shall be arranged in accordance with Sections 1004.2.2.1 and 1004.2.2.2.

1004.2.2.1 Two exit or exit access doorways. Where two exits or exit access doorways are required, from any portion of the exit access, the exit doors or exit access doorways shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between exit doors or exit access doorways.

Exceptions:

1. Where exit enclosures are provided as a portion of the required exit and are interconnected by a 1-hour fire-resistance-rated corridor conforming to the requirements of Section 1004.3.2, the required exit separation shall be measured along a direct line of travel within the corridor. Exit enclosure walls shall not be less than 30 feet (9144 mm) apart at any point in a direct line of measurement.
2. Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, the separation distance of the exit doors or exit access doorways shall not be less than one-third of the length of the maximum overall diagonal dimension of the area served.

1004.2.2.2 Three or more exits or exit access doorways. Where access to three or more exits is required, at least two exit doors or exit access doorways shall be placed a distance apart equal to not less than one-half of

the length of the maximum overall diagonal dimension of the area served measured in a straight line between such exit doors or exit access doorways. Additional exits or exit access doorways shall be arranged a reasonable distance apart so that if one becomes blocked, the others will be available.

1004.2.3 Egress through intervening spaces. Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas are accessory to the area served; are not a high-hazard occupancy; and provide a discernible path of egress travel to an exit. Egress shall not pass through kitchens, store rooms, closets or spaces used for similar purposes. An exit access shall not pass through a room that can be locked to prevent egress. Means of egress from dwelling units or sleeping areas shall not lead through other sleeping areas, toilet rooms or bathrooms.

Exceptions:

1. Means of egress are not prohibited through a kitchen area serving adjoining rooms constituting part of the same dwelling unit or guestroom.
2. Means of egress are not prohibited through rooms or spaces in a high-hazard occupancy where such rooms or spaces are the same occupancy group.

1004.2.3.1 Multiple tenants. Where more than one tenant occupies any one floor of a building or structure, each tenant space, dwelling unit, and guestroom shall be provided with access to the required exits without passing through adjacent tenant spaces, dwelling units, and guestrooms.

1004.2.3.2 Group I-2. Habitable rooms or suites in Group I-2 occupancies shall have an exit access door leading directly to an exit access corridor.

Exceptions:

1. Rooms with exit doors opening directly to the outside at ground level.
2. Patient sleeping rooms are permitted to have one intervening room if the intervening room is not used as an exit access for more than eight patient beds.
3. Special nursing suites are permitted to have one intervening room where the arrangement allows for direct and constant visual supervision by nursing personnel.
4. For rooms other than patient sleeping rooms, suites of rooms are permitted to have one intervening room if the travel distance within the suite to the exit access door is not greater than 100 feet (30 480 mm) and are permitted to have two intervening rooms where the travel distance within the suite to the exit access door is not greater than 50 feet (15 240 mm).

Suites of sleeping rooms shall not exceed 5,000 square feet (465 m²). Suites of rooms, other than patient sleeping rooms, shall not exceed 10,000 square feet (929 m²). Any patient sleeping room, or any suite that includes pa-

tient sleeping rooms, of more than 1,000 square feet (93 m²) shall have at least two exit access doors remotely located from each other. Any room or suite of rooms, other than patient sleeping rooms, of more than 2,500 square feet (232 m²) shall have at least two access doors remotely located from each other. The travel distance between any point in a Group I-2 occupancy and an exit access door in the room shall not exceed 50 feet (15 240 mm). The travel distance between any point in a suite of sleeping rooms and an exit access door of that suite shall not exceed 100 feet (30 480 mm).

1004.2.4 Exit access travel distance. Exits shall be so located that the maximum length of exit access travel, measured from the most remote point to the entrance to an exit along the natural and unobstructed path of egress travel, shall not exceed the distances given in Table 1004.2.4.

Where the path of exit access includes unenclosed stairways or ramps within the exit access, the distance of travel on such means of egress components shall also be included in the travel distance measurement. The measurement along stairways shall be made on a plane parallel and tangent to the stair tread nosings in the center of the stairway.

Exception: Travel distance in open parking garages is permitted to be measured to the closest riser of open stairs.

**TABLE 1004.2.4
EXIT ACCESS TRAVEL DISTANCE^a**

OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, I-1, M, R, S-1	200	250 ^b
B	200	300 ^c
F-2, S-2, U	300	400 ^b
H-1	Not Permitted	75 ^c
H-2	Not Permitted	100 ^c
H-3	Not Permitted	150 ^c
H-4	Not Permitted	175 ^c
H-5	Not Permitted	200 ^c
I-2, I-3, I-4	150	200 ^c

For SI: 1 foot = 304.8 mm.

a. See the following sections for modifications to exit access travel distance requirements:

- Section 402: For the distance limitation in malls.
- Section 404: For the distance limitation through an atrium space.
- Section 1004.2.4.1: For increased limitation in Groups F-1 and S-1.
- Section 1008.6: For increased limitation in assembly seating.
- Section 1008.6: For increased limitation for assembly open-air seating.
- Section 1005.2.2: For buildings with one exit.
- Chapter 31: For the limitation in temporary structures.

b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where sprinkler systems according to Section 903.3.1.2 are permitted.

c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

1004.2.4.1 Roof vent increase. In buildings which are one story in height, equipped with automatic heat and smoke roof vents complying with Section 910 and

equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the maximum exit access travel distance shall be 400 feet (122 m) for occupancies in Group F-1 or S-1.

1004.2.4.2 Exterior egress balcony increase. Travel distances specified in Section 1004.2.4 shall be increased up to an additional 100 feet (30 480 mm) provided the last portion of the exit access leading to the exit occurs on an exterior egress balcony constructed in accordance with Section 1004.3.3. The length of such balcony shall not be less than the amount of the increase taken.

1004.2.5 Common path of egress travel. In occupancies other than Groups H-1, H-2 and H-3, the common path of egress travel shall not exceed 75 feet (22 860 mm). In occupancies in Groups H-1, H-2, and H-3 the common path of egress travel shall not exceed 25 feet (7620 mm).

Exceptions:

1. The length of a common path of egress travel in an occupancy in Groups B, F and S shall not be more than 100 feet (30 480 mm), provided that the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
2. Where a tenant space in an occupancy in Groups B, S and U has an occupant load of not more than 30, the length of a common path of egress travel shall not be more than 100 feet (30 480 mm).
3. The length of a common path of egress travel in occupancies in Group I-3 shall not be more than 100 feet (30 480 mm).

1004.3 Exit access components. Exit access components shall comply with Section 1004 and the applicable requirements of Section 1003.

1004.3.1 Aisles. Aisles serving as a portion of the exit access in the means of egress system shall comply with the requirements of this section. Aisles shall be provided from all occupied portions of the exit access which contain seats, tables, furnishings, displays, and similar fixtures or equipment. Aisles serving assembly areas, other than seating at tables, shall comply with Section 1008. Aisles serving reviewing stands, grandstands and bleachers shall also comply with Section 1008.

The required width of aisles shall be unobstructed.

Exception: Doors, when fully opened, and handrails shall not reduce the required width by more than 7 inches (178 mm). Doors in any position shall not reduce the required width by more than one-half. Other nonstructural projections such as trim and similar decorative features are permitted to project into the required width 1.5 inches (38 mm) from each side.

1004.3.1.1 Public areas Group B and M. In public areas of Group B and M occupancies, the minimum clear aisle width shall be 36 inches (914 mm) where seats, tables, furnishings, displays and similar fixtures or equipment are placed on only one side of the aisle and 44

inches (1118 mm) where such fixtures or equipment are placed on both sides of the aisle.

1004.3.1.2 Nonpublic areas. In nonpublic areas, aisle widths shall be a minimum of 36 inches (914 mm).

Exception: Nonpublic aisles serving less than 50 people, and not required to be accessible by Chapter 11 need not exceed 28 inches (711 mm) in width.

1004.3.1.3 Seating at tables. Where seating is located at a table or counter and is adjacent to an aisle or aisle accessway, the measurement of required clear width of the aisle or aisle accessway, shall be made to a line 19 inches (483 mm) away from and parallel to the edge of the table or counter. The 19-inch (483 mm) distance shall be measured perpendicular to the side of the table or counter. In the case of other side boundaries for aisle or aisle accessways, the clear width shall be measured to walls, edges of seating and tread edges, except that hand-rail projections are permitted.

Exception: Where tables or counters are served by fixed seats, the width of the aisle accessway shall be measured from the back of the seat.

1004.3.1.3.1 Aisle accessway for tables and seating. Aisle accessways serving arrangements of seating at tables or counters shall have sufficient clear width to conform to the capacity requirements of 1003.2.3 but shall not have less than the appropriate minimum clear width specified in Section 1004.3.1.2.

1004.3.1.3.2 Table and seating accessway width. Aisle accessways shall provide a minimum of 12 inches (305 mm) of width plus 0.5 inch (12.7 mm) of width for each additional 1 foot (305 mm), or fraction thereof, beyond 12 feet (3658 mm) of aisle accessway length measured from the center of the seat farthest from an aisle.

Exception: Portions of an aisle accessway having a length not exceeding 6 feet (1829 mm) and used by a total of not more than four persons.

1004.3.1.3.3 Table and seating aisle accessway length. The length of travel along the aisle accessway shall not exceed 30 feet (9144 mm) from any seat to the point where a person has a choice of two or more paths of egress travel to separate exits.

1004.3.2 Corridors. Corridors shall comply with Sections 1004.3.2.1 through 1004.3.2.5.

1004.3.2.1 Construction. Corridors shall be fire-resistance rated in accordance with Table 1004.3.2.1. The corridor walls required to be fire-resistance-rated shall comply with Section 708 for fire partitions.

Exceptions:

1. A fire-resistance rating is not required for corridors in an occupancy in Group E where each room that is used for instruction has at least one door directly to the exterior and rooms for assembly purposes have at least one-half of the required means of egress doors opening directly

**TABLE 1004.3.2.1
CORRIDOR FIRE-RESISTANCE RATING**

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system ^c
H-1, H-2, H-3	All	1	1
H-4, H-5	Greater than 30	1	1
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	1	1
I-2 ^a , I-4	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1 ^b

a. For requirements for occupancies in Group I-2, see Section 407.3.

b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.7.

c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

to the exterior. Exterior doors specified in this exception are required to be at ground level.

2. A fire-resistance rating is not required for corridors contained within a dwelling unit or a guestroom in an occupancy in Group R.
3. A fire-resistance rating is not required for corridors in open parking garages.
4. A fire-resistance rating is not required for corridors in an occupancy in Group B which is a space requiring only a single means of egress complying with Section 1004.2.1.

1004.3.2.2 Corridor width. The minimum corridor width shall be as determined in Section 1003.2.3, but not less than 44 inches (1118 mm).

Exceptions:

1. Twenty-four inches (610 mm)—For access to and utilization of electrical, mechanical, or plumbing systems or equipment.
2. Thirty-six inches (914 mm)—With a required occupant capacity of 50 or less.
3. Thirty-six inches (914 mm)—Within a dwelling unit.
4. Seventy-two inches (1829 mm)—In Group E with a corridor having a required capacity of 100 or more.
5. Seventy-two inches (1829 mm)—In corridors serving surgical Group I, health-care centers for ambulatory patients receiving outpatient medical care, which causes the patient to be not capable of self-preservation.
6. Ninety-six inches (2438 mm)—In Group I-2 in areas where required for bed movement

1004.3.2.3 Dead ends. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than 20 feet (6096 mm) in length.

Exceptions:

1. In occupancies in Group I-3 of Occupancy Conditions 2, 3 or 4 (See Section 308.4), the

dead end in a corridor shall not exceed 50 feet (15 240 mm).

2. In occupancies in Groups B and F where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the length of dead-end corridors shall not exceed 50 feet (15 240 mm).
3. A dead-end corridor shall not be limited in length where the length of the dead-end corridor is less than 2.5 times the least width of the dead-end corridor.

1004.3.2.4 Air movement in corridors. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts or plenums.

Exceptions:

1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted provided that each such corridor is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the corridor.
2. Use of the space between the corridor ceiling and the floor or roof structure above as a return air plenum is permitted for one or more of the following conditions:
 - 2.1. The corridor is not required to be of fire-resistance-rated construction.
 - 2.2. The corridor is separated from the plenum by fire-resistance-rated construction.
 - 2.3. The air-handling system serving the corridor is shut down upon activation of the air-handling unit smoke detectors required by the *International Mechanical Code*.
 - 2.4. The air-handling system serving the corridor is shut down upon detection of sprinkler water flow where the building

is equipped throughout with an automatic sprinkler system.

- 2.5. The space between the corridor ceiling and the floor or roof structure above the corridor is used as a component of an approved engineered smoke control system.
3. Where located within a dwelling unit, the use of corridors as return air plenums shall not be prohibited.
4. Where located within tenant spaces of 1,000 square feet (93 m²) or less in area, utilization of corridors as return air plenums is permitted.

1004.3.2.5 Corridor continuity. Fire-resistance-rated corridors shall be continuous from the point of entry to an exit. Fire-resistance-rated corridors shall not be interrupted by intervening rooms.

Exceptions:

1. Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.
2. In Group B buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, corridors are permitted to lead through enclosed elevator lobbies provided all areas of the building have access to at least one required exit without passing through the elevator lobby.

1004.3.3 Egress balconies. Balconies used for egress purposes shall conform to the same requirements as corridors for width, headroom, dead ends and projections. Exterior balconies shall be designed to minimize accumulation of snow or ice that impedes the means of egress.

Exception: Exterior balconies and concourses in outdoor stadiums shall be exempt from the design requirement to protect against the accumulation of snow or ice.

1004.3.3.1 Wall separation. Exterior egress balconies shall be separated from the interior of the building by walls and opening protectives as required for corridors.

Exception: Separation is not required where the exterior egress balcony is served by at least two stairs and a dead-end travel condition does not require travel past an unprotected opening to reach a stair.

1004.3.3.2 Openness: The long side of an egress balcony shall be at least 50 percent open, and the open area above the guards shall be so distributed as to minimize the accumulation of smoke or toxic gases.

SECTION 1005 EXITS

1005.1 General. Exits shall comply with Section 1005 and the applicable requirements of Section 1003. An exit shall not be used for any purpose that interferes with its function as a means

of egress. Once a given level of exit protection is achieved, such level of protection shall not be reduced until arrival at the exit discharge.

1005.2 Exit design requirements. The exit portion of the means of egress system shall comply with the design requirements of Sections 1005.2.1 through 1005.2.3.

1005.2.1 Minimum number of exits. Every floor area shall be provided with the minimum number of approved independent exits as required by Table 1005.2.1 based on the occupant load, except as modified in Section 1004.2.1 or 1005.2.2. For the purposes of this chapter, occupied roofs shall be provided with exits as required for floors. The required number of exits from any story, basement or individual space shall be maintained until arrival at grade or the public way.

**TABLE 1005.2.1
MINIMUM NUMBER OF EXITS FOR OCCUPANT LOAD**

OCCUPANT LOAD	MINIMUM NUMBER OF EXITS
1-500	2
501-1,000	3
More than 1,000	4

1005.2.1.1 Open parking structures. Parking structures shall not have less than two exits from each parking tier, except that only one exit is required where vehicles are mechanically parked. Unenclosed vehicle ramps shall not be considered as required exits unless pedestrian facilities are provided.

1005.2.1.2 Helistops. The means of egress from helistops shall comply with the provisions of this chapter, provided that landing areas located on buildings or structures shall have two or more exits. For landing platforms or roof areas less than 60 feet (18 288 mm) long, or less than 2,000 square feet (186 m²) in area, the second means of egress is permitted to be a fire escape or ladder leading to the floor below.

1005.2.2 [Comm 62.1005] Buildings with one exit. Only one exit shall be required in buildings as described below:

1. Buildings described in Table 1005.2.2, provided that the building has not more than one level below the first story.
2. Buildings of Group R-3 occupancy.
3. Single-level buildings with the occupied space at the level of exit discharge provided that the story or space complies with Section 1004.2.1 as a space with one means of egress.
4. Buildings of Group I-3 occupancy that are used as guard towers, provided they are no taller than two stories, have no more than 10 occupants, and have a travel distance of no more than 75 feet (22 860 mm).

TABLE 1005.2.2
BUILDINGS WITH ONE EXIT

OCCUPANCY	MAXIMUM HEIGHT OF BUILDING ABOVE GRADE PLANE	MAXIMUM OCCUPANTS (OR DWELLING UNITS) PER FLOOR AND TRAVEL DISTANCE
A, B ^d , E, F, M, U	1 Story	50 occupants and 75 feet travel distance
H-2, H-3	1 Story	3 occupants and 25 feet travel distance
H-4, H-5, I, R	1 Story	10 occupants and 75 feet travel distance
S ^a	1 Story	30 occupants and 100 feet travel distance
B ^b , F, M, S ^a	2 Stories	30 occupants and 75 feet travel distance
R-2	2 Stories ^c	4 dwelling units and 50 feet travel distance

For SI: 1 foot = 304.8 mm.

- For the required number of exits for open parking structures, see Section 1005.2.1.1.
- For the required number of exits for air traffic control towers, see Section 412.1.
- Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1009 shall have a maximum height of three stories above grade.
- Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 with an occupancy in Group B shall have a maximum travel distance of 100 feet.

1005.2.3 Exit continuity. Exits shall be continuous from the point of entry into the exit to the exit discharge.

1005.3 Exit components. Exit components shall comply with Section 1005, and the applicable requirements of Section 1003.

1005.3.1 Exterior exit doors. Buildings or structures used for human occupancy shall have at least one exterior door that meets the requirements of Section 1003.3.1.1.

1005.3.1.1 Detailed requirements. Exterior exit doors shall comply with the applicable requirements of Section 1003.3.1.

1005.3.1.2 Arrangement. Exterior exit doors shall lead directly to the exit discharge or the public way.

1005.3.2 Vertical exit enclosures. Interior exit stairways shall be enclosed. Vertical exit enclosures four stories or more shall be 2-hour fire-resistance rated. Vertical exit enclosures less than four stories shall be 1-hour fire-resistance rated. The number of stories shall be computed as all floor levels, including basements but excluding mezzanines. An exit enclosure shall not be used for any purpose other than means of egress. Vertical exit enclosures shall be constructed as fire barriers in accordance with Section 706. The enclosure requirements for interior exit ramps shall be the same as for interior exit stairways.

Exceptions:

- In other than Groups H and I occupancies, a stairway serving an occupant load of less than 10 not

more than one story above the level of exit discharge is not required to be enclosed.

- Exits in buildings of Group A-5 where all portions of the means of egress are essentially open to the outside need not be enclosed.
- Stairways serving and contained within a single residential dwelling unit in occupancies in Group R-2 or R-3 and guestrooms or individual suites in occupancies in Group R-1 are not required to be enclosed.
- Stairways that are not a required means of egress element are not required to be enclosed where such stairways comply with Section 707.2.
- Stairways in open parking structures which serve only the parking structure are not required to be enclosed.
- Stairways in occupancies in Group I-3 as provided for in Section 408.3.6 are not required to be enclosed.
- Means of egress stairways as required by Section 410.5.4 are not required to be enclosed.
- In other than occupancy Groups H and I, a maximum of 50 percent of egress stairways serving one adjacent floor are not required to be enclosed, provided at least two means of egress are provided from both floors served by the unenclosed stairways. Any two such interconnected floors shall not be open to other floors.

1005.3.2.1 Vertical enclosure exterior walls. Exterior walls of a vertical exit enclosure shall comply with the requirements of Section 704 for exterior walls. Where nonrated walls or unprotected openings enclose the exterior of the stairway and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall be constructed as required for a minimum 1-hour fire-resistance rating with 0.75-hour opening protectives. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the stairway or to the roof line, whichever is lower.

1005.3.2.2 Enclosures under stairways. The walls and soffits within enclosed usable spaces under enclosed and unenclosed stairways shall be protected by 1-hour fire-resistance-rated construction, or the fire-resistance rating of the stairway enclosure, whichever is greater. Access to the enclosed usable space shall not be directly from within the stair enclosure.

Exception: Spaces under stairways serving and contained within a single residential dwelling unit in Group R-2 or R-3 as applicable in Section 101.2.

There shall be no enclosed usable space under exterior exit stairways unless the space is completely enclosed in 1-hour fire-resistance-rated construction for stairways serving less than four stories, and 2-hour fire-resistance-rated construction for stairways serving four or more sto-

ries. The open space under exterior stairways shall not be used for any purpose.

1005.3.2.3 Discharge identification. A stairway in an exit enclosure shall not continue below the level of exit discharge unless an approved barrier is provided at the level of exit discharge to prevent persons from unintentionally continuing into levels below. Directional exit signs shall be provided as specified in Section 1003.2.10.

1005.3.2.4 Stairway floor number signs. A sign shall be provided at each floor landing in interior vertical exit enclosures connecting more than three stories designating the floor level, the terminus of the top and bottom of the stair enclosure, and the identification of the stair. The signage shall also state the story of, and the direction to the exit discharge and the availability of roof access from the stairway for the fire department. The sign shall be located 5 feet (1524 mm) above the floor landing in a position which is readily visible when the doors are in the open and closed positions.

1005.3.2.5 Smokeproof enclosures. In buildings required to comply with Section 403 or 405, each of the exits of a building that serves stories where the floor surface is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access or more than 30 feet (9144 mm) below the level of exit discharge serving such floor levels shall be a smokeproof enclosure or pressurized stairway in accordance with Section 909.20.

1005.3.2.5.1 Enclosure exit. A smokeproof enclosure or pressurized stairway shall exit into a public way or into an exit passageway, yard, or open space having direct access to a public way. The exit passageway shall be without other openings and shall be separated from the remainder of the building by 2-hour fire-resistance-rated construction.

Exceptions:

1. Openings in the exit passageway serving a smokeproof enclosure are permitted where the exit passageway is protected and pressurized in the same manner as the smokeproof enclosure, and openings are protected as required for access from other floors.
2. Openings in the exit passageway serving a pressurized stairway are permitted where the exit passageway is protected and pressurized in the same manner as the pressurized stairway.

1005.3.2.5.2 Enclosure access. Access to the stairway within a smokeproof enclosure shall be by way of a vestibule or by way of an open exterior balcony.

Exception: Access is not required by way of a vestibule or exterior balcony for stairways using the pressurization alternative complying with Section 909.20.5.

1005.3.3 Exit passageway. Exit passageways serving as an exit component in a means of egress system shall comply with the requirements of Sections 1005.3.3.1 through

1005.3.3.2. An exit passageway shall not be used for any purpose other than as a means of egress.

1005.3.3.1 Width. The width of exit passageways shall be determined as specified in Section 1003.2.3 but such width shall not be less than 44 inches (1118 mm), except that exit passageways serving an occupant load of less than 50 shall not be less than 36 inches (914 mm) in width.

The required width of exit passageways shall be unobstructed.

Exception: Doors, when fully opened, and handrails, shall not reduce the required width by more than 7 inches (178 mm). Doors in any position shall not reduce the required width by more than one-half. Other nonstructural projections such as trim and similar decorative features may project into the required width 1.5 inches (38 mm) on each side.

1005.3.3.2 Construction. Exit passageway enclosures shall have walls, floors and ceilings of not less than 1-hour fire-resistance rating, and not less than that required for any connecting exit enclosure. Exit passageways shall be constructed as fire barriers in accordance with Section 706.

1005.3.4 Openings and penetrations. Exit passageway and vertical exit enclosure opening protectives shall be in accordance with the requirements of Section 714.

Except as permitted in Section 402.4.6, openings in exit enclosures and exit passageways other than unexposed exterior openings shall be limited to those necessary for exit access to the enclosure from normally occupied spaces and for egress from the enclosure.

Where interior exit enclosures are extended to the exterior of a building by an exit passageway, the door assembly from the exit enclosure to the exit passageway shall be protected by a fire door conforming to the requirements in Section 714.2. Fire door assemblies in exit enclosures shall comply with Section 714.2.4.

Elevators shall not open into an exit passageway.

1005.3.4.1 Penetrations. Penetrations into and openings through an exit enclosure assembly are prohibited except for required exit doors, equipment and ductwork necessary for independent pressurization, sprinkler piping, standpipes, and electrical conduit serving the exit enclosure and terminating at a steel box not exceeding 16 square inches (0.010 m²). Such penetrations shall be protected in accordance with Section 711. There shall be no penetrations or communicating openings, whether protected or not, between adjacent exit enclosures.

1005.3.4.2 Ventilation. Equipment and ductwork for exit enclosure ventilation shall comply with one of the following items:

1. Such equipment and ductwork shall be located exterior to the building and shall be directly connected to the exit enclosure by ductwork enclosed in construction as required for shafts.

2. Where such equipment and ductwork is located within the exit enclosure, the intake air shall be taken directly from the outdoors and the exhaust air shall be discharged directly to the outdoors, or such air shall be conveyed through ducts enclosed in construction as required for shafts.
3. Where located within the building, such equipment and ductwork shall be separated from the remainder of the building, including other mechanical equipment, with construction as required for shafts.

In each case, openings into the fire-resistance-rated construction shall be limited to those needed for maintenance and operation and shall be protected by self-closing fire-resistance-rated devices in accordance with Chapter 7 for enclosure wall opening protectives.

Exit enclosure ventilation systems shall be independent of other building ventilation systems.

1005.3.5 Horizontal exits. Horizontal exits serving as an exit in a means of egress system shall comply with the requirements of Sections 1005.3.5.1 through 1005.3.5.3. A horizontal exit shall not serve as the only exit from a portion of a building, and where two or more exits are required, not more than one-half of the total number of exits or total exit width shall be horizontal exits.

Exceptions:

1. Horizontal exits are permitted to comprise two-thirds of the required exits from any building or floor area for occupancies in Group I-2.
2. Horizontal exits are permitted to comprise 100 percent of the exits required for occupancies in Group I-3. At least 6 square feet (0.6 m²) of accessible space per occupant shall be provided on each side of the horizontal exit for the total number of people in adjoining compartments.

Every fire compartment for which credit is allowed in connection with a horizontal exit shall not be required to have a stairway or door leading directly outside, provided the adjoining fire compartments have stairways or doors leading directly outside and are so arranged that egress shall not require the occupants to return through the compartment from which egress originates.

The area into which a horizontal exit leads shall be provided with exits adequate to meet the occupant requirements of this chapter, but not including the added occupant capacity imposed by persons entering it through horizontal exits from another area. At least one of its exits shall lead directly to the exterior or to an exit enclosure.

1005.3.5.1 Separation. The separation between buildings or areas of refuge connected by a horizontal exit shall be provided by a fire wall complying with Section 705 or a fire barrier complying with Section 706 and having a fire-resistance rating of not less than 2 hours. Opening protectives in horizontal exit walls shall also comply with Section 714. The horizontal exit separation shall extend vertically through all levels of the building unless

floor assemblies are of 2-hour fire resistance with no unprotected openings.

Horizontal exit walls constructed as fire barriers shall be continuous from exterior wall to exterior wall so as to divide completely the floor served by the horizontal exit.

1005.3.5.2 Opening protectives. Fire doors in horizontal exits shall be self-closing or automatic-closing when activated by a smoke detector installed in accordance with Section 907.11. Opening protectives in horizontal exits shall be consistent with the fire-resistance rating of the wall. Such doors where located in a cross-corridor condition shall be automatic-closing by activation of a smoke detector installed in accordance with Section 907.11.

1005.3.5.3 Capacity of refuge area. The refuge area of a horizontal exit shall be spaces occupied by the same tenant or public areas and each such area of refuge shall be adequate to house the original occupant load of the refuge space plus the occupant load anticipated from the adjoining compartment. The anticipated occupant load from the adjoining compartment shall be based on the capacity of the horizontal exit doors entering the area of refuge. The capacity of areas of refuge shall be computed on a net floor area allowance of 3 square feet (0.2787 m²) for each occupant to be accommodated therein, not including areas of stairways, elevators and other shafts or courts.

Exception: The net floor area allowable per occupant shall be as follows for the indicated occupancies:

1. Six square feet (0.6 m²) per occupant for occupancies in Group I-3.
2. Fifteen square feet (1.4 m²) per occupant for ambulatory occupancies in Group I-2.
3. Thirty square feet (2.8 m²) per occupant for nonambulatory occupancies in Group I-2.

1005.3.6 Exterior exit stairways. Exterior exit stairways serving as an element of a required means of egress shall comply with Sections 1005.3.6.1 through 1005.3.6.5.

Exception: Exterior exit stairways for outdoor stadiums complying with Section 1005.3.2, Exception 2.

1005.3.6.1 Use in a means of egress. Exterior exit stairways shall not be used as an element of a required means of egress for occupancies in Group I-2. For occupancies in other than Group I-2, exterior exit stairways shall be permitted as an element of a required means of egress for buildings not exceeding six stories or 75 feet (22 860 mm) in height.

1005.3.6.2 Open side. Exterior exit stairways serving as an element of a required means of egress shall be open on at least one side. An open side shall have a minimum of 35 square feet (3.3 m²) of aggregate open area adjacent to each floor level and the level of each intermediate landing. The required open area shall be located not less than 42 inches (1067 mm) above the adjacent floor or landing level.

1005.3.6.3 Side yards. The open areas adjoining exterior exit stairways shall be either yards, courts, or public ways; the remaining sides are permitted to be enclosed by the exterior walls of the building.

1005.3.6.4 Location. Exterior stairways shall be located in accordance with Section 1006.2.2.

1005.3.6.5 Exterior stairway protection. Exterior exit stairs shall be separated from the interior of the building as required in Section 1005.3.2. Openings shall be limited to those necessary for egress from normally occupied spaces.

Exceptions:

1. Separation from the interior of the building is not required for occupancies, other than those in Group R-1 or R-2, in buildings that are no more than two stories above grade where the level of exit discharge is the first story above grade.
2. Separation from the interior of the building is not required where the exterior stairway is served by an exterior balcony that connects two remote exterior stairways or other approved exits, with a perimeter that is not less than 50 percent open. To be considered open, the opening shall be a minimum of 50 percent of the height of the enclosing wall, with the top of the openings no less than 7 feet (2134 mm) above the top of the balcony.
3. Separation from the interior of the building is not required for an exterior stairway located in a building or structure that is permitted to have unenclosed interior stairways in accordance with Section 1005.3.2.
4. Separation from the interior of the building is not required for exterior stairways connected to open-ended corridors, provided that: items 4.1 through 4.4 are met.
 - 4.1. The building, including corridors and stairs, shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
 - 4.2. The open-ended corridors comply with Section 1004.3.2.
 - 4.3. The open-ended corridors are connected on each end to an exterior exit stairway complying with Section 1005.3.6.
 - 4.4. At any location in an open-ended corridor where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3.3 m²) or an exterior stairway shall be provided. Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.

SECTION 1006 EXIT DISCHARGE

1006.1 General. Exits shall discharge directly to the exterior of the building. The exit discharge shall be at grade or shall provide direct access to grade. The exit discharge shall not re-enter a building.

Exceptions:

1. A maximum of 50 percent of the number and capacity of the exit enclosures is permitted to egress through areas on the level of discharge provided all of the following are met:
 - 1.1. Such exit enclosures egress to a free and unobstructed way to the exterior of the building, which way is readily visible and identifiable from the point of termination of the exit enclosure.
 - 1.2. The entire area of the level of discharge is separated from areas below by construction conforming to the fire-resistance rating for the exit enclosure.
 - 1.3. The level of discharge is protected throughout by an approved automatic sprinkler system and any other portion of the level of discharge with access to the discharge area is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 or separated from the other portions of the building in accordance with the requirements for the enclosure of exits.
2. A maximum of 50 percent of the number and capacity of the exit enclosures is permitted to egress through a vestibule provided all of the following are met:
 - 2.1. The entire area of the vestibule is separated from areas below by construction conforming to the fire-resistance rating for the exit enclosure.
 - 2.2. The depth from the exterior of the building is not greater than 10 feet (3048 mm) and the length is not greater than 30 feet (9144 mm).
 - 2.3. The area is separated from the remainder of the level of exit discharge by construction providing protection at least the equivalent of approved wired glass in steel frames.
 - 2.4. The area is used only for means of egress and exits directly to the outside.

1006.2 Exit discharge design requirements. The exit discharge portion of the means of egress system shall comply with the applicable design requirements of Sections 1006.2.1 and 1006.2.2.

1006.2.1 Exit discharge capacity. The capacity of the exit discharge shall be not less than the required discharge capacity of the exits being served.

1006.2.2 Exit discharge location. Exterior balconies, stairways and ramps shall be located at least 10 feet (3048 mm) from adjacent lot lines and from other buildings on the same

lot unless the adjacent building exterior walls and openings are protected in accordance with Section 704 based on fire separation distance.

Comm 62.1006 Safe dispersal areas. On sites where a public way is more than 100 feet (30 480 mm) from the building, the exit discharge may lead to a safe dispersal area such as a parking lot or fire access lane. The safe dispersal area may not be less than 50 feet (15 240 mm) from the building served and shall be large enough to accommodate all occupants of the building, based on at least 3 square feet (0.28 m²) of area per occupant.

1006.3 Exit discharge components. Exit discharge components incorporated into the design of the exit discharge portion of the means of egress system shall comply with the requirements of Section 1006. Exit discharge components shall be sufficiently open to the exterior so as to minimize the accumulation of smoke and toxic gases.

1006.3.1 Egress courts. Egress courts serving as a portion of the exit discharge in the means of egress system shall comply with the requirements of Section 1006.

1006.3.1.1 Width. The width of egress courts shall be determined as specified in Section 1003.2.3.1, but such width shall not be less than 44 inches (1118 mm), except as specified herein. Egress courts serving occupancies in Group R-3 applicable in Section 101.2 and Group U shall not be less than 36 inches (914 mm) in width.

The required width of egress courts shall be unobstructed to a height of 7 feet (2134 mm).

Exception: Doors, when fully opened, and handrails shall not reduce the required width by more than 7 inches (178 mm). Doors in any position shall not reduce the required width by more than one-half. Other nonstructural projections such as trim and similar decorative features are permitted to project into the required width 1.5 inches (38 mm) from each side.

Where an egress court exceeds the minimum required width and the width of such egress court is then reduced along the path of exit travel, the reduction in width shall be gradual. The transition in width shall be affected by a guard not less than 36 inches (914 mm) in height and shall not create an angle of more than 30 degrees (0.52 rad) with respect to the axis of the egress court along the path of egress travel. In no case shall the width of the egress court be less than the required minimum.

1006.3.1.2 Construction and openings. Where an egress court serving a building or portion thereof is less than 10 feet (3048 mm) in width, the egress court walls shall be not less than 1-hour fire-resistance-rated exterior walls complying with Section 704 for a distance of 10 feet (3048 mm) above the floor of the court, and openings therein shall be equipped with fixed or self-closing, ³/₄-hour opening protective assemblies.

Exceptions:

1. Egress courts serving an occupant load of less than 10.

2. Egress courts serving Group R-3 as applicable in Section 101.2.

SECTION 1007 MISCELLANEOUS MEANS OF EGRESS REQUIREMENTS

1007.1 Boiler, incinerator and furnace rooms. Two exit access doorways are required in boiler, incinerator and furnace rooms where the area is over 500 square feet (46 m²) and any fuel-fired equipment exceeds 400,000 British thermal unit (Btu) (422 000 KJ) input capacity. Where two exit access doorways are required, one is permitted to be a fixed ladder or an alternating tread device. Exit access doorways shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of room.

1007.2 Refrigeration machinery rooms. Machinery rooms larger than 1,000 square feet (93 m²) shall have not less than two exits or exit access doors. Where two exit access doorways are required, one such doorway is permitted to be served by a fixed ladder or an alternating tread device. Exit access doorways shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of room.

All portions of machinery rooms shall be within 150 feet (45 720 mm) of an exit or exit access doorway. An increase in travel distance is permitted in accordance with Section 1004.2.4.

Doors shall swing in the direction of egress travel, regardless of the occupant load served. Doors shall be tight fitting and self-closing.

1007.3 Refrigerated rooms or spaces. Rooms or spaces having a floor area of 1,000 square feet (93 m²) or more, containing a refrigerant evaporator and maintained at a temperature below 68°F (20°C), shall have access to not less than two exits or exit access doors.

Travel distance shall be determined as specified in Section 1004.2.4, but all portions of a refrigerated room or space shall be within 150 feet (45 720 mm) of an exit or exit access door where such rooms are not protected by an approved automatic sprinkler system. Egress is allowed through adjoining refrigerated rooms or spaces.

Exception: Where using refrigerants in quantities limited to the amounts based on the volume set forth in the *International Mechanical Code*.

1007.4 Cellulose nitrate film handling. Where cellulose nitrate film is handled in film laboratories, projection rooms and film-processing rooms, access to not less than two exits or exit access doors shall be provided. Doors to such rooms shall be protected by a fire assembly having a fire protection rating of not less than 1 hour and shall be maintained self-closing.

1007.5 Stage means of egress. Where two means of egress are required, based on the stage size or occupant load, one means of egress shall be provided on each side of the stage.

1007.5.1 Gallery, gridiron and catwalk means of egress. The means of egress from lighting and access catwalks, gal-

leries and gridirons shall meet the requirements for occupancies in Group F-2.

Exceptions:

1. A minimum width of 22 inches (559 mm) is permitted for lighting and access catwalks.
2. Spiral stairs are permitted in the means of egress.
3. Stairways required by this subsection need not be enclosed.
4. Stairways with a minimum width of 22 inches (559 mm), ladders, or spiral stairs are permitted in the means of egress.
5. A second means of egress is not required from these areas where a means of escape to a floor or to a roof is provided. Ladders, alternating tread devices, or spiral stairs are permitted in the means of escape.
6. Ladders are permitted in the means of egress.

SECTION 1008 ASSEMBLY

1008.1 Assembly main exit. Group A occupancies that have an occupant load of greater than 300 shall be provided with a main exit. The main exit shall be of sufficient width to accommodate not less than one-half of the occupant load, but such width shall not be less than the total required width of all means of egress leading to the exit. Where the building is classified as a Group A occupancy, the main exit shall front on at least one street or an unoccupied space of not less than 10 feet (3048 mm) in width that adjoins a street or public way.

Exception: In assembly occupancies where there is no well-defined main exit or where multiple main exits are provided, exits shall be permitted to be distributed around the perimeter of the building provided that the total width of egress is not less than 100 percent of the required width.

1008.2 Assembly other exits. In addition to having access to a main exit, each level of an occupancy in Group A having an occupant load of greater than 300 shall be provided with additional exits that shall provide an egress capacity for at least one-half of the total occupant load served by that level and comply with Section 1004.2.2.

Exception: In assembly occupancies where there is no well-defined main exit or where multiple main exits are provided, exits shall be permitted to be distributed around the perimeter of the building provided that the total width of egress is not less than 100 percent of the required width.

1008.3 Foyers and lobbies. In theaters and similar Group A occupancies, where persons are admitted to the building at times when seats are not available and are allowed to wait in a lobby or similar space, such use of lobby or similar space shall not encroach upon the required clear width of the means of egress. Such waiting areas shall be separated from the required means of egress by substantial permanent partitions or by fixed rigid railings not less than 42 inches (1067 mm) high. Such foyer, if not directly connected to a public street by all the main entrances or exits, shall have a straight and unobstructed corridor or passage to every such main entrance and exit.

1008.4 Interior balcony and gallery means of egress. For balconies or galleries having a seating capacity of over 50 located in Group A occupancies, at least two means of egress shall be provided, one from each side of every balcony or gallery, with at least one leading directly to an exit.

1008.4.1 Enclosure of balcony openings. Interior stairways and other vertical openings shall be enclosed in a vertical exit enclosure as provided in Section 1005.3.2, except that stairways are permitted to be open between the balcony and the main assembly floor in occupancies such as theaters, churches and auditoriums.

1008.5 Width of means of egress for assembly. The clear width of aisles and other means of egress shall comply with Section 1008.5.1 where smoke-protected seating is not provided and with Section 1008.5.2 or 1008.5.3 where smoke-protected seating is provided. The clear width shall be measured to walls, edges of seating and tread edges except for permitted projections.

1008.5.1 Without smoke protection. The clear width of the means of egress shall provide sufficient capacity in accordance with all of the following, as applicable:

1. At least 0.3 inch (7.6 mm) of width for each occupant served shall be provided on stairs having riser heights 7 inches (178 mm) or less and tread depths 11 inches (279 mm) or greater, measured horizontally between tread nosing.
2. At least 0.005 inch (0.127 mm) of additional stair width for each occupant shall be provided for each 0.10 inch (2.5 mm) of riser height above 7 inches (178 mm).
3. Where egress requires stair descent, at least 0.075 inch (1.9 mm) of additional width for each occupant shall be provided on those portions of stair width having no handrail within a horizontal distance of 30 inches (762 mm).
4. Ramped means of egress, where slopes are steeper than one unit vertical in 12 units horizontal (8-percent slope), shall have at least 0.22 inch (5.6 mm) of clear width for each occupant served. Level or ramped means of egress, where slopes are not steeper than one unit vertical in 12 units horizontal (8-percent slope), shall have at least 0.20 inch (5.1 mm) of clear width for each occupant served.

1008.5.2 Smoke-protected seating. The clear width of the means of egress for smoke-protected assembly seating shall be not less than the occupant load served by the egress element multiplied by the appropriate factor in Table 1008.5.2. The total number of seats specified shall be those within a single assembly space and exposed to the same smoke-protected environment. Interpolation is permitted between the specific values shown. A Life Safety Evaluation, complying with NFPA 101, shall be done for a facility utilizing the reduced width requirements of Table 1008.5.2 for smoke-protected assembly seating.

1008.5.2.1 Smoke control. Means of egress serving a smoke-protected assembly seating area shall be provided with a smoke control system complying with Section 909 or natural ventilation designed to maintain the

TABLE 1008.5.2
WIDTH OF AISLES FOR SMOKE-PROTECTED ASSEMBLY

TOTAL NUMBER OF SEATS IN THE SMOKE PROTECTED ASSEMBLY OCCUPANCY	INCHES OF CLEAR WIDTH PER SEAT SERVED			
	Stairs and aisle steps with handrails within 30 inches	Stairs and aisle steps without handrails within 30 inches	Passageways, doorways and ramps not steeper than 1 in 10 in slope	Ramps steeper than 1 in 10 in slope
Equal to or less than 2,000	0.300	0.375	0.200	0.220
5,000	0.200	0.250	0.150	0.165
10,000	0.130	0.163	0.100	0.110
15,000	0.096	0.120	0.070	0.077
20,000	0.076	0.095	0.056	0.062
Equal to or greater than 25,000	0.060	0.075	0.044	0.048

For SI: 1 inch = 25.4 mm.

smoke level at least 6 feet (1829 mm) above the floor of the means of egress.

1008.5.2.2 Roof height. A smoke-protected assembly seating area with a roof shall have the lowest portion of the roof deck not less than 15 feet (4572 mm) above the highest aisle or aisle accessway.

Exception: A roof canopy in an outdoor stadium shall be permitted to be less than 15 feet (4572 mm) above the highest aisle or aisle accessway provided that there are no objects less than 80 inches (2032 mm) above the highest aisle or aisle accessway.

1008.5.2.3 Automatic sprinklers. Enclosed areas with walls and ceilings in buildings or structures containing smoke-protected assembly seating shall be protected with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

Exceptions:

1. The floor area used for the contest, performance or entertainment provided the roof construction is more than 50 feet (15 240 mm) above the floor level and the use is restricted to low-fire-hazard uses.
2. Press boxes and storage facilities less than 1,000 square feet (93 m²) in area.
3. Outdoor seating facilities where seating and the means of egress in the seating area are essentially open to the outside.

1008.5.3 Width of means of egress for outdoor smoke-protected assembly. The clear width in inches (mm) of aisles and other means of egress shall be not less than the total occupant load served by the egress element multiplied by 0.08 (2.0 mm) where the egress is by aisles and stairs and multiplied by 0.06 (1.52 mm) where egress is by ramps, corridors, tunnels or vomitories.

Exception: The clear width in inches (mm) of aisles and other means of egress shall be permitted to comply with Section 1008.5.2 for the number of seats in the outdoor smoke-protected assembly where Section 1008.5.2 permits less width.

1008.6 Travel distance. Exits and aisles shall be so located that the travel distance to an exit door shall not be greater than 200 feet (60 960 mm) measured along the line of travel in unsprinklered buildings. Travel distance shall not be more than 250 feet (76 200 mm) in sprinklered buildings. Where aisles are provided for seating, the distance shall be measured along the aisles and aisle accessway without travel over or on the seats.

Exceptions:

1. Smoke-protected assembly seating: The travel distance from each seat to the nearest entrance to a vomitory or concourse shall not exceed 200 feet (60 960 mm). The travel distance from the entrance to the vomitory or concourse to a stair, ramp or walk on the exterior of the building shall not exceed 200 feet (60 960 mm).
2. Open-air seating: The travel distance from each seat to the building exterior shall not exceed 400 feet (122 m). The travel distance shall not be limited in facilities of Type I or II construction.

1008.7 Assembly aisles are required. Every occupied portion of any occupancy in Group A that contains seats, tables, displays, similar fixtures or equipment shall be provided with aisles leading to exits or exit access doorways in accordance with this section. Aisle accessways for tables and seating shall comply with Section 1004.3.1.3.

Exception: An aisle is not required in seating facilities where all of the following conditions exist:

1. Seats are without backrests.
2. The rise from row to row does not exceed 6 inches (152 mm) per row.
3. The row spacing does not exceed 28 inches (711 mm) unless the seat boards and footboards are at the same elevation.
4. The number of rows does not exceed 16 rows in height.
5. The first seating board is not more than 12 inches (305 mm) above the ground or floor below or a cross aisle.
6. Seat boards have a continuous flat surface.

7. Seat boards provide a walking surface with a minimum width of 11 inches (279 mm).
8. Egress from seating is not restricted by rails, guards or other obstructions.

1008.7.1 Minimum aisles width. The minimum clear width of aisles shall be as follows:

1. Forty-eight inches (1219 mm) for aisle stairs having seating on each side.

Exception: Thirty-six inches (914 mm) where aisle does not serve more than 50 seats.

2. Thirty-six inches (914 mm) for aisle stairs having seating on only one side.
3. Twenty-three inches (584 mm) between an aisle stair handrail or guard and seating where the aisle is subdivided by handrail.
4. Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

Exception: Thirty-six inches (914 mm) where aisle does not serve more than 50 seats.

5. Thirty-six inches (914 mm) for level or ramped aisles having seating on only one side.
6. Twenty-three inches (584 mm) between an aisle stair handrail and seating where an aisle does not serve more than five rows on one side.

1008.7.2 Aisle width. The aisle width shall provide sufficient egress capacity for the number of persons accommodated by the catchment area served by the aisle. The catchment area served by an aisle is that portion of the total space that is served by that section of the aisle. In establishing catchment areas, the assumption shall be made that there is a balanced use of all means of egress, with the number of persons in proportion to egress capacity.

1008.7.3 Converging aisles. Where aisles converge to form a single path of egress travel, the required egress capacity of that path shall not be less than the combined required capacity of the converging aisles.

1008.7.4 Uniform width. Those portions of aisles, where egress is possible in either of two directions, shall be uniform in required width.

1008.7.5 Assembly aisle termination. Each end of an aisle shall terminate at cross aisle, foyer, doorway, vomitory or concourse having access to an exit.

Exceptions:

1. Dead-end aisles shall not be greater than 20 feet (6096 mm) in length.
2. Dead-end aisles longer than 20 feet (6096 mm) are permitted where seats beyond the 20-foot (6096 mm) dead-end aisle are no more than 24 seats from another aisle, measured along a row of seats having a minimum clear width of 12 inches (305 mm) plus 0.6 inch (15.2 mm) for each additional seat above seven in the row.
3. For smoke-protected assembly seating, the dead-end aisle length of vertical aisles shall not exceed a distance of 21 rows.

4. For smoke-protected assembly seating, a longer dead-end aisle is permitted where seats beyond the 21-row dead-end aisle are not more than 40 seats from another aisle, measured along a row of seats having an aisle accessway with a minimum clear width of 12 inches (305 mm) plus 0.3 inch (7.6 mm) for each additional seat above seven in the row.

1008.7.6 Assembly aisle obstructions. There shall be no obstructions in the required width of aisles except for handrails as provided in Section 1008.11.

1008.8 Clear width of aisle accessways serving seating. Where seating rows have 14 or fewer seats, the minimum clear aisle accessway width shall not be less than 12 inches (305 mm) measured as the clear horizontal distance from the back of the row ahead and the nearest projection of the row behind. Where chairs have automatic or self-rising seats, the measurement shall be made with seats in the raised position. Where any chair in the row does not have an automatic or self-rising seat, the measurements shall be made with the seat in the down position. For seats with folding tablet arms, row spacing shall be determined with the tablet arm down.

1008.8.1 Dual access. For rows of seating served by aisles or doorways at both ends, there shall not be more than 100 seats per row. The minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.3 inch (7.6 mm) for every additional seat beyond 14 seats, but the minimum clear width is not required to exceed 22 inches (559 mm).

Exception: For smoke-protected assembly seating, the row length limits for a 12-inch-wide (305 mm) aisle accessway, beyond which the aisle accessway minimum clear width shall be increased, are in Table 1008.8.1.

**TABLE 1008.8.1
SMOKE-PROTECTED GRANDSTAND
ASSEMBLY AISLE ACCESSWAYS**

TOTAL NUMBER OF SEATS IN THE SMOKE PROTECTED ASSEMBLY OCCUPANCY	MAXIMUM NUMBER OF SEATS PER ROW PERMITTED TO HAVE A MINIMUM 12-INCH CLEAR WIDTH AISLE ACCESSWAY	
	Aisle or doorway at both ends of row	Aisle or doorway at one end of row only
Less than 4,000	14	7
4,000	15	7
7,000	16	8
10,000	17	8
13,000	18	9
16,000	19	9
19,000	20	10
22,000 and greater	21	11

For SI: 1 inch = 25.4 mm.

1008.8.2 Single access. For rows of seating served by an aisle or doorway at only one end of the row, the minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.6 inch (15.2 mm) for every additional seat beyond seven seats, but the minimum clear width is not required to exceed 22 inches (559 mm). The path of egress travel, however, shall not exceed 30 feet (9144 mm) from

any seat to a point where a person has a choice of two paths of egress travel to two exits. Where one of the two paths of travel is across the aisle through a row of seats to another aisle, there shall not be more than 24 seats between the two aisles; and the minimum clear width between rows for the row between the two aisles shall be 12 inches (305 mm) plus 0.6 inch (15.2 mm) for each additional seat above seven in the row between aisles.

Exception: For smoke-protected assembly seating, the row length limits for a 12-inch-wide (305 mm) aisle accessway, beyond which the aisle accessway minimum clear width shall be increased, are in Table 1008.8.1.

1008.9 Assembly aisle walking surfaces. Aisles with a slope not exceeding one unit vertical in eight units horizontal (12.5-percent slope) shall consist of a ramp having a slip-resistant walking surface. Aisles with a slope exceeding one unit vertical in eight units horizontal (12.5-percent slope) shall consist of a series of risers and treads that extend across the full width of aisles and comply with Sections 1008.9.1 through 1008.9.3.

1008.9.1 Treads. Tread depths shall be a minimum of 11 inches (279 mm) and shall have dimensional uniformity.

Exception: The tolerance between adjacent treads shall not exceed 0.188 inch (4.8 mm).

1008.9.2 Risers. Where the gradient of aisle stairs is to be the same as the gradient of adjoining seating areas, the riser height shall not be less than 4 inches (102 mm) nor more than 8 inches (203 mm) and shall be uniform within each flight.

Exceptions:

1. Riser height nonuniformity shall be limited to the extent necessitated by changes in the gradient of the adjoining seating area to maintain adequate sightlines. Where nonuniformities exceed 0.188 inch (4.8 mm) between adjacent risers, the exact location of such nonuniformities shall be indicated with a distinctive marking stripe on each tread at the nosing or leading edge adjacent to the nonuniform risers. Such stripe shall be a minimum of 1 inch (25.4 mm) wide and a maximum of 2 inches (51 mm) wide. The edge marking strip shall be distinctively different from the contrasting marking stripe.
2. Riser heights not exceeding 9 inches (229 mm) shall be permitted where they are necessitated by the slope of the adjacent seating areas to maintain sightlines.

1008.9.3 Tread contrasting marking stripe. A contrasting marking stripe shall be provided on each tread at the nosing or leading edge such that the location of each tread is readily apparent when viewed in descent. Such stripe shall be a minimum of 1 inch (25.4 mm) wide and a maximum of 2 inches (51 mm) wide.

Exception: The contrasting marking stripe is permitted to be omitted where tread surfaces are such that the location of each tread is readily apparent when viewed in descent.

1008.10 Seat stability. In places of assembly, the seats shall be securely fastened to the floor.

Exceptions:

1. In places of assembly or portions thereof without ramped or tiered floors for seating and with 200 or fewer seats, the seats shall not be required to be fastened to the floor.
2. In places of assembly or portions thereof with seating at tables and without ramped or tiered floors for seating, the seats shall not be required to be fastened to the floor.
3. In places of assembly or portions thereof without ramped or tiered floors for seating and with greater than 200 seats, the seats shall be fastened together in groups of not less than three or the seats shall be securely fastened to the floor.
4. In places of assembly where flexibility of the seating arrangement is an integral part of the design and function of the space and seating is on tiered levels, a maximum of 200 seats shall not be required to be fastened to the floor. Plans showing seating, tiers, and aisles shall be submitted for approval.
5. Groups of seats within a place of assembly separated from other seating by railings, guards, partial height walls or similar barriers with level floors and having no more than 14 seats per group shall not be required to be fastened to the floor.
6. Seats intended for musicians or other performers and separated by railings, guards, partial height walls, or similar barriers shall not be required to be fastened to the floor.

1008.11 Handrails. Ramped aisles having a slope exceeding one unit vertical in 15 units horizontal (6.7-percent slope) and aisle stairs shall be provided with handrails located either at the side or within the aisle width.

Exceptions:

1. Handrails are not required for ramped aisles having a gradient no greater than one unit vertical in eight units horizontal (12.5-percent slope) and seating on both sides.
2. Handrails are not required if, at the side of the aisle, there is a guard that complies with the graspability requirements of handrails.

1008.11.1 Discontinuous handrails. Where there is seating on both sides of the aisle, the handrails shall be discontinuous with gaps or breaks at intervals not exceeding five rows to facilitate access to seating and to permit crossing from one side of the aisle to the other. These gaps or breaks shall have a clear width of at least 22 inches (559 mm) and not greater than 36 inches (914 mm), measured horizontally, and the handrail shall have rounded terminations or bends.

1008.11.2 Intermediate handrails. Where handrails are provided in the middle of aisle stairs, there shall be an additional intermediate handrail located approximately 12 inches (305 mm) below the main handrail.

1008.12 Assembly guards. Assembly guards shall comply with Sections 1008.12.1 through 1008.12.3.

1008.12.1 Cross aisles. Cross aisles located more than 30 inches (762 mm) above the floor or grade below shall have guards in accordance with Section 1003.2.12.

Where an elevation change of 30 inches (762 mm) or less occurs between a cross aisle and the adjacent floor or grade below, guards not less than 26 inches (660 mm) above the aisle floor shall be provided.

Exception: Where the backs of seats on the front of the cross aisle project 24 inches (610 mm) or more above the adjacent floor of the aisle, a guard need not be provided.

1008.12.2 Sightline-constrained guard heights. Unless subject to the requirements of Section 1008.12.3, a fascia or railing system in accordance with the guard requirements of Section 1003.2.12 and having a minimum height of 26 inches (660 mm) shall be provided where the floor or footboard elevation is more than 30 inches (762 mm) above the floor or grade below and the fascia or railing would otherwise interfere with the sightlines of immediately adjacent seating.

1008.12.3 Guards at the end of aisles. A fascia or railing system complying with the guard requirements of Section 1003.2.12 shall be provided for the full width of the aisle where the foot of the aisle is more than 30 inches (762 mm) above the floor or grade below. The fascia or railing shall be a minimum of 36 inches (914 mm) high and shall provide a minimum 42 inches (1067 mm) measured diagonally between the top of the rail and the nosing of the nearest tread.

1008.13 Bleacher footboards. Bleacher footboards shall be provided for rows of seats above the third row or being at such a point where the seating plank is more than 24 inches (610 mm) above the ground or floor below. Where the same platform is used for both seating and footrests, footrests are not required, provided each level or platform is not less than 24 inches (610 mm) wide. When projected on a horizontal plane, horizontal gaps shall not exceed 0.25 inch (6.4 mm) between footboards and seatboards. At aisles, horizontal gaps shall not exceed 0.25 inch (6.4 mm) between footboards. Where footboards are more than 30 inches (762 mm) above grade, openings between the seat and footboards shall not allow the passage of a sphere greater than 4 inches (102 mm).

1008.14 Bench seating. Where bench seating is used, the number of persons shall be based on one person for each 18 inches (457 mm) of length of the bench.

SECTION 1009 EMERGENCY ESCAPE AND RESCUE

1009.1 General. In addition to the means of egress required by this chapter, provisions shall be made for emergency escape and rescue in Group R as applicable in Section 101.2 and Group I-1 occupancies. Basements and sleeping rooms below the fourth story shall have at least one exterior emergency escape and rescue opening in accordance with this section. Such open-

ing shall open directly into a public street, public alley, yard or court.

Exceptions:

1. In other than Group R-3 occupancies as applicable in Section 101.2, buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. In other than Group R-3 occupancies as applicable in Section 101.2, sleeping rooms provided with a door to a fire-resistance-rated corridor having access to two remote exits in opposite directions.
3. The emergency escape and rescue opening is permitted to open onto a balcony within an atrium in accordance with the requirements of Section 404 provided the balcony provides access to an exit and the dwelling unit or sleeping room has a means of egress that is not open to the atrium.
4. Basements with a ceiling height of less than 80 inches (2032 mm) shall not be required to have emergency escape and rescue windows.

1009.2 Minimum size. Emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.53 m²).

Exception: The minimum net clear opening for emergency escape and rescue grade floor openings shall be 5 square feet (0.46 m²).

1009.2.1 Minimum dimensions. The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

1009.3 Maximum height from floor. Emergency escape and rescue openings shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

1009.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates, or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with Section 1009.2 and such devices shall be releasable or removable from the inside without the use of a key, tool, or force greater than that which is required for normal operation of the escape and rescue opening. Where such bars, grilles, grates, or similar devices are installed in existing buildings, smoke alarms shall be installed in accordance with Section 907.2.10 regardless of the valuation of the alteration.

1009.5 Window wells. An emergency escape and rescue opening with a finished sill height below the adjacent ground level shall be provided with a window well in accordance with Sections 1009.5.1 and 1009.5.2.

1009.5.1 Minimum size. The clear horizontal dimensions of the window well shall allow the emergency escape and rescue opening to be fully opened and provide a minimum

accessible net clear opening of 9 square feet (0.84 m²), with a minimum dimension of 36 inches (914 mm).

1009.5.2 Ladders or steps. Window wells with a vertical depth of more than 44 inches (1118 mm) shall be equipped with an approved permanently affixed ladder or steps. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the window well. The ladder or steps shall not encroach into the required dimensions of the window well by more than 6 inches (152 mm). The ladder or steps shall not be obstructed by the emergency escape and rescue opening. Ladders or steps required by this section are exempt from the stairway requirements of Section 1003.3.3.

CHAPTER 11

ACCESSIBILITY

SECTIONS 1101-1109

Deleted

Comm 62.1100 Accessibility. Buildings and facilities shall be designed for accessibility in accordance with ss. Comm 62.1101 to 62.1110.

Comm 62.1101 General Requirements.

- (1) **Scope.** The provisions of ss. Comm 62.1101 to 62.1110 control the design and construction of facilities for accessibility to people with disabilities.
- (2) **Design.** Buildings and facilities shall be designed and constructed to be accessible in accordance with this code, with ICC/ANSI A117.1 and with the changes, additions, or omissions to the ICC/ANSI A117.1 requirements specified in subs. (3) to (5).
- (3) **Doors and doorways.** This is a department informational note to be used under ICC/ANSI A117.1 section 1003.5.

Note: In accordance with s. 101.132 (2) (a) 4., Stats., a renter of a dwelling unit in covered multifamily housing may request the landlord to install lever door handles on any doors inside the dwelling unit or install single-lever controls on any plumbing fixtures used by the renter. These requests shall be provided by the landlord at no additional cost to the renter.

- (4) **Operable controls.** This is a department rule in addition to the requirements in ICC/ANSI A117.1 section 1003.9: Circuit controls, when provided for use by tenants in occupancies with dwelling or sleeping units, shall comply with ICC/ANSI A117.1 sections 309.2 and 309.3.
- (5) **Bathroom requirements in R-2 occupancies.** For R-2 occupancies only, substitute the following wording for the requirements in ICC/ANSI A117.1 section 1003.11.3:
 - (a) **Scope.** At least one bathroom in each dwelling unit or sleeping unit in R-2 occupancies shall conform to this subsection. The accessible fixtures shall be in a single toilet/bathing area, such that travel between fixtures does not require travel through other parts of the dwelling unit.

(b) General—bathing facilities.

1. Where either a bathtub or shower compartment is provided, the fixture shall conform to par. (c) or par. (d).
2. Where both a bathtub and a shower compartment are provided in a single toilet/bathing area, at least one of the bathing fixtures shall conform to par. (c) or par. (d).
- (c) **Bathtubs.** Bathtub controls and the minimum 30-inch by 48-inch clear floor space shall conform to one of the following:
 1. Where the centerline of the controls is located between 9 inches and 18 inches from

the apron of the bathtub, the clear floor space shall extend at least 9 inches beyond the controls, to facilitate a parallel approach. The centerline of the controls may not be located more than 18 inches from the apron of the bathtub.

2. Where the centerline of the controls is located not more than 9 inches from the apron of the bathtub, the clear floor space shall extend at least 5 inches beyond the controls, to facilitate a parallel approach.

(d) Showers.

1. 'Shower compartments.' Where a shower compartment is the only bathing facility, the compartment shall be at least 36 inches wide by 36 inches deep. For a transfer-type shower compartment complying with ICC/ANSI A117.1 section 608, reinforcing shall be provided for the later installation of a shower seat. Reinforcing for a shower seat is not required in a roll-in-type shower compartment complying with ICC/ANSI A117.1 section 608.
2. 'Shower controls and clear floor space.' Shower controls and the minimum 30-inch by 48-inch clear floor space shall conform to one of the following:
 - a. Where the centerline of the controls for a transfer-type shower compartment is located between 9 inches and 18 inches from the face of the shower, the clear floor space shall extend at least 9 inches beyond the controls, to facilitate a parallel approach. The centerline of the controls may not be located more than 18 inches from the face of the shower.
 - b. Where the centerline of the controls for a transfer-type shower compartment is located not more than 9 inches from the face of the shower, the clear floor space shall extend at least 5 inches beyond the controls, to facilitate a parallel approach.
 - c. Where a shower compartment without a curb is provided and the controls are reachable, the clear floor space is not required to extend beyond the controls.
- (e) **Lavatories.** Lavatories shall comply with ICC/ANSI A117.1 sections 1003.11.3.2.1.1 through 1003.11.3.2.1.3.

(f) Water closets. The water closet shall comply with ICC/ANSI A117.1 section 1003.11.3.1.2.

Note: Under s. ICC/ANSI A117.1 section 1003.5.2.1, all bathrooms that are in a dwelling unit or sleeping unit which contains multiple bathrooms must have entrance doors conforming with that section.

Comm 62.1102 Definitions. In this code:

- (1) “Accessible” means a site, building, facility or portion thereof that complies with ss. Comm 62.1101 to 62.1110 and with ICC/ANSI A117.1.
- (2) “Accessible route” means a continuous, unobstructed path that complies with ss. Comm 62.1101 to 62.1110 and with ICC/ANSI A117.1.
- (3) “Accessible unit” means a dwelling unit or sleeping unit that complies with ss. Comm 62.1101 to 62.1110 and chapters 1 to 9 of ICC/ANSI A117.1.
- (4) “Circulation path” means an exterior or interior way of passage from one place to another for pedestrians.
- (5) “Detectable warning” means a standardized surface feature built in or applied to walking surfaces or other elements to warn visually impaired persons of hazards on a circulation path.
- (6) “Dwelling unit or sleeping unit, multistory” means a dwelling unit or sleeping unit with habitable space located on more than one story.
- (7) “Dwelling unit or sleeping unit, Type A” means a dwelling unit or sleeping unit designed and constructed for accessibility in accordance with ICC/ANSI A117.1.
- (8) “Dwelling unit or sleeping unit, Type B” means a dwelling unit or sleeping unit designed and constructed for accessibility in accordance with ICC/ANSI A117.1, consistent with the design and construction requirements of the federal Fair Housing Act, 24 CFR, chapter 1.
- (9) “Facility” means the entire building or any portion of a building, structure or area, including the site on which such building, structure or area is located, wherein specific services are provided or activities are performed.
- (10) “Finished ground level” means the ground surface of the site after all construction, leveling, grading, and development has been completed.
- (11) “Intended to be occupied as a residence” means a dwelling unit or sleeping unit that can or will be used all or part of the time as the occupant’s place of abode.
- (12) “Public entrance” means an entrance that is not a service entrance.
- (13) “Public-use areas” means interior or exterior rooms or spaces that are made available to the general public.
- (14) “Self-service storage facility” means real property designed and used for the purpose of renting or leasing individual storage spaces to customers for the purpose of storing and removing personal property on a self-service basis.
- (15) “Service entrance” means an entrance intended primarily for delivery of goods and services.
- (16) “Site” means a parcel of land bounded by a property line or a designated portion of a public right-of-way.
- (17) “Sleeping unit” means a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of the dwelling unit are not sleeping units.
- (18) “Wheelchair space” means space for a single wheelchair and its occupant.
- (19) “Wheelchair space cluster” means locations of two or more adjacent wheelchair spaces along with companion seating in assembly areas.

Comm 62.1103 Scoping requirements.

- (1) **Where accessibility is required.** Except as specified in sub. (2), buildings and structures, temporary or permanent, including their associated sites and facilities, shall be accessible to people with disabilities.
- (2) **General exceptions.** Sites, buildings, facilities and elements shall be exempt from ss. Comm 62.1101 to 62.1110 to the extent specified in all of the following:
 - (a) **Specific requirements.** Accessibility is not required in buildings and facilities, or portions thereof, to the extent permitted by ss. Comm 62.1104 to 62.1109.
 - (b) **Existing buildings.** Existing buildings shall comply with IBC section 3408 and s. Comm 62.3408.
 - (c) **Work areas.** Individual employee work stations are not required to be accessible but shall be located on an accessible route.
 - (d) **Detached dwellings.** Detached one- and two-family dwellings and accessory structures, and their associated sites and facilities are not required to be accessible as specified in ss. Comm 62.1101 to 62.1110.
 - (e) **Utility buildings.** Occupancies in Group U are exempt from the requirements of ss. Comm 62.1101 to 62.1110 other than any of the following:
 1. In agricultural buildings, access is required to paved work areas and areas open to the general public.
 2. Private garages or carports that contain required accessible parking.
 - (f) **Construction sites.** Structures, sites and equipment directly associated with the actual processes of construction including, but not limited to, scaffolding, bridging, materials hoists, materials storage, or construction trailers are not required to be accessible.
 - (g) **Raised areas.** Raised areas used primarily for purposes of security, life safety, or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers, or lifeguard stands are not required to be accessible or to be served by an accessible route.
 - (h) **Limited access spaces.** Nonoccupiable spaces accessed only by ladders, catwalks, crawl spaces, freight elevators, very narrow passageways, or tunnels are not required to be accessible.

- (i) **Equipment spaces.** Spaces frequented only by personnel for maintenance, repair, or monitoring of equipment are not required to be accessible. Such spaces include, but are not limited to, elevator pits, elevator penthouses, mechanical, electrical, or communications equipment rooms, piping or equipment catwalks, water or sewage treatment pump rooms and stations, electric substations and transformer vaults, and highway and tunnel utility facilities.
- (j) **Single occupant structures.** Single occupant structures accessed only by passageways below grade or elevated above grade including, but not limited to, toll booths that are accessed only by underground tunnels, are not required to be accessible.
- (k) **Residential Group R-1.** Buildings of Group R-1 containing not more than five sleeping units for rent or hire that are also occupied as the residence of the proprietor, are not required to be accessible.
- (l) **Day care facilities.** Where a day care facility (Groups A-3, E, I-4 and R-3) is part of a dwelling unit, only the portion of the structure utilized for the day care facility is required to be accessible.

Comm 62.1104 Accessible route.

- (1) **Site arrival points.** Accessible routes within the site shall be provided from public transportation stops, accessible parking and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance served.
- (2) **Within a site.**
 - (a) **General.** Except as specified in par. (b), at least one accessible route shall connect accessible buildings, accessible facilities, accessible elements, and accessible spaces that are on the same site.
 - (b) **Exception.** An accessible route is not required between accessible facilities that have, as the only means of access between them, a vehicular way not providing for pedestrian access.
- (3) **Connected spaces.**
 - (a) **General.** Except as specified in par. (b), when a building, or portion of a building, is required to be accessible, an accessible route shall be provided to each portion of the building, to accessible building entrances, connecting accessible pedestrian walkways and the public way. Where only one accessible route is provided, the accessible route shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.
 - (b) **Exception.** A single accessible route is permitted to pass through a kitchen or storage room in an accessible dwelling unit.
- (4) **Multilevel buildings and facilities.**

- (a) **General.** Except as specified in par. (b), at least one accessible route shall connect each accessible level, including mezzanines, in multilevel buildings and facilities.

(b) Exceptions.

- 1. An accessible route is not required to floors that are above and below accessible levels and that have an aggregate area of not more than 3,000 square feet. This exception shall not apply to any of the following:
 - a. Multiple tenant facilities of Group M occupancies containing five or more tenant spaces.
 - b. Levels containing offices of health care providers (Group B or Group I).
 - c. Passenger transportation facilities and airports (Group A-3 or Group B).
 - d. Government-owned or operated facilities.
- 2. In Groups A, I, R and S occupancies, levels that do not contain accessible elements or other spaces required by ss. Comm 62.1107 and 62.1108 are not required to be served by an accessible route from an accessible level.
- 3. An accessible route is not required to levels located above or below the accessible level in government-owned or operated buildings or facilities which are less than three stories and which are not open to the general public, if the floor level above or below the accessible level has a capacity of no more than 5 persons and is less than 500 square feet in area. The floor level above or below the accessible level that is less than 500 square feet shall have a sign stating a maximum capacity of 5 persons, and the sign shall be placed in a conspicuous location at the main entrance to the floor level.

Note: Examples include drawbridge towers and boat traffic towers, lock and dam control stations, press boxes, and train dispatching towers.

(5) Location.

- (a) **General.** Except as specified in par. (b), accessible routes shall coincide with or be located in the same area as a general circulation path. Where the circulation path is interior, the accessible route shall also be interior.
- (b) **Exception.** Accessible routes from parking garages contained within and serving Type B dwelling units are not required to be interior.

Comm 62.1105 Accessible entrances.

(1) Required.

- (a) **General.** Except as specified in par. (b), at least 50 percent but not less than one entrance to each building and structure, and each separate tenant

space within the building or structure, shall comply with the accessible route provisions of ss. Comm 62.1101 to 62.1110.

(b) Exceptions.

1. Entrances to spaces not required to be accessible as provided for in ss. Comm 62.1107 or 62.1108.
2. Loading and service entrances that are not the only entrance to a building or to a tenant space.

(2) Multiple accessible entrances. Where a building or facility has entrances that normally serve accessible parking facilities, transportation facilities, passenger loading zones, taxi stands, public streets and sidewalks, tunnels or elevated walkways, or accessible interior vertical access, then at least one of the entrances serving each such function shall comply with the accessible route provisions of ss. Comm 62.1101 to 62.1110.

Comm 62.1106 Parking and passenger loading facilities.

- (1) Required.** Where parking is provided, accessible parking spaces complying with ICC/ANSI A117.1 shall be provided in compliance with Table Comm 62.1106 except as required by subs. (2) and (3).
- (2) Groups R-2 and R-3.** Two percent, but not less than one, of each type of parking space provided for occupancies in Groups R-2 and R-3, which are required to have Type A or Type B dwelling or sleeping units, shall be accessible. Where parking is provided within or beneath a building, accessible parking spaces shall also be provided within or beneath the building.
- (3) Rehabilitation facilities and outpatient physical therapy facilities.** Twenty percent of patient and visitor parking spaces provided at rehabilitation facilities and outpatient physical therapy facilities shall be accessible.
- (4) Van spaces.** For every eight or fraction of eight accessible parking spaces, at least one shall be a van-accessible parking space.

**TABLE COMM 62.1106
ACCESSIBLE PARKING SPACES**

TOTAL PARKING SPACES PROVIDED	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2% of total
More than 1,000	20 plus one for each 100 over 1,000

(5) Location.

(a) General. Except as specified in par. (b), accessible parking spaces shall be located on the shortest accessible route of travel from adjacent parking to an accessible building entrance. In parking facilities that do not serve a particular building, accessible parking spaces shall be located on the shortest route to an accessible pedestrian entrance to the parking facility. Where buildings have multiple accessible entrances with adjacent parking, accessible parking spaces shall be dispersed and located near the accessible entrances.

(b) Exception. In multilevel parking structures, van-accessible parking spaces are permitted on one level.

(6) Passenger loading zones. Passenger loading zones shall be designed and constructed in accordance with ICC/ANSI A117.1.

(a) Medical facilities. A passenger loading zone shall be provided at an accessible entrance to licensed medical and long-term care facilities where people receive physical or medical treatment or care and where the period of stay exceeds 24 hours.

(b) Valet parking. A passenger loading zone shall be provided at valet parking services.

Comm 62.1107 Dwelling units and sleeping units.

- (1) General.** In addition to the other requirements of ss. Comm 62.1101 to 62.1110, occupancies having dwelling units or sleeping units shall be provided with accessible features in accordance with subs. (2) to (7).
- (2) Design.** Dwelling units and sleeping units which are required to be accessible units shall comply with this code and the applicable portions of chapters 1 to 9 of ICC/ANSI A117.1. Type A and Type B units shall comply with the applicable portions of chapter 10 of ICC/ANSI A117.1. Units required to be Type A units are permitted to be designed and constructed as accessible units. Units required to be Type B units are permitted to be designed and constructed as accessible units or as Type A units.

(3) Accessible spaces.

(a) General. Except as specified in par. (b), rooms and spaces available to the general public or available for use by residents and serving accessible units, Type A units or Type B units shall be accessible. Accessible spaces shall include toilet and bathing rooms, kitchen, living and dining areas and any exterior spaces, including patios, terraces and balconies.

(b) Exception. Recreational facilities shall comply with s. Comm 62.1109 (14).

(4) Accessible route.

(a) General. Except as specified in par. (b), at least one accessible route shall connect accessible building or facility entrances with the primary entrance of each accessible unit, Type A unit and

Type B unit within the building or facility, and with those exterior and interior spaces and facilities that serve the units.

(b) Exceptions.

1. If the slope of the finished ground level between accessible facilities and buildings exceeds one unit vertical in 12 units horizontal (1:12), or where physical barriers prevent the installation of an accessible route, a vehicular route with parking that complies with s. Comm 62.1106 at each public or common use facility or building is permitted in place of the accessible route.
2. Exterior decks, patios, or balconies that are part of Type B units and have impervious surfaces, and that are not more than 4 inches below the finished floor level of the adjacent interior space of the unit.

(5) Group I. Occupancies in Group I shall be provided with accessible features in accordance with all of the following:

(a) Group I-1. Group I-1 occupancies shall be provided with accessible features in accordance with all of the following:

1. 'Accessible units.' At least 4 percent, but not less than one, of the dwelling units and sleeping units shall be accessible units.
2. 'Type B units.'
 - a. Except as specified in subd. 2. b., in structures with three or more dwelling or sleeping units intended to be occupied as a residence, every dwelling and sleeping unit intended to be occupied as a residence shall be a Type B unit.
 - b. The number of Type B units is permitted to be reduced in accordance with sub. (7).

(b) Group I-2 nursing homes. Nursing homes of Group I-2 shall be provided with accessible features in accordance with all of the following:

1. 'Accessible units.' At least 50 percent, but not less than one, of the dwelling units and sleeping units shall be accessible units.
2. 'Type B units.'
 - a. Except as specified in subd. 2. b., in structures with three or more dwelling or sleeping units intended to be occupied as a residence, every dwelling and sleeping unit intended to be occupied as a residence shall be a Type B unit.
 - b. The number of Type B units is permitted to be reduced in accordance with sub. (7).

(c) Group I-2 hospitals. In general purpose hospitals, psychiatric facilities, detoxification facilities and residential care or assisted living facilities of Group I-2, shall be provided with accessible features in accordance with all of the following:

1. 'Accessible units.' At least 10 percent, but not less than one, of the dwelling units and sleeping units shall be accessible units.
2. 'Type B units.'
 - a. Except as specified in subd. 2. b., in structures with three or more dwelling or sleeping units intended to be occupied as a residence, every dwelling and sleeping unit intended to be occupied as a residence shall be a Type B unit.
 - b. The number of Type B units is permitted to be reduced in accordance with sub. (7).

(d) Group I-2 rehabilitation facilities. In hospitals and rehabilitation facilities of Group I-2 which specialize in treating conditions that affect mobility, or units within either which specialize in treating conditions that affect mobility, 100 percent of the dwelling units and sleeping units shall be accessible units.

(e) Group I-3. In occupancies in Group I-3, at least 5 percent, but not less than one, of the dwelling units and sleeping units shall be accessible units.

(6) Group R. Occupancies in Group R shall be provided with accessible features in accordance with all of the following:

(a) Group R-1. Group R-1 occupancies shall be provided with accessible features in accordance with all of the following:

1. 'Accessible units.' In occupancies in Group R-1, accessible dwelling units and sleeping units shall be provided in accordance with Table Comm 62.1107. All facilities on a site shall be considered to determine the total number of accessible units. Accessible units shall be dispersed among the various classes of units. Roll-in showers provided in accessible units shall include a permanently mounted folding shower seat.
2. 'Type B units.'
 - a. Except as specified in subd. 2. b., in structures with three or more dwelling or sleeping units intended to be occupied as a residence, every dwelling and sleeping unit intended to be occupied as a residence shall be a Type B unit.
 - b. The number of Type B units is permitted to be reduced in accordance with sub. (7).

**TABLE COMM 62.1107
ACCESSIBLE DWELLING AND SLEEPING UNITS**

TOTAL NUMBER OF UNITS PROVIDED	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS ASSOCIATED WITH ROLL-IN SHOWERS	TOTAL NUMBER OF REQUIRED ACCESSIBLE UNITS
1 to 25	0	1
26 to 50	0	2
51 to 75	1	4
76 to 100	1	5
101 to 150	2	7
151 to 200	2	8
201 to 300	3	10
301 to 400	4	12
401 to 500	4	13
501 to 1,000	1% of total	3% of total
Over 1,001	10 plus 1 for each 100 over 1,000	30 plus 2 for each 100 over 1,000

(b) Group R-2. Type A and Type B units shall be provided in occupancies in Group R-2 in accordance with all of the following:

1. 'Type A units.'
 - a. Except as specified in subd. 1. b. and c., in occupancies in Group R-2 containing more than 20 dwelling units or sleeping units, at least 2 percent, but not less than one, of the units shall be a Type A unit. All units on a site shall be considered to determine the total number of units and the required number of Type A units. Type A units shall be dispersed among the various classes of units.
 - b. The number of Type A units is permitted to be reduced in accordance with sub. (7).
 - c. Existing structures on a site shall not contribute to the total number of units on a site.
2. 'Type B units.'
 - a. Except as specified in subd. 2. b., where there are three or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit.
 - b. The number of Type B units is permitted to be reduced in accordance with sub. (7).

"2. Grade-level dwelling units, in housing without elevators, that are first ready for occupancy on or after October 1, 1993, consisting of 3 or more dwelling units."

(c) Group R-3.

1. Except as specified in subd. 2., in occupancies in Group R-3 where there are three or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling and sleeping unit intended to be occupied as a residence shall be a Type B unit.
2. The number of Type B units is permitted to be reduced in accordance with sub. (7).

(d) Group R-4. Group R-4 occupancies shall be provided with accessible features in accordance with all of the following:

1. 'Accessible units.' At least one of the dwelling or sleeping units shall be an accessible unit.
2. 'Type B dwelling units.'
 - a. Except as specified in subd. 2. b., in structures with three or more dwelling or sleeping units intended to be occupied as a residence, every dwelling and sleeping unit intended to be occupied as a residence shall be a Type B unit.
 - b. The number of Type B units is permitted to be reduced in accordance with sub. (7).

(7) General exceptions. Where specifically permitted by subs. (5) and (6), the required number of Type A and Type B units is permitted to be reduced in accordance with all of the following:

(a) Buildings without elevator service. Where no elevator service is provided in a building, only the dwelling and sleeping units that are located on sto-

Note: Type B dwelling units specified in s. Comm 62.1107 have the same meaning as "covered multifamily housing" as defined in s. 101.132 (1) (d), Stats. Section 101.132 (1) (d), Stats., reads as follows: " 'Covered multifamily housing' means any of the following:

"1. Housing that is first ready for occupancy on or after October 1, 1993, consisting of 3 or more dwelling units if the housing has one or more elevators.

ries indicated in subd. 1. and 2. are required to be Type A and Type B units. The number of Type A units shall be determined in accordance with sub. (6) (b).

1. 'One story with Type B units required.' At least one story containing dwelling units or sleeping units intended to be occupied as a residence shall be provided with accessible entrances as specified in s. Comm 62.1105 (1), from the exterior of the building, and all units intended to be occupied as a residence on that story shall be Type B units.

2. 'Additional stories with Type B units.' On all other stories that have a building entrance in proximity to arrival points intended to serve units on that story, as specified in subpars. a. and b., all dwelling units and sleeping units intended to be occupied as a residence served by that entrance on that story shall be Type B units. Where no such arrival points are within 50 feet of the entrance, the closest arrival points shall be used unless that arrival point serves the story required by subd. 1.

a. Where the slopes of the undisturbed site measured between the planned entrance and all vehicular or pedestrian arrival points within 50 feet of the planned entrance are 10 percent or less.

b. Where the slopes of the planned finished grade measured between the entrance and all vehicular or pedestrian arrival points within 50 feet of the planned entrance are 10 percent or less.

(b) Multistory units. A multistory dwelling or sleeping unit which is not provided with elevator service is not required to be a Type B unit. Where a multistory unit is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit and shall comply with the requirements for a Type B unit, and a toilet facility shall be provided on that floor.

(c) Elevator service to the lowest story with units. Where elevator service in the building provides an accessible route only to the lowest story containing dwelling or sleeping units intended to be occupied as a residence, only the units on that story which are intended to be occupied as a residence are required to be Type B units.

(d) Site impracticality.

1. 'Variance procedures.' Pursuant to ss. 101.132 (2) (b) 4. and (c) 2., Stats., the owner may request a reduction in accessible dwelling units due to site impracticality specified in subd. 2. through the petition for variance procedures specified in ch. Comm 61.

2. 'General.' On a site with multiple non-elevator buildings, the number of units required by sub. (7) (a) to be Type B units is permitted to be reduced to a percentage which is equal to the percentage of the entire site having grades, prior to development, which are less than 10 percent, provided that all of the following conditions are met:

a. Not less than 50 percent of the units required by par. (a) on the site are Type B units.

b. Units required by par. (a), where the slope between the building entrance serving the units on that story and a pedestrian or vehicular arrival point is no greater than 8.33 percent, are Type B units.

c. Units required by par. (a), where an elevated walkway is planned between a building entrance serving the units on that story and a pedestrian or vehicular arrival point and the slope between them is 10 percent or less, are Type B units.

d. Units served by an elevator in accordance with par. (c) are Type B units.

(e) Base flood elevation.

1. 'Variance procedures.' Pursuant to ss. 101.132 (2) (b) 4. and (c) 2., Stats., the owner may request a reduction in accessible dwelling units due to unusual characteristics of the site specified in subd. 2. through the petition for variance procedures specified in ch. Comm 61.

2. 'General.' The required number of Type A and Type B units shall not apply to a site where the lowest floor or the lowest structural building members of non-elevator buildings are required to be at or above the base flood elevation resulting in all of the conditions specified in subds a. and b. Where no such arrival points are within 50 feet of the primary entrances, the closest arrival point shall be used.

a. A difference in elevation between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet exceeding 30 inches.

b. A slope exceeding 10 percent between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet.

Comm 62.1108 Special occupancies.

(1) General. In addition to the other requirements of ss. Comm 62.1101 to 62.1110, the requirements of subs. (2) to (3) shall apply to specific occupancies.

(2) **Assembly area seating.** Assembly areas with fixed seating shall comply with pars. (a) to (d). Dining areas shall comply with par. (e).

(a) **Services.** Services and facilities provided in areas not required to be accessible shall be provided on an accessible level and shall be accessible.

(b) **Wheelchair spaces.** In theaters, bleachers, grandstands and other fixed seating assembly areas, accessible wheelchair spaces shall be provided in accordance with Table Comm 62.1108-1. At least one seat for a companion shall be provided beside each wheelchair space.

**TABLE COMM 62.1108-1
ACCESSIBLE WHEELCHAIR SPACES**

CAPACITY OF SEATING IN ASSEMBLY AREAS	MINIMUM REQUIRED NUMBER OF WHEELCHAIR SPACES
4 to 25	1
26 to 50	2
51 to 100	4
101 to 300	5
301 to 500	6
Over 500	6, plus 1 additional space for each total seating capacity increase of 100

1. 'Wheelchair space clusters.' Except as specified in subd. 2., accessible wheelchair spaces shall be grouped in wheelchair space clusters in accordance with Table Comm 62.1108-2.
2. 'Exception.' In fixed seating assembly areas where sightlines require more than one step for a rise in elevation between rows, the minimum required number of wheelchair space clusters in that area shall be one-half of that required by Table Comm 62.1108-2, but not less than one.

**TABLE COMM 62-1108-2
WHEELCHAIR SPACE CLUSTERS**

CAPACITY OF SEATING IN ASSEMBLY AREAS	MINIMUM REQUIRED NUMBER OF WHEELCHAIR SPACE CLUSTERS
Up to 300	1
301 to 600	2
601 to 900	3
901 to 1,500	4
1,501 to 2,100	5
2,101 to 3,000	6
Over 3,000	6, plus 1 additional cluster for each 1,000 seats or portion thereof

(c) **Dispersion of wheelchair space clusters.** Dispersion of wheelchair space clusters shall be based on the availability of accessible routes to various seating areas including seating at various levels in multilevel facilities.

1. 'Multilevel assembly seating areas.'

- a. Except as specified in subd. 1. b. and c., in multilevel assembly seating areas, wheelchair space clusters shall be provided on the main floor level and on one of each two additional floor or mezzanine levels.
- b. In multilevel assembly spaces utilized for worship services, where the second floor or mezzanine level contains 25 percent or less of the total seating capacity, wheelchair space clusters shall be permitted to all be located on the main level.
- c. In multilevel assembly seating where the second floor or mezzanine level provides 25 percent or less of the total seating capacity and 300 or fewer seats, wheelchair space clusters shall be permitted to all be located on the main level.

2. 'Separation between clusters.'

- a. Except as specified in subd. 2. b., wheelchair space clusters shall be separated by a minimum of five intervening rows or by a minimum of ten intervening seats. Wheelchair spaces within any one wheelchair space cluster shall not be separated by an intervening row, nor by more than two intervening seats, nor by more than a 7-inch vertical level change.
- b. A vertical level change exceeding 7 inches is permitted in a wheelchair space cluster where necessary to maintain sightlines.

(d) **Assistive listening systems.**

1. 'Audible communications.' Stadiums, theaters, auditoriums, lecture halls and similar fixed seating assembly areas where audible communications are integral to the use of the space shall have an assistive listening system if the area is equipped with an audio amplification system or the area has a capacity of 50 or more persons.
2. 'Receivers.' Receivers shall be provided for assistive listening systems in accordance with Table Comm 62.1108-3. Twenty-five

percent of receivers, but not less than two, shall be hearing aid compatible.

**TABLE COMM 62.1108-3
RECEIVER FOR ASSISTIVE LISTENING SYSTEMS**

CAPACITY OF SEATING IN ASSEMBLY AREAS	MINIMUM REQUIRED NUMBER OF RECEIVERS
Less than 50	2
50 to 500	2, plus 4 for each total seating capacity increase of 100 above 51
501 to 1,000	20, plus 3 for each total seating capacity increase of 100 above 501
1,001 to 2,000	35, plus 2 for each total seating capacity increase of 100 above 1,001
Over 2,000	55, plus 1 for each total seating capacity increase of 100 above 2,000

(e) Dining areas.

1. 'General.'

- a. Except as specified in subd. 1. b., in dining areas, the total floor area allotted for seating and tables shall be accessible.
- b. In buildings without elevators, an accessible route to a mezzanine seating area is not required, provided that the mezzanine contains less than 25 percent of the total area and the same services are provided in the accessible area.

2. 'Fixed or built-in seating or tables.' Where fixed or built-in seating or tables are provided in dining areas, at least 5 percent, but not less than one such seat or table, shall be accessible and be distributed throughout the facility.

3. 'Dining counters.' In establishments serving food or drink for consumption where the only seating is at counters exceeding 34 inches in height, a 60-inch minimum length portion of the counter shall be accessible.

(3) Self-service storage facilities.

(a) General. Self-service storage facilities shall provide accessible individual self-storage spaces in accordance with Table Comm 62.1108-4.

**TABLE COMM 62.1108-4
ACCESSIBLE SELF-SERVICE STORAGE FACILITIES**

TOTAL SPACES IN FACILITY	MINIMUM NUMBER OF REQUIRED ACCESSIBLE SPACES
1 to 200	5%, but not less than 1
Over 200	10, plus 2% of total number of units over 200

(b) Dispersion. Accessible individual self-service storage spaces shall be dispersed throughout the various classes of spaces provided. Where more classes of spaces are provided than the number of required accessible spaces, the number of accessible spaces shall not be required to exceed that required by Table Comm 62.1108-4. Accessible spaces are permitted to be dispersed in a single building of a multibuilding facility.

Comm 62.1109 Other features and facilities.

(1) General.

- (a) Except as specified in par. (b), accessible building features and facilities shall be provided in accordance with subs. (2) to (14).
- (b) Type A and Type B dwelling and sleeping units shall comply with ICC/ANSI A117.1.

(2) Toilet and bathing facilities.

(a) General. Except as specified in par. (b), toilet rooms and bathing facilities shall be accessible. Where a floor level is not required to be connected by an accessible route, the only toilet rooms or bathing facilities provided within the facility shall not be located on the inaccessible floor. At least one of each type of fixture, element, control or dispenser in each accessible toilet room and bathing facility shall be accessible.

(b) Exceptions.

1. In toilet rooms or bathing facilities accessed only through a private office, not for common or public use, and intended for use by a single occupant, any of the following alternatives are allowed:

- a. Doors are permitted to swing into the clear floor space provided the door swing can be reversed to meet the requirements in ICC/ANSI A117.1.
- b. The height requirements for the water closet in ICC/ANSI A117.1 are not applicable.
- c. Grab bars are not required to be installed in a toilet room, provided that the reinforcement has been installed in the walls and located so as to permit the installation of such grab bars.
- d. The requirement for height, knee and toe clearance shall not apply to a lavatory.

2. This section is not applicable to toilet and bathing facilities that serve dwelling units or sleeping units that are not required to be accessible by s. Comm 62.1107.

3. Where multiple single-user toilet rooms or bathing facilities are clustered at a single location and contain fixtures in excess of the minimum required number of plumbing fixtures, at least 5 percent, but not less than one

room for each use at each cluster, shall be accessible.

4. Toilet room fixtures that are in excess of those required and that are designated for use by children in day care and primary school occupancies.

(c) Unisex toilet and bathing rooms.

1. 'Where permitted and required.'
 - a. In assembly and mercantile occupancies, an accessible unisex toilet room may be provided where an aggregate of six or more male and female water closets are required. Where a unisex toilet room is provided, it shall count for no more than 15 persons. In buildings of mixed occupancy, only those water closets required for the assembly or mercantile occupancy shall be permitted to use the unisex toilet room option. Except as specified in subd. 1. b., in recreational facilities where separate-sex bathing rooms are provided, an accessible unisex bathing room shall be provided. Fixtures located within unisex toilet and bathing rooms shall be included in determining the number of fixtures provided in an occupancy.
 - b. Where each separate-sex bathing room has only one shower or bathtub fixture, a unisex bathing room is not required.
 - c. Unisex toilet and bathing rooms shall comply with this section and ICC/ANSI A117.1.
2. 'Unisex toilet rooms.'
 - a. Except as specified in subd. 2. b., unisex toilet rooms shall include only one water closet and only one lavatory. A unisex bathing room in accordance with subd. 3. shall be considered a unisex toilet room.
 - b. A separate-sex toilet room containing not more than two water closets without urinals, or containing only one water closet and one urinal shall be considered a unisex toilet room.
3. 'Unisex bathing rooms.' Unisex bathing rooms shall include only one shower or bathtub fixture. Unisex bathing rooms shall also include one water closet and one lavatory. Where storage facilities are provided for separate-sex bathing rooms, accessible storage facilities shall be provided for unisex bathing rooms.
4. 'Location.' Unisex toilet rooms, when provided, and bathing rooms shall be located on

an accessible route. Unisex toilet rooms shall be located not more than one story above or below separate-sex toilet rooms. The accessible route from any separate-sex toilet room to a unisex toilet room shall not exceed 500 feet.

5. 'Prohibited location.' In passenger transportation facilities and airports, the accessible route from separate-sex toilet rooms to a unisex toilet room shall not pass through security checkpoints.
6. 'Clear floor space.' Where doors swing into a unisex toilet or bathing room, a clear floor space not less than 30 inches by 48 inches shall be provided, within the room, beyond the area of the door swing.
7. 'Privacy.' Doors to unisex toilet and bathing rooms shall be securable from within the room.

(d) Water closet compartment. Where water closet compartments are provided in a toilet room or bathing facility, at least one wheelchair-accessible compartment shall be provided. Where the combined total water closet compartments and urinals provided in a toilet room or bathing facility is six or more, at least one ambulatory-accessible water closet compartment shall be provided in addition to the wheelchair-accessible compartment. Wheelchair-accessible and ambulatory-accessible compartments shall comply with ICC/ANSI A117.1.

(3) Sinks.

(a) General. Except as specified in par. (b), where sinks are provided in accessible spaces, at least 5 percent, but not less than one shall comply with ICC/ANSI A117.1.

(b) Exceptions.

1. Mop or service sinks are not required to be accessible.
2. Sinks designated for use by children in day care and primary school occupancies.

(4) Kitchens, kitchenettes and wet bars. Where kitchen, kitchenettes and wet bars are provided in accessible spaces or rooms, they shall be accessible in accordance with ICC/ANSI A117.1.

(5) Drinking fountains. On floors where drinking fountains are provided, at least 50 percent, but not less than one fountain, shall be accessible.

(6) Elevators. Passenger elevators on an accessible route shall be accessible and comply with s. Comm 62.3001 and ch. Comm 18.

(7) Lifts.

(a) General. Except as specified in par. (b), platform lifts shall not be part of a required accessible route in new construction.

(b) Exceptions. Platform lifts are permitted as part of an accessible route in any of the following applications:

1. To a performing area in occupancies in Group A.
2. To wheelchair spaces required by s. Comm 62.1108 (2) (b).
3. To spaces that are not open to the general public with an occupant load of not more than five.
4. Within a dwelling or sleeping unit.
5. To wheelchair seating spaces located in outdoor dining terraces in A-5 occupancies where the means of egress from the dining terraces to a public way is open to the outdoors.

(8) Storage.

(a) General. Where fixed or built-in storage elements such as cabinets, shelves, medicine cabinets, closets and drawers are provided in required accessible spaces, at least one of each type shall contain storage space complying with ICC/ANSI A117.1.

(b) Lockers. Where lockers are provided in accessible spaces, at least 5 percent, but not less than one, of each type shall be accessible.

(c) Shelving and display units. Self-service shelves and display units in mercantile occupancies and shelving in stack areas of libraries shall be located on an accessible route. Such shelving and display units shall not be required to comply with reach-range provisions.

(d) Coat hooks and folding shelves. Where coat hooks or folding shelves are provided in inaccessible toilet rooms, toilet compartments, or in dressing, fitting or locker rooms, at least one of each type shall be provided in accessible toilet rooms, toilet compartments, and dressing, fitting and locker rooms.

(9) Detectable warnings.

(a) General. Except as specified in par. (b), passenger transit platform edges bordering a drop-off and not protected by platform screens or guards shall have a detectable warning.

(b) Exception. Detectable warnings are not required at bus stops.

(10) Assembly area seating. Assembly areas with fixed seating in every occupancy shall comply with s. Comm 62.1108 (2) for accessible seating and assistive listening devices.

(11) Seating at tables, counters and work surfaces.

(a) General. Where seating at fixed or built-in tables, counters or work surfaces is provided in accessible spaces, at least 5 percent of the seating, but not less than one, shall be accessible.

(b) Dispersion. Accessible fixed or built-in seating at tables, counters or work surfaces shall be distributed throughout the space or facility containing such elements.

(12) Customer service facilities. Customer service facilities shall provide for accessible features in accordance with pars. (a) to (e).

(a) Dressing, fitting and locker rooms. Where dressing rooms, fitting rooms, or locker rooms are provided, at least 5 percent, but not less than one, of each type of use in each cluster provided shall be accessible.

(b) Check-out aisles.

1. Except as specified in subd. 2., where check-out aisles are provided, accessible check-out aisles shall be provided in accordance with Table Comm 62.1109. Where check-out aisles serve different functions, at least one accessible check-out aisle shall be provided for each function. Where check-out aisles are dispersed throughout the building or facility, accessible check-out aisles shall also be dispersed. Traffic control devices, security devices and turnstiles located in accessible check-out aisles or lanes shall be accessible.
2. Where the area of the selling space is less than 5,000 square feet, only one check-out aisle is required to be accessible.

**TABLE COMM 62.1109
ACCESSIBLE CHECK-OUT AISLES**

TOTAL CHECK-OUT AISLES OF EACH FUNCTION	MINIMUM NUMBER OF ACCESSIBLE CHECK-OUT AISLES FOR EACH FUNCTION
1 to 4	1
5 to 8	2
9 to 15	3
Over 15	3, plus 20% of additional aisles

(c) Point-of-sale and service counters. Where counters are provided for sales or distribution of goods or services, at least one of each type provided shall be accessible. Where such counters are dispersed throughout the building or facility, the accessible counters shall also be dispersed.

(d) Food service lines. Food service lines shall be accessible. Where self-service shelves are provided, at least 50 percent, but not less than one, of each type provided shall be accessible.

(e) Queue and waiting lines. Queue and waiting lines serving accessible counters or check-out aisles shall be accessible.

(13) Controls, operating mechanisms and hardware.

(a) General. Controls, operating mechanisms and hardware intended for operation by the occupant (including switches that control lighting and ven-

tilation, and electrical convenience outlets) in accessible spaces, along accessible routes or as parts of accessible elements shall be accessible.

(b) Operable windows.

1. Except as specified in subd. 2., where operable windows are provided in rooms that are required to be accessible in accordance with ss. Comm 62.1107 (5), and (6) (a) and (b), at least one window in each room shall be accessible and each required operable window shall be accessible.
2. Accessible windows are not required in bathrooms or kitchens.

(14) Recreational facilities. Recreational facilities shall be provided with accessible features in accordance with pars. (a) to (c).

(a) Facilities serving a single building. In Group R-2 and R-3 occupancies where recreational facilities are provided serving a single building containing Type A or Type B units, 25 percent, but not less than one, of each type of recreational facility shall be accessible. Every recreational facility of each type on a site shall be considered to determine the total number of each type which are required to be accessible.

(b) Facilities serving multiple buildings. In Group R-2 and R-3 occupancies on a single site where multiple buildings containing Type A or Type B units are served by recreational facilities, 25 percent, but not less than one, of each type of recreational facility serving each building shall be accessible. The total number of each type of recreational facility which is required to be accessible shall be determined by considering every recreational facility of each type serving each building on the site.

(c) Other occupancies. All recreational facilities not described in pars. (a) and (b) shall be accessible.

(15) Stairways. Stairways located along accessible routes connecting floor levels that are not connected by an elevator shall be designed and constructed to comply with ICC/ANSI A117.1 and IBC Chapter 10.

Comm 62.1110 Signage.

(1) Signs.

(a) General. Except as specified in par (b), required accessible elements shall be identified by the International Symbol of Accessibility at all of the following locations:

1. Accessible passenger loading zones.
2. Accessible areas of refuge required by IBC Section 1003.2.13.5.
3. Accessible rooms where multiple single-user toilet or bathing rooms are clustered at a single location.
4. Accessible entrances where not all entrances are accessible.

5. Accessible check-out aisles where not all aisles are accessible. The sign, where provided, shall be above the check-out aisle in the same location as the check-out aisle number or type of check-out identification.

6. Unisex toilet and bathing rooms.

7. Accessible dressing, fitting, and locker rooms where not all such rooms are accessible.

(b) Exception.

1. Accessible parking spaces required in s. Comm 62.1106 for the general public shall be identified with a sign complying with the accessible parking sign requirements specified in s. Trans 200.07.
2. Accessible parking facilities identified for use only by employees of any building or facility or by tenants in Group R-2 occupancies may be identified with signs other than the Trans 200.07 signs.

(2) Directional signage. Directional signage indicating the route to the nearest like accessible element within the building or facility shall be provided at all of the locations specified in pars. (a) to (e). These directional signs shall include the International Symbol of Accessibility.

- (a) Inaccessible building entrances.
- (b) Inaccessible public toilet and bathing facilities.
- (c) Elevators not serving an accessible route.
- (d) At each separate-sex toilet and bathing room indicating the location of the nearest unisex toilet or bathing room where provided in accordance with sub. (1).
- (e) At exits and elevators serving a required accessible space, but not providing an approved accessible means of egress, signage shall be provided in accordance with IBC Section 1003.2.13.6.

(3) Other signs. Signage providing directional information, information about functional spaces, or signage indicating special accessibility provisions shall be provided as follows:

- (a) In assembly areas required to comply with s. Comm 62.1108 (2) (d), a sign notifying the general public of the availability of assistive listening systems shall be provided at ticket offices or similar locations.
- (b) At each door to an exit stairway, signage shall be provided in accordance with IBC Section 1003.2.10.3.
- (c) At areas of refuge, signage shall be provided in accordance with IBC Sections 1003.2.13.5.3 to 1003.2.13.5.5.
- (d) At areas for assisted rescue, signage shall be provided in accordance with s. Comm 62.1003 (2) (b).

Note: Refer to s. 101.123, Stats., for requirements for designating smoking areas.

CHAPTER 12

INTERIOR ENVIRONMENT

SECTION 1201 GENERAL

1201.1 Scope. The provisions of this chapter shall govern ventilation, temperature control, lighting, yards and courts, sound transmission, room dimensions, surrounding materials and rodent proofing associated with the interior spaces of buildings.

SECTION 1202 VENTILATION

1202.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1202.4 or shall be provided with mechanical ventilation in accordance with the *International Mechanical Code*.

1202.2 Attic spaces. Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing member shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. A minimum of 1 inch (25 mm) of air space shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than $1/150$ of the area of the space ventilated, with 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.

Exception: The minimum required net free ventilating area shall be $1/300$ of the area of the space ventilated, provided a vapor retarder having a transmission rate not exceeding 1 perm in accordance with ASTM E 96 is installed on the warm side of the attic insulation and provided 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents, with the balance of the required ventilation provided by eave or cornice vents.

1202.2.1 Openings into attic. Exterior openings into the attic space of any building intended for human occupancy shall be covered with corrosion resistant wire cloth screening, hardware cloth, perforated vinyl or similar material that will prevent the entry of birds, squirrels, rodents, snakes and other similar creatures. The openings therein shall be a minimum of $1/8$ inch (3.2 mm) and shall not exceed $1/4$ inch (6.4 mm). Where combustion air is obtained from an attic area, it shall be in accordance with Chapter 7 of the *International Mechanical Code*.

1202.3 Under-floor ventilation. The space between the bottom of the floor joists and the earth under any building except spaces occupied by a basement or cellar shall be provided with ventilation openings through foundation walls or exterior

walls. Such openings shall be placed so as to provide cross-ventilation of the under-floor space.

1202.3.1 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet (0.67 m² for each 100 m²) of crawl space area. Ventilation openings shall be covered for their height and width with any of the following materials, provided that the least dimension of the covering shall not exceed $1/4$ inch (6 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grills or gratings.
4. Extruded load-bearing vents.
5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension not exceeding $1/8$ inch (3.2 mm).

1202.3.2 Exceptions. The following are exceptions to Sections 1202.3 and 1202.3.1:

1. Where warranted by climatic conditions, ventilation openings to the outdoors are not required if ventilation openings to the interior are provided.
2. The total area of ventilation openings is permitted to be reduced to $1/1,500$ of the under-floor area where the ground surface is treated with an approved vapor retarder material and the required openings are placed so as to provide cross-ventilation of the space. The installation of operable louvers shall not be prohibited.
3. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cfm for each 50 square feet (1.02 L/s for each 10 m²) of crawl space floor area and the ground surface is covered with an approved vapor retarder.
4. Ventilation openings are not required when the ground surface is covered with an approved vapor retarder, the perimeter walls are insulated and the space is conditioned in accordance with the *International Energy Conservation Code*.
5. For buildings in flood hazard areas as established in Section 1612.3, the opening requirements of ASCE 24 are authorized to be satisfied by ventilation openings that are designed and installed in accordance with ASCE 24.

1202.4 Natural ventilation. Natural ventilation of an occupied space shall be through windows, doors, louvers or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.

1202.4.1 Ventilation area required. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

1202.4.1.1 Adjoining spaces. Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining rooms shall be unobstructed and shall have an area not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.3 m²). The minimum openable area to the outdoors shall be based on the total floor area being ventilated.

1202.4.1.2 Openings below grade. Where openings below grade provide required natural ventilation, the outside horizontal clear space measured perpendicular to the opening shall be one and one-half times the depth of the opening. The depth of the opening shall be measured from the average adjoining ground level to the bottom of the opening.

1202.4.2 Contaminants exhausted. Contaminant sources in naturally ventilated spaces shall be removed in accordance with the *International Mechanical Code* and the *International Fire Code*.

1202.4.2.1 Bathrooms. Rooms containing bathtubs, showers, spas and similar bathing fixtures shall be mechanically ventilated in accordance with the *International Mechanical Code*.

1202.4.3 Openings on yards or courts. Where natural ventilation is to be provided by openings onto yards or courts, such yards or courts shall comply with Section 1205.

1202.5 Other ventilation and exhaust systems. Ventilation and exhaust systems for occupancies and operations involving flammable or combustible hazards or other contaminant sources as covered in the *International Mechanical Code* or the *International Fire Code* shall be provided as required by the *International Mechanical Code* and the *International Fire Code*.

SECTION 1203 TEMPERATURE CONTROL

1203.1 [Comm 62.1203] Equipment and systems. Interior spaces intended for human occupancy shall conform to the IMC.

SECTION 1204 LIGHTING

1204.1 General. Every space intended for human occupancy shall be provided with natural light by means of exterior glazed openings in accordance with Section 1204.2 or shall be provided with artificial light in accordance with Section 1204.3. Exterior glazed openings shall open directly onto a public way or onto a yard or court in accordance with Section 1205.

1204.2 Natural light. The minimum net glazed area shall not be less than 8 percent of the floor area of the room served.

1204.2.1 Adjoining spaces. For the purpose of natural lighting, any room is permitted to be considered as a portion of an adjoining room where one-half of the area of the com-

mon wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room or 25 square feet (2.3 m²), whichever is greater.

1204.2.2 Exterior openings. Exterior openings required by 1204.2 for natural light shall open directly onto a public way, yard or court, as set forth in Section 1205.

Exceptions:

1. Required exterior openings are permitted to open into a roofed porch where the porch:
 - 1.1. Abuts a public way, yard or court.
 - 1.2. Has a ceiling height of not less than 7 feet (2134 mm).
 - 1.3. Has a longer side at least 65 percent open and unobstructed.
2. Skylights are not required to open directly onto a public way, yard or court.

1204.3 Artificial light. Artificial light shall be provided that is adequate to provide an average illumination of 10 foot-candles (107 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

1204.4 Stairway illumination. Stairways within dwelling units shall be provided with a minimum illumination level of 10 foot-candles (107 lux) measured at every tread nosing. Exterior stairways serving a dwelling unit shall have an illumination level on tread runs of 1 foot-candle (11 lux). Stairs in other occupancies shall be governed by Chapter 10.

1204.4.1 Controls. The control for activation of the required stairway lighting shall be in accordance with the *ICC Electrical Code*.

1204.5 Emergency egress lighting. The means of egress shall be illuminated in accordance with Section 1003.2.11.

SECTION 1205 YARDS OR COURTS

1205.1 General. This section shall apply to yards and courts adjacent to exterior openings that provide natural light or ventilation. Such yards and courts shall be on the same property as the building.

1205.2 Yards. Yards shall not be less than 3 feet (914 mm) in width for one-story and two-story buildings. For buildings more than two stories in height, the minimum width of the yard shall be increased at the rate of 1 foot (305 mm) for each additional story. For buildings exceeding 14 stories in height, the required width of the yard shall be computed on the basis of 14 stories.

1205.3 Courts. Courts shall not be less than 3 feet (914 mm) in width. Courts having windows opening on opposite sides shall not be less than 6 feet (1829 mm) in width. Courts shall not be less than 10 feet (3048 mm) in length unless bounded on one end by a public way or yard. For buildings more than two stories in height, the court shall be increased 1 foot (305 mm) in width and 2 feet (310 mm) in length for each additional story. For buildings exceeding 14 stories in height, the required dimensions shall be computed on the basis of 14 stories.

1205.3.1 Court access. Access shall be provided to the bottom of courts for cleaning purposes.

1205.3.2 Air intake. Courts more than two stories in height shall be provided with a horizontal air intake at the bottom not less than 10 square feet (0.93 m²) in area and leading to the exterior of the building unless abutting a yard or public way.

1205.3.3 [Comm 62.1205] Court drainage. The bottom of every court shall be properly graded and drained.

Note: See ch. Comm 82 for requirements for storm water piping.

SECTION 1206 SOUND TRANSMISSION

1206.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units or between dwelling units and adjacent public areas such as halls, corridors, stairs or service areas.

1206.2 Air-borne sound. Walls, partitions and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90. This requirement shall not apply to dwelling unit entrance doors; however, such doors shall be tight fitting to the frame and sill.

1206.3 Structure-borne sound. Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 50 (45 if field tested) when tested in accordance with ASTM E 492.

SECTION 1207 INTERIOR SPACE DIMENSIONS

1207.1 Minimum room widths. Habitable spaces, other than a kitchen, shall not be less than 7 feet (2134 mm) in any plan dimension. Kitchens shall have a clear passageway of not less than 3 feet (914 mm) between counter fronts and appliances or counter fronts and walls.

1207.2 Minimum ceiling heights. Occupiable spaces, habitable spaces and corridors shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Bathrooms, toilet rooms, kitchens, storage rooms and laundry rooms shall be permitted to have a ceiling height of not less than 7 feet (2134 mm).

Exceptions:

1. In one- and two-family dwellings, beams or girders spaced not less than 4 feet (1219 mm) on center and projecting not more than 6 inches (152 mm) below the required ceiling height.
2. Basement rooms in one- and two-family dwellings having a ceiling height of not less than 6 feet 8 inches (2033 mm) with not less than 6 feet 4 inches (1932 mm) of clear height under beams, girders, ducts and similar obstructions.
3. If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in one-

half the area thereof. Any portion of the room measuring less than 5 feet (1524 mm) from the finished floor to the finished ceiling shall not be included in any computation of the minimum area thereof.

4. Mezzanines constructed in accordance with Section 505.1.

1207.2.1 Furred ceiling. Any room with a furred ceiling shall be required to have the minimum ceiling height in two-thirds of the area thereof, but in no case shall the height of the furred ceiling be less than 7 feet (2134 mm).

1207.3 Room area. Every dwelling unit shall have at least one room that shall have not less than 150 square feet (13.9 m²) of net floor area. Other habitable rooms except kitchens shall have a net floor area of not less than 70 square feet (6.5 m²).

1207.4 Efficiency dwelling units. An efficiency living unit shall conform to the requirements of the code except as modified herein:

1. The unit shall have a living room of not less than 220 square feet (20.4 m²) of floor area. An additional 100 square feet (9.3 m²) of floor area shall be provided for each occupant of such unit in excess of two.
2. The unit shall be provided with a separate closet.
3. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a clear working space of not less than 30 inches (762 mm) in front. Light and ventilation conforming to this code shall be provided.
4. The unit shall be provided with a separate bathroom containing a water closet, lavatory and bathtub or shower.

SECTION 1208 ACCESS TO UNOCCUPIED SPACES

1208.1 Crawl spaces. Crawl spaces shall be provided with a minimum of one access opening not less than 18 inches by 24 inches (457 mm by 610 mm).

1208.2 Attic spaces. An opening not less than 20 inches by 30 inches (559 mm by 762 mm) shall be provided to any attic area having a clear height of over 30 inches (762 mm). A 30-inch (762 mm) minimum clear headroom in the attic space shall be provided at or above the access opening.

1208.3 Mechanical appliances. Access to mechanical appliances installed in under-floor areas, in attic spaces, and on roofs or elevated structures shall be in accordance with the *International Mechanical Code*.

SECTION 1209 SURROUNDING MATERIALS

1209.1 Floors. In other than dwelling units, toilet and bathing room floors shall have a smooth, hard, nonabsorbent surface that extends upward onto the walls at least 6 inches (152 mm).

1209.2 Walls. Walls within 2 feet (610 mm) of urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of 4 feet (1219 mm) above the floor, and except for struc-

tural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.

Exceptions:

1. Dwelling units and guestrooms.
2. Toilet rooms that are not accessible to the public and which have not more than one water closet.

Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.

1209.3 Showers. Shower compartments and walls above bathtubs with installed shower heads shall be finished with a smooth, nonabsorbent surface to a height not less than 70 inches (1778 mm) above the drain inlet.

1209.4 Waterproof joints. Built-in tubs with showers shall have waterproofed joints between the tub and adjacent wall.

1209.5 Toilet rooms. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public.

Comm 62.1209 (1) Privacy and access. Every toilet room shall be enclosed and separated from other areas of the building in a manner that will ensure privacy of the users of the toilet rooms. Restriction of access to toilet rooms, such as by use of key locks or other similar devices, is prohibited, except as provided in sub. (2).

(2) Exceptions:

- (a) Toilet rooms for a service or filling station that are accessed from the exterior may be key locked.
- (b) A self-service filling station that has a key- or card-operated fuel-dispensing device which can be used while the station is unattended by an employee is not required to have toilet rooms available during the unattended periods.
- (c) Single-occupant toilet rooms may have privacy locks.

CHAPTER 13

ENERGY EFFICIENCY

SECTION 1301

GENERAL

1301.1 Scope. This chapter governs the design and construction of buildings for energy efficiency.

1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the *International Energy Conservation Code*.

CHAPTER 14

EXTERIOR WALLS

SECTION 1401 GENERAL

1401.1 Scope. The provisions of this chapter shall establish the minimum requirements for exterior walls, exterior wall coverings, exterior wall openings, exterior windows and doors, architectural trim, balconies and bay windows.

SECTION 1402 DEFINITIONS

1402.1 General. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

ADHERED MASONRY VENEER. Veneer secured and supported through the adhesion of an approved bonding material applied to an approved backing.

ALUMINUM COMPOSITE MATERIAL (ACM). A factory-manufactured panel consisting of aluminum skins bonded to both faces of a plastic core.

ALUMINUM COMPOSITE MATERIAL (ACM) SYSTEM. An exterior wall finish system fabricated using ACM in a specific assembly including joints, seams, attachments, substrate, framing and other details as appropriate to a particular design.

ANCHORED MASONRY VENEER. Veneer secured with approved mechanical fasteners to an approved backing.

BACKING. The wall or surface to which the veneer is secured.

EXTERIOR WALL. A wall, bearing or nonbearing, that is used as an enclosing wall for a building, other than a fire wall, and that has a slope of 60 degrees (1.05 rad) or greater with the horizontal plane.

EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resisting barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural trim and embellishments such as cornices, soffits, facias, gutters and leaders.

EXTERIOR WALL ENVELOPE. A system or assembly of exterior wall components, including exterior wall finish materials, that provide protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.

VENEER. A facing attached to a wall for the purpose of providing ornamentation, protection, or insulation, but not counted as adding strength to the wall.

SECTION 1403 PERFORMANCE REQUIREMENTS

1403.1 General. The provisions of this section shall apply to exterior walls, wall coverings and components thereof.

1403.2 Weather protection. Exterior walls shall provide the building with a weather resistant exterior wall envelope. The exterior wall envelope shall include flashing, described in Section 1405.3. The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistive barrier behind the exterior veneer, as described in Section 1404.2 and a means for draining water that enters the assembly to the exterior of the veneer, unless it is determined that penetration of water behind the veneer shall not be detrimental to the building performance. Protection against condensation in the exterior wall assembly shall be provided in accordance with the *International Energy Conservation Code*.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 19 and Chapter 21, respectively.
2. Compliance with the requirements for a means of drainage, and the requirements of Section 1405.2 and Section 1405.3, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
 - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. Exterior wall envelope assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (0.297 kN/m²).
 - 2.4. Exterior wall envelope assemblies shall be subjected to a minimum test exposure duration of 2 hours.

The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall enve-

lope, joints at the perimeter of openings penetration, or inter-sections of terminations with dissimilar materials.

1403.3 Vapor retarder. An approved interior noncorrodible vapor retarder shall be provided. Vapor retarders shall be tested in accordance with ASTM E 96.

Exceptions:

1. Where other approved means to avoid condensation and leakage of moisture are provided.
2. Plain and reinforced concrete or masonry exterior walls designed and constructed in accordance with Chapter 19 or Chapter 21, respectively.

Comm 62.1403 (1) Air barriers.

- (a) Except as specified in sub. (2), a durable air retarder shall be provided when a building component or assembly separates interior conditioned space from an exterior wall system.
- (b) The air retarder shall be located on the interior side of the wall insulation.

(2) Exceptions: An air retarder is not required in the following locations:

- (a) Where other approved means to avoid condensation and frost within the wall assembly are provided.
- (b) In plain or reinforced concrete exterior walls that are designed and constructed in accordance with IBC Chapter 19.

Note: Although air retarders are to reduce transmission of water vapor by convection (air movement), and vapor retarders are to reduce transmission of water vapor by diffusion, these functions may be combined in a single membrane. In practice, considerably more moisture is transported by convection than by diffusion.

1403.4 Structural. Exterior walls, and the associated openings, shall be designed and constructed to resist safely the superimposed loads required by Chapter 16.

1403.5 Fire resistance. Exterior walls shall be fire-resistance rated as required by other sections of this code with opening protection as required by Chapter 7.

1403.6 Flood resistance. For buildings in flood hazard areas as established in Section 1612.3, exterior walls extending below the design flood elevation shall be resistant to water damage. Wood shall be pressure-preservative treated in accordance with AWPA C1, C2, C3, C4, C9, C15, C18, C22, C24, C28, P1 and P2, or decay-resistant heartwood of redwood, black locust or cedar.

SECTION 1404 MATERIALS

1404.1 General. Materials used for the construction of exterior walls shall comply with the provisions of this section. Materials not prescribed herein shall be permitted, provided that any such alternative has been approved.

1404.2 Water-resistive barrier. A minimum of one layer of No. 15 asphalt felt, complying with ASTM D 226 for Type I felt, shall be attached to the sheathing, with flashing as described in Section 1405.3, in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer.

1404.3 Wood. Exterior walls of wood construction shall be designed and constructed in accordance with Chapter 23.

1404.3.1 Basic hardboard. Basic hardboard shall conform to the requirements of AHA A135.4.

1404.3.2 Hardboard siding. Hardboard siding shall conform to the requirements of AHA A135.6 and, where used structurally, shall be so identified by the label of an approved agency.

1404.4 Masonry. Exterior walls of masonry construction shall be designed and constructed in accordance with this section and Chapter 21. Masonry units, mortar and metal accessories used in anchored and adhered veneer shall meet the physical requirements of Chapter 21. The backing of anchored and adhered veneer shall be of concrete, masonry, steel framing, or wood framing.

1404.5 Metal. Exterior walls of formed steel construction, structural steel or lightweight metal alloys shall be designed in accordance with Chapters 22 and 20, respectively.

1404.5.1 Aluminum siding. Aluminum siding shall conform to the requirements of AAMA 1402.

1404.6 Concrete. Exterior walls of concrete construction shall be designed and constructed in accordance with Chapter 19.

1404.7 Glass-unit masonry. Exterior walls of glass-unit masonry shall be designed and constructed in accordance with Chapter 21.

1404.8 Plastics. Plastic panel, apron or spandrel walls as defined in this code shall not be limited in thickness, provided that such plastics and their assemblies conform to the requirements of Chapter 26 and are constructed of approved weather-resistant materials of adequate strength to resist the wind loads for cladding specified in Chapter 16.

1404.9 Vinyl siding. Vinyl siding shall conform to the requirements of ASTM D 3679.

SECTION 1405 INSTALLATION OF WALL COVERINGS

1405.1 General. Exterior wall coverings shall be designed and constructed in accordance with the applicable provisions of this section.

1405.2 Weather protection. Exterior walls shall provide weather protection for the building. The materials of the minimum nominal thickness specified in Table 1405.2 shall be acceptable as approved weather coverings.

TABLE 1405.2
MINIMUM THICKNESS OF WEATHER COVERINGS

COVERING TYPE	MINIMUM THICKNESS (Inches)
Adhered masonry veneer	0.25
Anchored masonry veneer	2.625
Aluminum siding	0.019
Asbestos-cement boards	0.125
Asbestos shingles	0.156
Exterior plywood (with sheathing)	0.313
Exterior plywood (without sheathing)	See Section 2304.6
Fiberboard siding	0.5
Glass-fiber reinforced concrete panels	0.375
Hardboard siding ^c	0.25
Marble slabs	1
Particleboard (with sheathing)	See Section 2304.6
Particleboard (without sheathing)	See Section 2304.6
Precast stone facing	0.625
Steel (approved corrosion resistant)	0.0149
Stone (cast artificial)	1.5
Stone (natural)	2
Stucco or exterior portland cement plaster	
Three-coat work over:	
Metal plaster base	0.875 ^b
Unit masonry	0.625 ^b
Cast-in-place or precast concrete	0.625 ^b
Two-coat work over:	
Unit masonry	0.5 ^b
Cast-in-place or precast concrete	0.375 ^b
Terra cotta (anchored)	1
Terra cotta (adhered)	0.25
Vinyl siding	0.035
Wood shingles	0.375
Wood siding (without sheathing) ^a	0.5
Structural glass	0.344

For SI: 1 inch = 25.4 mm.

a. Wood siding of thicknesses less than 0.5 inch shall be placed over sheathing that conforms to Section 2304.6.

b. Exclusive of texture.

c. As measured at the bottom of decorative grooves.

1405.3 Flashing. Flashing shall be installed in such a manner so as to prevent moisture from entering the top and sides of exterior window and door openings. Flashing shall be installed in such a manner so as to prevent moisture from entering at the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting flanges on both sides under stucco copings; under and at the ends of masonry, wood or metal copings and sills; continuously above projecting wood

trim; at the intersection of exterior walls and porches and decks; at wall and roof intersections with the step-flashing method; and at built-in gutters.

1405.3.1 Exterior wall pockets. In exterior walls of buildings or structures, wall pockets or crevices in which moisture can accumulate shall be avoided or protected with caps or drips, or other approved means shall be provided to prevent water damage.

1405.3.2 Masonry. Flashing and weepholes shall be located in the first course of masonry above finished ground level above the foundation wall or slab, and other points of support, including structural floors, shelf angles and lintels where anchored veneers are designed in accordance with Section 1405.5.

1405.4 Wood veneers. Wood veneers on exterior walls of buildings of Types I, II, III and IV construction shall be not less than 1-inch (25.4 mm) nominal thickness, 0.438-inch (11.1 mm) exterior hardboard siding or 0.375-inch (9.5 mm) exterior-type wood structural panels or particleboard and shall conform to the following:

1. The veneer does not exceed three stories in height, measured from grade, except where fire-retardant-treated wood is used, the height shall not exceed four stories.
2. The veneer is attached to or furred from a noncombustible backing that is fire-resistance rated as required by other provisions of this code.
3. Where open or spaced wood veneers (without concealed spaces) are used, they shall not project more than 24 inches (610 mm) from the building wall.

1405.5 Anchored masonry veneer. Anchored masonry veneer shall comply with the provisions of Sections 1405.5, 1405.6, 1405.7, and 1405.8 and Sections 6.1 and 6.2 of ACI 530/ASCE 5/TMS 402.

1405.5.1 Support. Exterior masonry veneers having an installed weight of 40 pounds/square foot (1.915 kN/m²) or less shall be permitted to be supported on wood construction where installed in compliance with the following:

1. There shall be a vertical movement joint between the veneer supported by the wood construction and the veneer supported by the foundation.
2. Members supporting the masonry veneer shall be attached to wood studs with lag screws.
3. Horizontal members supporting the masonry veneer shall be designed to limit deflection to $1/600$ of the span of the supporting members.
4. The design of the wood construction shall consider the weight of the veneer plus any other loads.

1405.5.2 Tolerances. Anchored masonry veneers in accordance with Chapter 14 are not required to meet the tolerances in Article 3.3 G1 of ACI 530.1/ASCE 6/TMS 602.

1405.5.3 Seismic requirements. Anchored masonry veneer located in Seismic Design Category C, D, E or F shall conform to the requirements of Section 6.2.2.10 of ACI 530/ASCE 5/TMS 402, as modified in accordance with Section 1405.5.3.1.

1405.5.3.1 Modifications to ACI 530/ASCE 5/TMS 402, Section 6.2.2.10. Section 6.2.2.10 of ACI 530/ASCE 5/TMS 402 shall be modified as indicated in the following.

1. Revise the title of Section 6.2.2.10.1 to read: Seismic Design Category C.
2. Revise the title of Section 6.2.2.10.2 to read: Seismic Design Category D.
3. Revise the title of Section 6.2.2.10.3 to read: Seismic Design Category E or F.

1405.6 Stone veneer. Stone veneer units not exceeding 10 inches (254 mm) in thickness shall be anchored directly to masonry, concrete or to stud construction by one of the following methods:

1. With concrete or masonry backing, anchor ties shall be not less than 0.1055-inch (2.68 mm) corrosion-resistant wire, or approved equal, formed beyond the base of the backing. The legs of the loops shall be not less than 6 inches (152 mm) in length bent at right angles and laid in the mortar joint, and spaced so that the eyes or loops are 12 inches (305 mm) maximum on center in both directions. There shall be provided not less than a 0.1055-inch (2.68 mm) corrosion-resistant wire tie, or approved equal, threaded through the exposed loops for every 2 square feet (0.2 m²) of stone veneer. This tie shall be a loop having legs not less than 15 inches (381 mm) in length bent so that it will lie in the stone veneer mortar joint. The last 2 inches (51 mm) of each wire leg shall have a right-angle bend. One-inch (25.4 mm) minimum thickness of cement grout shall be placed between the backing and the stone veneer.
2. With stud backing, a 2-inch by 2-inch (51 by 51 mm) 0.0625-inch (1.59 mm) corrosion-resistant wire mesh with two layers of waterproof paper backing in accordance with Section 1403.3 shall be applied directly to wood studs spaced a maximum of 16 inches (406 mm) on center. On studs, the mesh shall be attached with 2-inch-long (51 mm) corrosion-resistant steel wire furring nails at 4 inches (102 mm) on center providing a minimum 1.125-inch (29 mm) penetration into each stud and with 8d common nails at 8 inches (203 mm) on center into top and bottom plates or with equivalent wire ties. There shall be not less than a 0.1055-inch (2.68 mm) corrosion-resistant wire, or approved equal, looped through the mesh for every 2 square feet (0.2 m²) of stone veneer. This tie shall be a loop having legs not less than 15 inches (381 mm) in length, so bent that it will lie in the stone veneer mortar joint. The last 2 inches (51 mm) of each wire leg shall have a right-angle bend. One-inch (25.4 mm) minimum thickness of cement grout shall be placed between the backing and the stone veneer.

1405.7 Slab-type veneer. Slab-type veneer units not exceeding 2 inches (51 mm) in thickness shall be anchored directly to masonry, concrete or stud construction. For veneer units of marble, travertine, granite or other stone units of slab form ties of corrosion-resistant dowels in drilled holes located in the middle third of the edge of the units spaced a maximum of 24 inches (610 mm) apart around the periphery of each unit with not

less than four ties per veneer unit. Units shall not exceed 20 square feet (1.9 m²) in area. If the dowels are not tight-fitting, the holes shall be drilled not more than 0.063 inch (1.6 mm) larger in diameter than the dowel, with the hole countersunk to a diameter and depth equal to twice the diameter of the dowel in order to provide a tight fitting key of cement mortar at the dowel locations when the mortar in the joint has set. Veneer ties shall be corrosion-resistant metal capable of resisting, in tension or compression, a force equal to two times the weight of the attached veneer. If made of sheet metal, veneer ties shall be not smaller in area than 0.0336 by 1 inch (0.853 by 25.4 mm) or, if made of wire, not smaller in diameter than 0.1483-inch (3.76 mm) wire.

1405.8 Terra cotta. Anchored terra cotta or ceramic units not less than 1.625 inches (41 mm) thick shall be anchored directly to masonry, concrete or stud construction. Tied terra cotta or ceramic veneer units shall be not less than 1.625 inches (41 mm) thick with projecting dovetail webs on the back surface spaced approximately 8 inches (203 mm) on center. The facing shall be tied to the backing wall with corrosion-resistant metal anchors of not less than No. 8 gage wire installed at the top of each piece in horizontal bed joints not less than 12 inches (305 mm) nor more than 18 inches (457 mm) on center; these anchors shall be secured to 0.25-inch (6.4 mm) corrosion-resistant pencil rods that pass through the vertical aligned loop anchors in the backing wall. The veneer ties shall have sufficient strength to support the full weight of the veneer in tension. The facing shall be set with not less than a 2-inch (51 mm) space from the backing wall and the space shall be filled solidly with portland cement grout and pea gravel. Immediately prior to setting, the backing wall and the facing shall be drenched with clean water and shall be distinctly damp when the grout is poured.

1405.9 Adhered masonry veneer. Adhered masonry veneer shall comply with the applicable requirements in Section 1405.9.1 and Sections 6.1 and 6.3 of ACI 530/ASCE 5/TMS 402.

1405.9.1 Adhesion. Adhesion developed between adhered veneer units and backing shall have a shear strength of at least 50 pounds per square inch (0.34 MPa) based on gross unit surface area or shall be adhered in compliance with Article 3.3C of ACI 530.1/ASCE 6/TMS 602.

1405.9.1.1 Interior masonry veneers. Interior masonry veneers shall have a maximum weight of 20 pounds per square foot (0.958 kg/m²) and shall be installed in accordance with Section 1405.9. Where the interior veneer is supported by wood construction, the supporting members shall be designed to limit deflection to $1/600$ of the span of the supporting members.

1405.10 Metal veneers. Veneers of metal shall be fabricated from approved corrosion-resistant materials or shall be protected front and back with porcelain enamel, or otherwise be treated to render the metal resistant to corrosion. Such veneers shall not be less than 0.0149-inch (0.378 mm) nominal thickness sheet steel mounted on wood or metal furring strips or approved sheathing on the wood construction.

1405.10.1 Attachment. Exterior metal veneer shall be securely attached to the supporting masonry or framing members with corrosion-resistant fastenings, metal ties or by

other approved devices or methods. The spacing of the fastenings or ties shall not exceed 24 inches (610 mm) either vertically or horizontally, but where units exceed 4 square feet (0.4 m²) in area there shall be not less than four attachments per unit. The metal attachments shall have a cross-sectional area not less than provided by W 1.7 wire. Such attachments and their supports shall be capable of resisting a horizontal force in accordance with the wind loads specified in Section 1609, but in no case less than 20 pounds per square foot (0.958 kg/m²).

1405.10.2 Weather protection. Metal supports for exterior metal veneer shall be protected by painting, galvanizing, or by other equivalent coating or treatment. Wood studs, furring strips, or other wood supports for exterior metal veneer shall be approved pressure-treated wood or protected as required in Section 1403.2. Joints and edges exposed to the weather shall be caulked with approved durable waterproofing material or by other approved means to prevent penetration of moisture.

1405.10.3 Back-up. Masonry backup shall not be required for metal veneer except as is necessary to meet the fire-resistance requirements of this code.

1405.10.4 Grounding. Grounding of metal veneers on buildings shall comply with the requirements of Chapter 27 and the ICC *Electrical Code*.

1405.11 Glass veneer. The area of a single section of thin exterior structural glass veneer shall not exceed 10 square feet (0.93 m²) where it is not more than 15 feet (4572 mm) above the level of the sidewalk or grade level directly below, and shall not exceed 6 square feet (0.56 m²) where it is more than 15 feet (4572 mm) above that level.

1405.11.1 Length and height. The length or height of any section of thin exterior structural glass veneer shall not exceed 48 inches (1219 mm).

1405.11.2 Thickness. The thickness of thin exterior structural glass veneer shall be not less than 0.344 inch (8.7 mm).

1405.11.3 Application. Thin exterior structural glass veneer shall be set only after backing is thoroughly dry and after application of an approved bond coat applied uniformly over the entire surface of the backing so as to effectively seal the surface. Glass shall be set in place with an approved mastic cement in sufficient quantity so that at least 50 percent of the area of each glass unit is directly bonded to the backing by mastic not less than 0.25 inch (6.4 mm) thick and not more than 0.625 inch (15.9 mm) thick. The bond coat and mastic shall be evaluated for compatibility and shall bond firmly together.

1405.11.4 Installation at sidewalk level. Where glass extends to a sidewalk surface, each section shall rest in an approved metal molding, and be set at least 0.25 inch (6.4 mm) above the highest point of the sidewalk. The space between the molding and the sidewalk shall be thoroughly caulked and made water tight.

1405.11.4.1 Installation above sidewalk level. Where thin exterior structural glass veneer is installed above the level of the top of a bulkhead facing, or at a level more than 36 inches (914 mm) above the sidewalk level, the

mastic cement binding shall be supplemented with approved nonferrous metal shelf angles located in the horizontal joints in every course. Such shelf angles shall be not less than 0.0478-inch (1.2 mm) thick and not less than 2 inches (51 mm) long and shall be spaced at approved intervals, with not less than two angles for each glass unit. Shelf angles shall be secured to the wall or backing with expansion bolts, toggle bolts, or by other approved methods.

1405.11.5 Joints. Unless otherwise specifically approved by the building official, abutting edges of thin exterior structural glass veneer shall be ground square. Mitered joints shall not be used except where specifically approved for wide angles. Joints shall be uniformly buttered with an approved jointing compound and horizontal joints shall be held to not less than 0.063 inch (1.6 mm) by an approved nonrigid substance or device. Where thin exterior structural glass veneer abuts nonresilient material at sides or top, expansion joints not less than 0.25 inch (6.4 mm) wide shall be provided.

1405.11.6 Mechanical fastenings. Thin exterior structural glass veneer installed above the level of the heads of show windows and veneer installed more than 12 feet (3658 mm) above sidewalk level shall, in addition to the mastic cement and shelf angles, be held in place by the use of fastenings at each vertical or horizontal edge, or at the four corners of each glass unit. Fastenings shall be secured to the wall or backing with expansion bolts, toggle bolts, or by other methods. Fastenings shall be so designed as to hold the glass veneer in a vertical plane independent of the mastic cement. Shelf angles providing both support and fastenings shall be permitted.

1405.11.7 Flashing. Exposed edges of thin exterior structural glass veneer shall be flashed with overlapping corrosion-resistant metal flashing and caulked with a waterproof compound in a manner to effectively prevent the entrance of moisture between the glass veneer and the backing.

1405.12 Exterior windows and doors. Windows and doors installed in exterior walls shall conform to the testing and performance requirements of Section 1714.5.

1405.12.1 Installation. Windows and doors shall be installed in accordance with approved manufacturer's instructions. Fastener size and spacing shall be provided in such instructions and shall be calculated based on maximum loads and spacing used in the tests.

1405.13 Vinyl siding. Vinyl siding conforming to the requirements of this section and complying with ASTM D 3679 shall be permitted on exterior walls of buildings of Type V construction located in areas where the basic wind speed specified in Chapter 16 does not exceed 100 miles per hour (161 km/h) and the building height is less than 40 feet (12 192 mm) in Exposure C. Where construction is located in areas where the basic wind speed exceeds 100 miles per hour (161 km/h), or building heights are in excess of 40 feet (12 192 mm), tests or calculations indicating compliance with Chapter 16 shall be submitted. Vinyl siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.

1405.13.1 Application. The siding shall be applied over sheathing or materials listed in Section 2304.6. Siding shall be applied to conform with the weather-resistant barrier requirements in Section 1403. Siding and accessories shall be installed in accordance with approved manufacturer's instructions. Unless otherwise specified in the approved manufacturer's instructions, nails used to fasten the siding and accessories shall have a minimum 0.313-inch (7.9 mm) head diameter and 0.125-inch (3.18 mm) shank diameter. The nails shall be corrosion resistant and shall be long enough to penetrate the studs or nailing strip at least 0.75 inch (19 mm). Where the siding is installed horizontally, the fastener spacing shall not exceed 16 inches (406 mm) horizontally and 12 inches (305 mm) vertically. Where the siding is installed vertically, the fastener spacing shall not exceed 12 inches (305 mm) horizontally and 12 inches (305 mm) vertically.

1405.14 Cement plaster. Cement plaster applied to exterior walls shall conform to the requirements specified in Chapter 25.

1405.15 Fastening. Weather boarding and wall coverings shall be securely fastened with aluminum, copper, zinc, zinc-coated or other approved corrosion-resistant fasteners in accordance with the nailing schedule in Table 2304.9.1 or the approved manufacturer's installation instructions. Shingles and other weather coverings shall be attached with appropriate standard-shingle nails to furring strips securely nailed to studs, or with approved mechanically bonding nails, except where sheathing is of wood not less than 1-inch nominal thickness or of wood structural panels as specified in Table 2308.9.3(3).

SECTION 1406 COMBUSTIBLE MATERIALS ON THE EXTERIOR SIDE OF EXTERIOR WALLS

1406.1 General. This section shall apply to exterior wall coverings, balconies and similar appendages, and bay and oriel windows constructed of combustible materials.

1406.2 Combustible exterior wall coverings. Combustible exterior wall coverings shall comply with this section.

Exception: Plastics complying with Chapter 26.

1406.2.1 Ignition resistance. Combustible exterior wall coverings shall be tested in accordance with NFPA 268.

Exceptions:

1. Wood or wood-based products.
2. Other combustible materials covered with an exterior covering other than vinyl sidings listed in Table 1405.2.
3. Aluminum having a minimum thickness of 0.019 inch (0.48 mm).
4. Exterior wall coverings on exterior walls of Type V construction.

1406.2.1.1 Fire separation 5 feet or less. Where installed on exterior walls having a fire separation distance

of 5 feet (1524 mm) or less, combustible exterior wall coverings shall not exhibit sustained flaming as defined in NFPA 268.

1406.2.1.2 Fire separation greater than 5 feet. For fire separation distances greater than 5 feet (1524 mm), an assembly shall be permitted that has been exposed to a reduced level of incident radiant heat flux in accordance with the NFPA 268 test method without exhibiting sustained flaming. The minimum fire separation distance required for the assembly shall be determined from Table 1406.2.1.2 based on the maximum tolerable level of incident radiant heat flux that does not cause sustained flaming of the assembly.

1406.2.2 Architectural trim. In buildings of Types I, II, III, and IV construction that do not exceed three stories or 40 feet (12 192 mm) in height above grade plane, exterior wall coverings shall be permitted to be constructed of wood where permitted by Section 1405.4 or other equivalent combustible material. Combustible exterior wall coverings, other than fire-retardant-treated wood complying with Section 2303.2 for exterior installation, shall not exceed 10 percent of an exterior wall surface area where the fire separation distance is 5 feet (1524 mm) or less. Architectural trim that exceeds 40 feet (12 192 mm) in height above grade plane shall be constructed of approved noncombustible materials and shall be secured to the wall with metal or other approved noncombustible brackets.

TABLE 1406.2.1.2
MINIMUM FIRE SEPARATION FOR COMBUSTIBLE VENEERS

FIRE SEPARATION DISTANCE (feet)	TOLERABLE LEVEL INCIDENT RADIANT HEAT ENERGY(kW/m ²)	FIRE SEPARATION DISTANCE (feet)	TOLERABLE LEVEL INCIDENT RADIANT HEAT ENERGY(kW/m ²)
5	12.5	16	5.9
6	11.8	17	5.5
7	11.0	18	5.2
8	10.3	19	4.9
9	9.6	20	4.6
10	8.9	21	4.4
11	8.3	22	4.1
12	7.7	23	3.9
13	7.2	24	3.7
14	6.7	25	3.5
15	6.3		

For SI: 1 foot = 304.8 mm, 1 Btu/H² · °F = .0057 kW/m² · K.

1406.2.3 Location. Where combustible exterior wall covering is located along the top of exterior walls, such trim shall be completely backed up by the exterior wall and shall not extend over or above the top of exterior walls.

1406.2.4 Fireblocking. Where the combustible exterior wall covering is furred from the wall and forms a solid surface, the distance between the back of the covering and the wall shall not exceed 1.625 inches (41 mm) and the space thereby created shall be fireblocked in accordance with Section 716 so that there will be no open space exceeding 100 square feet (9.3 m²). Where wood furring strips are used,

they shall be of approved wood of natural decay resistance or preservative-treated wood.

Exceptions:

1. Fireblocking of cornices is not required in single-family dwellings.
2. Fireblocking shall not be required where installed on noncombustible framing and the face of the exterior wall finish exposed to the concealed space is covered by one of the following materials:
 - 2.1. Aluminum having a minimum thickness of 0.019 inch (0.5 mm);
 - 2.2. Corrosion-resistant steel having a base metal thickness not less than 0.016 inch (0.4 mm) at any point; or
 - 2.3. Other approved noncombustible materials.

1406.3 Balconies and similar projections. Balconies and similar projections of combustible construction, other than fire-retardant-treated wood, shall afford the fire-resistance rating required by Table 601 for floor construction or shall be of Type IV construction as described in Section 602.4, and the aggregate length shall not exceed 50 percent of the building perimeter on each floor.

Exceptions:

1. On buildings of Types I and II construction, three stories or less in height, fire-retardant-treated wood shall be permitted for balconies, porches, decks, and exterior stairways not used as required exits.
2. Untreated wood is permitted for pickets and rails, or similar guardrail devices that are limited to 42 inches (1067 mm) in height.
3. Balconies and similar appendages on buildings of Types III, IV, and V construction shall be permitted to be of Type V construction, and shall not be required to have a fire-resistance rating where sprinkler protection is extended to these areas.

1406.4 Bay windows and oriel windows. Bay and oriel windows shall conform to the type of construction required for the building to which they are attached.

Exception: Fire-retardant-treated wood shall be permitted on buildings three stories or less of Types I, II, III and IV construction.

SECTION 1407 ALUMINUM COMPOSITE MATERIALS (ACM)

1407.1 General. The provisions of this section shall govern the materials, construction and quality of aluminum composite materials (ACM) for use as exterior wall coverings in addition to other applicable requirements of Chapters 14 and 16.

1407.2 Exterior wall finish. ACM used as exterior wall finish or as elements of balconies and similar appendages and bay and oriel windows to provide cladding or weather-resistance shall comply with Sections 1407.4 through 1407.12.

1407.3 Architectural trim and embellishments. ACM used as architectural trim or embellishments shall comply with Sections 1407.7 through 1407.12.

1407.4 Structural design. ACM systems shall be designed and constructed to resist wind loads as required by Chapter 16 for components and cladding.

1407.5 [Comm 62.1407 (1)] Approval. Results of approved tests or an engineering analysis shall be made available to the code official upon request to verify compliance with the requirements of Chapter 16 for wind loads.

1407.6 Weather resistance. ACM systems shall comply with Section 1403 and shall be designed and constructed to resist wind and rain in accordance with this section and the manufacturer's installation instructions.

1407.7 Durability. ACM systems shall be constructed of approved materials that maintain the performance characteristics required in Section 1407 for the duration of use.

1407.8 [Comm 62.1407 (2)] Fire-resistance rating. Where ACM systems are used on exterior walls required to have a fire-resistance rating in accordance with Section 704, evidence shall be made available to the code official upon request that the required fire-resistance rating is maintained.

1407.9 Types I, II, III and IV construction. Where installed on buildings of Types I, II, III and IV construction, ACM systems shall comply with Sections 1407.9.1 through 1407.9.4, or 1407.10.

1407.9.1 Surface-burning characteristics. ACM shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450 when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84.

1407.9.2 Thermal barriers. ACM shall be separated from the interior of a building by an approved thermal barrier consisting of 0.5-inch (12.7 mm) gypsum wallboard or equivalent thermal barrier material that will limit the average temperature rise of the unexposed surface to not more than 250°F (121°C) after 15 minutes of fire exposure in accordance with the standard time-temperature curve of ASTM E 119. The thermal barrier shall be installed in such a manner that it will remain in place for not less than 15 minutes based on a test conducted in accordance with UL 1715.

1407.9.3 Thermal barrier not required. The thermal barrier specified for ACM in Section 1407.9.2 is not required where:

1. The ACM system is specifically approved based on tests conducted in accordance with UL 1040 or UL 1715. Such testing shall be performed with the ACM in the maximum thickness intended for use. The ACM system shall include seams, joints and other typical details used in the installation and shall be tested in the manner intended for use.
2. The ACM is used as elements of balconies and similar appendages, architectural trim or embellishments.

1407.9.4 [Comm 62.1407 (3)] Full-scale tests. Results of full-scale fire tests, which reflect an end-use configuration and demonstrate that the ACM system in its final form does not propagate flame over the surface or through the core when exposed on the exterior face to a fire source, shall be made available to the code official upon request, for approval. Such testing shall be performed on the ACM system with the ACM in the maximum thickness intended for use.

1407.10 Alternate conditions. ACM and ACM systems shall not be required to comply with Sections 1407.9.1 through 1407.9.4 provided such systems comply with Section 1407.10.1 or 1407.10.2.

1407.10.1 Installations up to 40 feet in height. ACM shall not be installed more than 40 feet (12 190 mm) in height above the grade plane where installed in accordance with Sections 1407.10.1.1 and 1407.10.1.2.

1407.10.1.1 Fire separation distance. Where the fire separation distance is 5 feet (1524 mm) or less, the area of ACM shall not exceed 10 percent of the exterior wall surface. Where the fire separation distance is greater than 5 feet (1524 mm), there shall be no limit on the area of exterior wall surface coverage using ACM.

1407.10.1.2 Surface-burning characteristics. ACM shall have a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84.

1407.10.2 Installations up to 50 feet in height. ACM shall not be installed more than 50 feet (15 240 mm) in height above the grade plane where installed in accordance with Sections 1407.10.2.1 and 1407.10.2.2.

1407.10.2.1 ACM shall have all of the following:

1. A flame spread index of 75 or less and a smoke-developed index of 450 or less when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84.
2. A self-ignition temperature of 650°F (343°C) or greater when tested in accordance with ASTM D 1929.

1407.10.2.2 Limitations. Sections of ACM shall not exceed 300 square feet (27.9 m²) in area and shall be separated by a minimum of 4 feet (1219 mm) vertically.

1407.11 Type V construction. Where installed on buildings of Type V construction, ACM systems shall comply with Section 1407.11.1.

1407.11.1 Surface-burning characteristics. ACM shall have a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84.

1407.12 Labeling. ACM shall be labeled in accordance with Section 1703.5.

CHAPTER 15

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1501 GENERAL

1501.1 Scope. The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies, and rooftop structures.

SECTION 1502 DEFINITIONS

1502.1 General. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

BUILT-UP ROOF COVERING. Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating or similar surfacing material.

CORROSION RESISTANT. Any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10-percent chromium or with not less than 0.20-percent copper.

INTERLAYMENT. A layer of felt or nonbituminous saturated felt not less than 18 inches (457 mm) wide, shingled between each course of a wood-shake roof covering.

MECHANICAL EQUIPMENT SCREEN. A partially enclosed rooftop structure used to aesthetically conceal HVAC electrical or mechanical equipment from view.

METAL ROOF PANEL. An interlocking metal sheet having a minimum installed weather exposure of 3 square feet per (279 mm²) sheet.

METAL ROOF SHINGLE. An interlocking metal sheet having an installed weather exposure less than 3 square feet (279 mm²) per sheet.

MODIFIED BITUMEN ROOF COVERING. One or more layers of polymer-modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an approved ballast layer.

PENTHOUSE. An enclosed, unoccupied structure above the roof of a building, other than a tank, tower, spire, dome cupola or bulkhead, occupying not more than one-third of the roof area.

POSITIVE ROOF DRAINAGE. The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly in-

cludes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder, and roof covering.

ROOF COVERING. The covering applied to the roof deck for weather resistance, fire classification or appearance.

ROOF COVERING SYSTEM. See "Roof Assembly."

ROOF DECK. The flat or sloped surface not including its supporting members or vertical supports.

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate, and installing a new roof covering.

ROOF VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from attics, cathedral ceilings or other enclosed spaces over which a roof assembly is installed.

ROOFTOP STRUCTURE. An enclosed structure on or above the roof of any part of a building.

SCUPPER. An opening in a wall or parapet that allows water to drain from a roof.

SINGLE-PLY MEMBRANE. A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.

UNDERLAYMENT. One or more layers of felt, sheathing paper, nonbituminous saturated felt, or other approved material over which a steep-slope roof covering is applied.

SECTION 1503 WEATHER PROTECTION

1503.1 General. Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof coverings shall be designed, installed and maintained in accordance with this code and the approved manufacturer's installation instructions such that the roof covering shall serve to protect the building or structure.

1503.2 Flashing. Flashing shall be installed in such a manner as to prevent moisture entering the wall through the joints in the coping, through moisture-permeable material, at intersections with the roof plane or at parapet wall penetrations.

1503.2.1 Locations. Flashing shall be installed at wall and roof intersections; at gutters; wherever there is a change in roof slope or direction; and around roof openings. Where flashing is of metal, the metal shall be corrosion resistant with a thickness of not less than 0.019 inch (No. 26 galvanized sheet).

1503.3 Coping. Parapet walls shall be properly coped with noncombustible, weatherproof materials of a width no less than the thickness of the parapet wall.

[P] 1503.4 Roof drainage. Design and installation of roof drainage systems shall comply with the *International Plumbing Code*.

1503.4.1 Gutters. Gutters and leaders placed on the outside of buildings, other than Group R-3 as applicable in Section 101.2, private garages, and buildings of Type V construction, shall be of noncombustible material or a minimum of Schedule 40 plastic pipe.

1503.5 Roof ventilation. Intake and exhaust vents shall be provided in accordance with Section 1202.2 and the manufacturer's installation instructions.

SECTION 1504 PERFORMANCE REQUIREMENTS

1504.1 Wind resistance of roofs. Roof decks and roof coverings shall be designed for wind loads in accordance with Chapter 16 and Sections 1504.2, 1504.3 and 1504.4.

Exception: Asphalt shingles shall be connected to the roof deck in accordance with Section 1507.2.

1504.2 Wind resistance of clay and concrete tile. Clay and concrete tile roof coverings shall be connected to the roof deck in accordance with Chapter 16.

1504.3 Wind resistance of nonballasted roofs. Roof coverings installed on roofs in accordance with Section 1507 that are mechanically attached or adhered to the roof deck shall be designed to resist the design wind load pressures for cladding in Chapter 16.

1504.3.1 Other roof systems. Roof systems with built-up, modified bitumen, fully adhered or mechanically attached single-ply through fastened metal panel roof systems, and other types of membrane roof coverings shall also be tested in accordance with FM 4450, FM 4470, UL 580 or UL 1897.

1504.3.2 Metal panel roof systems. Metal panel roof systems through fastened or standing seam shall be tested in accordance with UL 580 or ASTM E 1592.

1504.4 Ballasted low-slope roof systems. Ballasted low-slope (roof slope < 2:12) single-ply roof system coverings installed in accordance with Section 1507 shall be designed in accordance with ANSI/RMA/SPRI RP-4.

1504.5 Physical properties. Roof coverings installed on low slope roofs (roof slope < 2:12) in accordance with Section 1507 shall demonstrate physical integrity over the working life of the roof based upon 2,000 hours of exposure to accelerated weathering tests conducted in accordance with ASTM G 23, ASTM G 26 or ASTM G 53. Those roof coverings that are subject to cyclical flexural response due to wind loads shall not demonstrate any significant loss of tensile strength for unreinforced membranes or breaking strength for reinforced membranes when tested as herein required.

1504.6 Impact resistance. Roof coverings installed on low-slope roofs (roof slope < 2:12) in accordance with Section 1507 shall resist impact damage based on the results of tests con-

ducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37-GP-52M or FM 4470.

SECTION 1505 FIRE CLASSIFICATION

1505.1 General. Roof assemblies shall be divided into the classes defined below. Class A, B and C roof assemblies and roof coverings required to be listed by this section shall be tested in accordance with ASTM E 108 or UL 790. In addition, fire-retardant-treated wood roof coverings shall be tested in accordance with ASTM D 2898. The minimum roof coverings installed on buildings shall comply with Table 1505.1 based on the type of construction of the building.

TABLE 1505.1^{a,b}
MINIMUM ROOF COVERING CLASSIFICATION
FOR TYPES OF CONSTRUCTION

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C ^c	B	C ^c	B	B	C ^c

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- a. Deleted.
- b. Nonclassified roof coverings shall be permitted on buildings of Group R-3 as applicable in Section 101.2 and U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.
- c. Buildings that are not more than two stories in height and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 1505.6.

1505.2 Class A roof assemblies. Class A roof assemblies are those that are effective against severe fire test exposure. Class A roof assemblies and roof coverings shall be listed and identified as Class A by an approved testing agency. Class A roof assemblies shall be permitted for use in buildings or structures of all types of construction.

Exception: Class A roof assemblies include those with coverings of brick, masonry, slate, clay or concrete roof tile, exposed concrete roof deck, ferrous or copper shingles or sheets.

1505.3 Class B roof assemblies. Class B roof assemblies are those that are effective against moderate fire-test exposure. Class B roof assemblies and roof coverings shall be listed and identified as Class B by an approved testing agency.

Exception: Class B roof assemblies include those with coverings of metal sheets and shingles.

1505.4 Class C roof assemblies. Class C roof assemblies are those that are effective against light fire-test exposure. Class C roof assemblies and roof coverings shall be listed and identified as Class C by an approved testing agency.

1505.5 Nonclassified roofing. Nonclassified roofing is approved material that is not listed as a Class A, Class B or Class C roof covering.

1505.6 Wood shingles and shakes. When testing wood shingles and shakes in accordance with ASTM E 108 and ASTM D 2898 (including Method A and B of the rain test), the fire tests shall include the intermittent flame test, spread of flame test,

burning brand test and flying brand test. Additionally, at the conclusion of the rain test, test panels shall be subjected to the intermittent flame test, burning brand test and flying brand test. Shakes and shingles shall also be subjected to the weathering test as specified in UL 790.

1505.6.1 Fire-retardant-treated shingles and shakes.

Fire-retardant-treated wood shakes and shingles shall be treated by impregnation with chemicals by the full-cell vacuum-pressure process, in accordance with AWWA C1. Each bundle shall be marked to identify the manufactured unit and the manufacturer, and shall also be labeled to identify the classification of the material in accordance with the testing required in Section 1505.6 (Class B or C), the treating company and the quality control agency.

1505.7 Special purpose roofs. Special purpose wood shingle or wood shake roofing shall conform with the grading and application requirements of Section 1507.8 or 1507.9. In addition, an underlayment of 0.625 inch (15.9 mm) Type X water-resistant gypsum backing board or gypsum sheathing shall be placed under minimum nominal 0.5-inch-thick (12.7 mm) wood structural panel solid sheathing or 1-inch (25 mm) nominal spaced sheathing.

SECTION 1506 MATERIALS

1506.1 Scope. The requirements set forth in this section shall apply to the application of roof covering materials specified herein. Roof coverings shall be applied in accordance with this chapter and the manufacturer's installation instructions. Installation of roof coverings shall comply with the applicable provisions of Section 1507.

1506.2 Compatibility of materials. Roofs and roof coverings shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

1506.3 [Comm 62.1506] Material specifications and physical characteristics. Roof covering materials shall conform to the applicable standards listed in IBC Chapter 15.

1506.4 Product identification. Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels required in accordance with Section 1505. Bulk shipments of materials shall be accompanied with the same information issued in the form of a certificate or on a bill of lading by the manufacturer.

SECTION 1507 REQUIREMENTS FOR ROOF COVERINGS

1507.1 Scope. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions.

1507.2 Asphalt shingles. The installation of asphalt shingles shall comply with the provisions of this section and Table 1507.2.

1507.2.1 Deck requirements. Asphalt shingles shall be fastened to solidly sheathed decks.

1507.2.2 Slope. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (17-percent slope) or greater. For roof slopes from two units vertical in 12 units horizontal (17-percent slope) up to four units vertical in 12 units horizontal (33-percent slope), double underlayment application is required in accordance with Section 1507.2.8.

1507.2.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 226, Type I, or ASTM D 4869, Type I.

1507.2.4 Self-adhering polymer modified bitumen sheet. Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

1507.2.5 Asphalt shingles. Asphalt shingles shall have self-seal strips or be interlocking, and comply with ASTM D 225 or ASTM D 3462.

1507.2.6 Fasteners. Fasteners for asphalt shingles shall be galvanized, stainless steel, aluminum, or copper roofing nails, minimum 12 gage [0.105 inch (2.67 mm)] shank with a minimum 0.375 inch-diameter (9.5 mm) head, of a length to penetrate through the roofing materials and a minimum of 0.75 inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than 0.75 inch (19.1 mm) thick, the nails shall penetrate through the sheathing. Fasteners shall comply with ASTM F 1667.

1507.2.7 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer. For normal application, asphalt shingles shall be secured to the roof with not less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope exceeds 20 units vertical in 12 units horizontal (166-percent slope), special methods of fastening are required.

Exception: Asphalt strip shingles shall have a minimum of six fasteners per shingle where the roof is in one of the following categories:

1. The basic wind speed per Figure 1609 is 110 mph (177 km/h) or greater and the eave is 20 feet (6096 mm) or higher above grade.
2. The basic wind speed per Figure 1609 is 110 mph (177 km/h) or greater and the Importance Factor in Table 1609.5 is 1.15.
3. The basic wind speed per Figure 1609 is 120 mph (193 km/h) or greater.

1507.2.8 Underlayment application. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), up to four units vertical in 12 units horizontal (33-percent slope), underlayment shall be two layers applied in the following manner. Apply a minimum 19-inch-wide (483 mm) strip of underlayment felt parallel with and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment overlapping successive sheets 19 inches (483 mm) and fastened sufficiently to hold in place. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion.

**TABLE 1507.2
ASPHALT SHINGLE APPLICATION**

COMPONENT	INSTALLATION REQUIREMENT
1. Roof slope	Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (2:12) or greater. For roof slopes from two units vertical in 12 units horizontal (2:12) up to four units vertical in 12 units horizontal (4:12), double underlayment application is required in accordance with Section 1507.2.8.
2. Deck requirement	Asphalt shingles shall be fastened to solidly sheathed roofs.
3. Underlayment	Underlayment shall conform with ASTM D 226, Type 1, or ASTM D 4869, Type 1.
For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12)	Underlayment shall be two layers applied in the following manner. Apply a minimum 19-inch strip or underlayment felt parallel with the starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 35-inch wide sheets of underlayment overlapping successive sheets 19 inches and fastened sufficiently to hold in place.
For roof slopes from four units vertical in 12 units horizontal (4:12) or greater	Underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches, fastened only as necessary to hold in place.
In areas where the average daily temperature in January is 25°F or less or where there is a possibility of ice forming along the eaves causing a backup of water	An ice shield that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the eave's edge to a point at least 24 inches inside the exterior wall line of the building.
4. Application Attachment	Asphalt shingles shall have the type and minimum number of fasteners required by the manufacturer. For normal application, asphalt shingles shall be secured to the roof with not less than four fasteners per strip shingle to two fasteners per individual shingle. Where the roof slope exceeds 20 units vertical in 12 units horizontal (20:12), special methods of fastening are required ^a .
Fasteners	Galvanized, stainless steel, aluminum, or copper roofing nails, minimum 12-gage (0.015 inch) shank with a minimum 3/8-inch diameter head. Fasteners shall be long enough to penetrate into the sheathing 3/4-inch or through the thickness of the sheathing.
Flashings	Per Section 1507.2.9

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, °C = [(°F) - 32]/1.8, 1 mile per hour = 1.609 km/h.

a. Exception: Asphalt strip shingles shall have a minimum of six fasteners per shingle where the roof is one of the following categories.

1. The basic fastest-mile wind speed per Figure 1609 is 110 mph greater and the eave is 20 feet or higher above grade.
2. The basic fastest-mile wind speed per Figure 1609 is 110 mph greater and the Importance Factor in Table 1609.5 is 1.15.
3. The basic fastest-mile wind speed per Figure 1609 is 120 mph greater.

ion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened only as necessary to hold in place.

1507.2.8.1 High wind attachment. Underlayment applied in areas subject to high winds (greater than 110 mph per Figure 1609) shall be applied with corrosion-resistant fasteners in accordance with the manufacturer's instructions. Fasteners are to be applied along the overlap at a maximum spacing of 36 inches (914 mm) on center.

1507.2.8.2 Ice dam protection. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the eave's edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

1507.2.9 Flashings. Flashing for asphalt shingles shall comply with this section. Flashing shall be applied in accordance with this section and the asphalt shingle manufacturer's printed instructions.

dance with this section and the asphalt shingle manufacturer's printed instructions.

1507.2.9.1 Base and cap flashing. Base and cap flashing shall be installed in accordance with the manufacturer's installation instructions. Base flashing shall be of either corrosion-resistant metal of minimum nominal 0.019-inch (0.483 mm) thickness or mineral-surfaced roll roofing weighing a minimum of 77 pounds per 100 square feet (3.76 kg/m²). Cap flashing shall be corrosion-resistant metal of minimum nominal 0.019-inch (0.483 mm) thickness.

1507.2.9.2 Valleys. Valley linings shall be installed in accordance with the manufacturer's installation instructions before applying shingles. Valley linings of the following types shall be permitted:

1. For open valleys (valley lining exposed) lined with metal, the valley lining shall be at least 16 inches (406 mm) wide and of any of the corrosion-resistant metals in Table 1507.2.9.2.

- For open valleys, valley lining of two plies of mineral surface roll roofing shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
- For closed valleys (valley covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D 224 and at least 36 inches (914 mm) wide or types (1) and (2) above shall be permitted. Specialty underlayment shall comply with ASTM D 1970.

**TABLE 1507.2.9.2
VALLEY LINING MATERIAL**

MATERIAL	MINIMUM THICKNESS	GAGE	WEIGHT
Copper	—	—	16 oz
Aluminum	0.024 in.	—	—
Stainless steel	—	28	—
Galvanized steel	0.0179 in.	26 (zinc-coated G90)	—
Zinc alloy	0.027 in.	—	—
Lead	—	—	2.5 pounds
Painted terne	—	—	20 pounds

For SI: 1 inch = 25.4 mm, 1 pound = 0.454 kg, 1 ounce = 28.35 g.

1507.2.9.3 Drip edge. Provide drip edge at eaves and gables of shingle roofs. Overlap to be a minimum of 2 inches (51 mm). Eave drip edges shall extend 0.25 inch (6.4 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. A cricket or saddle shall be installed on the ridge side of any chimney greater than 30 inches wide. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

1507.3 Clay and concrete tile. The installation of clay and concrete tile shall comply with the provisions of this section.

1507.3.1 Deck requirements. Concrete and clay tile shall be installed only over solid sheathing or spaced structural sheathing boards.

1507.3.2 Deck slope. Clay and concrete roof tile shall be installed on roof slopes of 2 1/2 units vertical in 12 units horizontal (21-percent slope) or greater. For roof slopes from 2 1/2 units vertical in 12 units horizontal (21-percent slope) to four units vertical in 12 units horizontal (33-percent slope), double underlayment application is required in accordance with Section 1507.3.3.

1507.3.3 Underlayment. Unless otherwise noted, required underlayment shall conform to: ASTM D 226, Type II; ASTM D 2626 or ASTM D 249 Type I mineral-surfaced roll roofing.

1507.3.3.1 Low slope roofs. For roof slopes from 2 1/2 units vertical in 12 units horizontal (21-percent slope), up to four units vertical in 12 units horizontal (33-percent

slope), underlayment shall be a minimum of two layers underlayment applied as follows:

- Starting at the eave, a 19-inch (483 mm) strip of underlayment shall be applied parallel with the eave and fastened sufficiently in place.
- Starting at the eave, 36-inch wide (914 mm) strips of underlayment felt shall be applied overlapping successive sheets 19 inches (483 mm) and fastened sufficiently in place.

1507.3.3.2 High slope roofs. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater, underlayment shall be a minimum of one layer of underlayment felt applied shingle fashion, parallel to, and starting from the eaves and lapped 2 inches (51 mm), fastened only as necessary to hold in place.

1507.3.4 Clay tile. Clay roof tile shall comply with ASTM C 1167.

1507.3.5 Concrete tile. Concrete roof tiles shall be in accordance with the physical test requirements as follows:

- The transverse strength of tiles shall be determined according to Section 6.3 of ASTM C 1167 and in accordance with Table 1507.3.5.
- The absorption of concrete roof tiles shall be according to Section 8 of ASTM C 140. Roof tiles shall absorb not more than 15 percent of the dry weight of the tile during a 24-hour immersion test.
- Roof tiles shall be tested for freeze/thaw resistance according to Section 8 of ASTM C67. Roof tiles shall show no breakage and not have more than 1 percent loss in dry weight of any individual concrete roof tile.

**TABLE 1507.3.5
TRANSVERSE BREAKING STRENGTH
OF CONCRETE ROOF TILE (lbs.)**

TILE PROFILE	DRY	
	Average of five ties	Individual tile
High profile	400	350
Medium profile	300	250
Flat profile	300	250

For SI: 1 pound = 4.45 N.

1507.3.6 Fasteners. Tile fasteners shall be corrosion resistant and not less than 11 gage, 5/16 inch (8.0 mm) head, and of sufficient length to penetrate the deck a minimum of 0.75 inch (19.1 mm) or through the thickness of the deck, whichever is less. Attaching wire for clay or concrete tile shall not be smaller than 0.083 inch (2.1 mm). Perimeter fastening areas include three tile courses but not less than 36 inches (914 mm) from either side of hips or ridges and edges of eaves and gable rakes.

1507.3.7 Attachment. Clay and concrete roof tiles shall be fastened in accordance with Table 1507.3.7.

TABLE 1507.3.7
CLAY AND CONCRETE TILE ATTACHMENT^{a, b, c}

GENERAL — CLAY OR CONCRETE ROOF TILE				
Maximum basic wind speed (mph)	Mean roof height (feet)	Roof slope up to < 3:12	Roof slope 3:12 and over	
85	0-60	One fastener per tile. Flat tile without vertical laps, two fasteners per tile.	Two fasteners per tile. Only one fastener on slopes of 7:12 and less for tiles with installed weight exceeding 7.5 lbs/sq ft having a width no greater than 16 inches.	
100	0-40			
100	> 40-60	The head of all tiles shall be nailed. The nose of all eave tiles shall be fastened with approved clips. All rake tiles shall be nailed with two nails. The nose of all ridge, hip and rake tiles shall be set in a bead of roofer's mastic.		
110	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
120	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
130	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
All	> 60	The fastening system shall resist the wind forces in Section 1609.7.2.		
INTERLOCKING CLAY OR CONCRETE ROOF TILE WITH PROJECTING ANCHOR LUGS ^{d, e} (Installations on spaced/solid sheathing with battens or spaced sheathing)				
Maximum basic wind speed (mph)	Mean roof height (feet)	Roof slope up to < 5:12	Roof slope 5:12 < 12:12	Roof slope 12:12 and over
85	0-60			
100	0-40	Fasteners are not required. Tiles with installed weight less than 9 lbs/sq ft require a minimum of one fastener per tile.	One fastener per tile every other row. All perimeter tiles require one fastener. Tiles with installed weight less than 9 lbs/sq ft require a minimum of one fastener per tile.	One fastener required for every tile. Tiles with installed weight less than 9 lbs/sq ft require a minimum of one fastener per tile.
100	> 40-60	The head of all tiles shall be nailed. The nose of all eave tiles shall be fastened with approved clips. All rake tiles shall be nailed with two nails The nose of all ridge, hip and rake tiles shall be set in a bead of roofers's mastic.		
110	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
120	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
130	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
All	> 60	The fastening system shall resist the wind forces in Section 1609.7.2.		
INTERLOCKING CLAY OR CONCRETE ROOF TILE WITH PROJECTING ANCHOR LUGS (Installations on solid sheathing without battens)				
Maximum basic wind speed (mph)	Mean roof height (feet)	All roof slopes		
85	0-60	One fastener per tile		
100	0-40	One fastener per tile		
100	> 40-60	The head of all tiles shall be nailed. The nose of all eave tiles shall be fastened with approved clips. All rake tiles shall be nailed with two nails The nose of all ridge, hip and rake tiles shall be set in a bead of roofers's mastic.		
110	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
120	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
130	0-60	The fastening system shall resist the wind forces in Section 1609.7.2.		
All	> 60	The fastening system shall resist the wind forces in Section 1609.7.2.		

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.609 km/h, 1 pound per square foot = 0.0478 kN/m².

- Minimum fastener size. Corrosion resistant nails not less than No. 11 gage with $\frac{5}{16}$ -inch head. Fasteners shall be long enough to penetrate into the sheathing 0.75-inch or through the thickness of the sheathing, whichever is less. Attaching wire for clay and concrete tile shall not be smaller than 0.083-inch.
- Snow areas. A minimum of two fasteners per tile are required or battens and one fastener.
- Roof slopes greater than 24:12. The nose of all tiles shall be securely fastened.
- Horizontal battens. Battens shall be not less than 1-inch-by-2-inch nominal. Provisions shall be made for drainage by a minimum of $\frac{1}{8}$ -inch riser at each nail or by 4-foot-long battens with at least a 0.5-inch separation between battens. Horizontal battens are required for slopes over 7:12.
- Perimeter fastening areas include three tile courses but not less than 36 inches from either side of hips or ridges and edges of eaves and gable rakes.

1507.3.8 Application. Tile shall be applied according to the manufacture's installation instructions, based on the following:

1. Climatic conditions.
2. Roof slope.
3. Underlayment system.
4. Type of tile being installed.

1507.3.9 Flashing. At the juncture of the roof vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacture's installation instructions, and where of metal, shall not be less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal. The valley flashing shall extend at least 11 inches from the centerline each way and have a splash diverter rib not less than 1 inch (25.4 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). For roof slopes of three units vertical in 12 units horizontal (25-percent slope) and over, the valley flashing shall have a 36-inch-wide (914 mm) underlayment of one layer of Type I underlayment running the full length of the valley, in addition to other required underlayment. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for slopes under seven units vertical in 12 units horizontal (58-percent slope).

1507.4 Metal roof panels. The installation of metal roof panels shall comply with the provisions of this section.

1507.4.1 Deck requirements. Metal roof panel roof coverings shall be applied to a solid or closely fitted deck, except where the roof covering is specifically designed to be applied to spaced sheathing.

1507.4.2 Deck slope. The minimum slope for lapped, nonsoldered seam metal roofs without applied lap sealant shall be three units vertical in 12 units horizontal (25-percent slope). The minimum slope for lapped, nonsoldered seam metal roofs with applied lap sealant shall be one-half vertical unit in 12 units horizontal (4-percent slope). The minimum slope for standing seam of roof systems shall be one-quarter unit vertical in 12 units horizontal (2-percent slope).

1507.4.3 Material standards. Metal-sheet roof covering systems that incorporate supporting structural members shall be designed in accordance with Chapter 22. Metal-sheet roof coverings installed over structural decking shall comply with Table 1507.4.3.

1507.4.4 Attachment. Metal roofing fastened directly to steel framing shall be attached by approved manufacturers' fasteners. In the absence of manufacturer's recommendations, all of the following fasteners shall be used:

1. Galvanized fasteners shall be used for galvanized roofs.
2. Hard copper or copper alloy shall be used for copper roofs.
3. Stainless-steel fasteners are acceptable for all types of metal roofs.

**TABLE 1507.4.3
METAL ROOF COVERINGS**

ROOF COVERING TYPE	STANDARD APPLICATION RATE/THICKNESS
Galvanized steel	ASTM A 653 G-90 zinc-coated, 0.013-inch-thick minimum
Prepainted steel	ASTM A 755
Aluminum-zinc alloy coated steel	ASTM A 792 AZ 50
Lead-coated copper	ASTM B 101
Copper	16 ounce/square foot for metal sheet roof covering systems 12 ounce/square feet for preformed metal shingle systems.
Hard lead	2 pounds/square foot
Soft lead	3 pounds/square foot
Aluminum	0.024-inch minimum thickness
Terne (tin) and terne-coated stainless	Terne coating of 40 pounds per double base box, field painted where applicable in accordance with manufacturer's installation instructions.

For SI: 1 inch = 25.4 mm, 1 pound = 0.454 kg,
1 ounce per square foot = 0.0026 kg/m²,
1 pound per square foot = 4.882 kg/m².

1507.5 Metal roof shingles. The installation of metal roof shingles shall comply with the provisions of this section.

1507.5.1 Deck requirements. Metal roof shingles shall be applied to a solid or closely fitted deck, except where the roof covering is specifically designed to be applied to spaced sheathing.

1507.5.2 Deck slope. Metal roof shingles shall not be installed on roof slopes below three units vertical in 12 units horizontal (25-percent slope).

1507.5.3 Underlayment. Underlayment shall conform to ASTM D 226, Type I. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the eave's edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

1507.5.4 Material standards. Metal roof shingle roof coverings shall comply with Table 1507.4.3.

1507.5.5 Attachment. Metal roof shingles shall be secured to the roof in accordance with the approved manufacturer's installation instructions.

1507.5.6 Flashing. Roof valley flashing shall be of corrosion-resistant metal of the same material as the roof covering or shall comply with the standards in Table 1507.4.3. The valley flashing shall extend at least 8 inches (203 mm) from the centerline each way and shall have a splash diverter rib not less than 0.75 inch (19.1 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). In areas

where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, the metal valley flashing shall have a 36-inch-wide (914 mm) underlayment directly under it consisting of one layer of underlayment running the full length of the valley, in addition to underlayment required for metal roof shingles. The metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under seven units vertical in 12 units horizontal (58-percent slope) or of self-adhering polymer modified bitumen sheet.

1507.6 Mineral-surfaced roll roofing. The installation of mineral-surfaced roll roofing shall comply with this section.

1507.6.1 Deck requirements. Mineral-surfaced roll roofing shall be fastened to solidly sheathed roofs.

1507.6.2 Deck slope. Mineral-surfaced roll roofing shall not be applied on roof slopes below one unit vertical in 12 units horizontal (8-percent slope).

1507.6.3 Underlayment. Underlayment shall conform to ASTM D 226, Type I. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet, shall extend from the eave's edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

1507.6.4 Material standards. Mineral-surfaced roll roofing shall conform to ASTM D 224, ASTM D 249, ASTM D 371, or ASTM D 3909.

1507.7 Slate shingles. The installation of slate shingles shall comply with the provisions of this section.

1507.7.1 Deck requirements. Slate shingles shall be fastened to solidly sheathed roofs.

1507.7.2 Deck slope. Slate shingles shall only be used on slopes of four units vertical in 12 units horizontal (4:12) or greater.

1507.7.3 Underlayment. Underlayment shall comply with ASTM D 226, Type II. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet, shall extend from the eave's edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

1507.7.4 Material standards. Slate shingles shall comply with ASTM C 406.

1507.7.5 Application. Minimum headlap for slate shingles shall be in accordance with Table 1507.7.5. Slate shingles shall be secured to the roof with two fasteners per slate.

**TABLE 1507.7.5
SLATE SHINGLE HEADLAP**

SLOPE	HEADLAP (inches)
4:12 < slope < 8:12	4
8:12 < slope < 20:12	3
slope ≥ 20:12	2

For SI: 1 inch = 25.4 mm.

1507.7.6 Flashing. Flashing and counterflashing shall be made with sheet metal. Valley flashing shall be a minimum of 15 inches (381 mm) wide. Valley and flashing metal shall be a minimum uncoated thickness of 0.0179-inch (0.455 mm) zinc-coated G90. Chimneys, stucco or brick walls shall have a minimum of two plies of felt for a cap flashing consisting of a 4-inch-wide (102 mm) strip of felt set in plastic cement and extending 1 inch (25.4 mm) above the first felt and a top coating of plastic cement. The felt shall extend over the base flashing 2 inches (51 mm).

1507.8 Wood shingles. The installation of wood shingles shall comply with the provisions of this section and Table 1507.8.

1507.8.1 Deck requirements. Wood shingles shall be installed on solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners.

1507.8.1.1 Solid sheathing required. Solid sheathing is required in areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water.

1507.8.2 Deck slope. Wood shingles shall be installed on slopes of three units vertical in 12 units horizontal (25-percent slope) or greater.

1507.8.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet shall extend from the eave's edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

1507.8.4 Material standards. Wood shingles shall be of naturally durable wood and comply with the requirements of Table 1507.8.4.

**TABLE 1507.8.4
WOOD SHINGLE MATERIAL REQUIREMENTS**

MATERIAL	APPLICABLE MINIMUM GRADES	GRADING RULES
Wood shingles of naturally durable wood	1, 2 or 3	CSSB

CSSB = Cedar Shake and Shingle Bureau

**TABLE 1507.8
WOOD SHINGLE AND SHAKE INSTALLATION**

ROOF ITEM	WOOD SHINGLES	WOOD SHAKES
1. Roof Slope	Wood shingles shall be installed on slopes of three units vertical in 12 units horizontal (3:12) or greater.	Wood shakes shall be installed on slopes of four units vertical in 12 units horizontal (4:12) or greater.
2. Deck requirement	—	—
Temperate Climate	Shingles shall be applied to roofs with solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be 4 less than 1" x 4" nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners.	Shakes shall be applied to roofs with solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1" x 4" nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners. When 1" x 4" spaced sheathing is installed at 10 inches, boards must be installed between the sheathing boards.
In areas where the average daily temperature in January is 25°F or less or where there is a possibility of ice forming along the eaves causing a backup of water.	Solid sheathing required.	Solid sheathing is required.
3. Interlayment	No requirements.	Interlayment shall comply with ASTM D 226 Type 1.
4. Underlayment	Underlayment shall comply with ASTM D 226, Type 1.	Underlayment shall comply with ASTM D 226, Type 1.
Temperature climate		
In areas where the average daily temperature in January is 25°F or less or where there is a possibility of ice forming along the eaves causing a backup of water.	An ice shield that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet shall extend from the eave's edge to a point at least 24 inches inside the exterior wall line of the building.	An ice shield that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet shall extend from the eave's edge to a point at least 24 inches inside the exterior wall line of the building.
5. Application	Fasteners for wood shingles shall be corrosion resistant with a minimum penetration of 0.75 inch into the sheathing. For sheathing less than 0.5" thick, the fasteners shall extend through the sheathing.	Fasteners for wood shakes shall be corrosion resistant with a minimum penetration of 0.75 inch into the sheathing. For sheathing less than 0.5" thick, the fasteners shall extend through the sheathing.
Attachment		
No. of fasteners	Two per shingle	Two per shake
Exposure	Weather exposures shall not exceed those set forth in Table 1507.8.6	Weather exposures shall not exceed those set forth in Table 1507.9.7
Method	Shingles shall be laid with a side lap of not less than 1.5 inches between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing between shingles shall be 0.25 to 0.375 inch.	Shakes shall be laid with a side lap of not less than 1.5 inches between joints in adjacent courses. Spacing between shakes shall not be less than 0.375 inch or more than 0.625 inch for shakes and tapersawn shakes of naturally durable wood and shall be 0.25 to 0.375 inch for preservative tapersawn shakes.
Flashing	Per Section 1507.8.7	Per Section 1507.9.8

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

1507.8.5 Attachment. Fasteners for wood shingles shall be corrosion resistant with a minimum penetration of 0.75 inch (19.1 mm) into the sheathing. For sheathing less than 0.5 inch (12.7 mm) in thickness, the fasteners shall extend through the sheathing. Each shingle shall be attached with a minimum of two fasteners.

1507.8.6 Application. Wood shingles shall be laid with a side lap not less than 1.5 inches (38 mm) between joints in adjacent courses, and not be in direct alignment in alternate courses. Spacing between shingles shall be 0.25 to 0.375 inches (6.4 to 9.5 mm). Weather exposure for wood shingles shall not exceed that set in Table 1507.8.6.

**TABLE 1507.8.6
WOOD SHINGLE WEATHER EXPOSURE AND ROOF SLOPE**

ROOFING MATERIAL	LENGTH (inches)	GRADE	EXPOSURE (inches)	
			3:12 pitch to < 4:12	4:12 pitch or steeper
Shingles of naturally durable wood	16	No. 1	3.75	5
		No. 2	3.5	4
		No. 3	3	3.5
	18	No. 1	4.25	5.5
		No. 2	4	4.5
		No. 3	3.5	4
	24	No. 1	5.75	7.5
		No. 2	5.5	6.5
		No. 3	5	5.5

For SI: 1 inch = 25.4 mm.

1507.8.7 Flashing. At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacturer's installation instructions, and where of metal, shall not be less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal. The valley flashing shall extend at least 11 inches (279 mm) from the centerline each way and have a splash diverter rib not less than 1 inch (25.4 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). For roof slopes of three units vertical in 12 units horizontal (25-percent slope) and over, the valley flashing shall have a 36-inch-wide (914 mm) underlayment of one layer of Type I underlayment running the full length of the valley, in addition to other required underlayment. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for slopes under seven units vertical in 12 units horizontal (58-percent slope).

1507.9 Wood shakes. The installation of wood shakes shall comply with the provisions of this section and Table 1507.8.

1507.9.1 Deck requirements. Wood shakes shall only be used on solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1 inch by 4 inches (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners. Where 1-inch by 4-inch (25 mm by 102 mm) spaced sheathing is installed at 10 inches (254 mm) on center, additional 1-inch by 4-inch (25

mm by 102 mm) boards shall be installed between the sheathing boards.

1507.9.1.1 Solid sheathing required. Solid sheathing is required in areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water.

1507.9.2 Deck slope. Wood shakes shall only be used on slopes of four units vertical in 12 units horizontal (33-percent slope) or greater.

1507.9.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, an ice barrier that consists of at least two layers of underlayment cemented together or a self-adhering polymer-modified bitumen sheet shall extend from the edge of the eave to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

1507.9.4 Interlayment. Interlayment shall comply with ASTM D 226, Type I.

1507.9.5 Material standards. Wood shakes shall comply with the requirements of Table 1507.9.5.

**TABLE 1507.9.5
WOOD SHAKE MATERIAL REQUIREMENTS**

MATERIAL	MINIMUM GRADES	APPLICABLE GRADING RULES
Wood shakes of naturally durable wood	1	CSSB
Taper sawn shakes of naturally durable wood	1 or 2	CSSB
Preservative-treated shakes and shingles of naturally durable wood	1	CSSB
Fire-retardant-treated shakes and shingles of naturally durable wood	1	CSSB
Preservative-treated tapered shakes of Southern Yellow Pine treated in accordance with AWP Standard C2	1 or 2	TFS

CSSB = Cedar Shake and Shingle Bureau.

TFS = Forest Products Laboratory of the Texas Forest Services.

1507.9.6 Attachment. Fasteners for wood shakes shall be corrosion resistant with a minimum penetration of 0.75 inch (19.1 mm) into the sheathing. For sheathing less than 0.5 inch (12.7 mm) in thickness, the fasteners shall extend through the sheathing. Each shake shall be attached with a minimum of two fasteners.

1507.9.7 Application. Wood shakes shall be laid with a side lap not less than 1.5 inches (38 mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 0.375 to 0.625 inches (9.5 to 15.9 mm) for shakes and taper sawn shakes of naturally durable wood and shall be 0.25 to 0.375 inch (6.4 to 9.5 mm) for preservative taper sawn shakes. Weather exposure for wood shakes shall not exceed those set in Table 1507.9.7.

**TABLE 1507.9.7
WOOD SHAKE WEATHER EXPOSURE
AND ROOF SLOPE**

ROOFING MATERIAL	LENGTH (inches)	GRADE	EXPOSURE (inches) 4:12 PITCH OR STEEPER
Shakes of naturally durable wood	18	No. 1	7.5
	24	No. 1	10 ^a
Preservative-treated tapersawn shakes of Southern Yellow Pine	18	No. 1	7.5
	24	No. 1	10
	18	No. 2	5.5
	24	No. 2	7.5
Tapersawn shakes of naturally durable wood	18	No. 1	7.5
	24	No. 1	10
	18	No. 2	5.5
	24	No. 2	7.5

For SI: 1 inch = 25.4 mm.

a. For 24-inch by 0.375-inch handsplit shakes, the maximum exposure is 7.5 inches.

1507.9.8 Flashing. At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacturer's installation instructions, and where of metal, shall not be less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal. The valley flashing shall extend at least 11 inches from the centerline each way and have a splash diverter rib not less than 1 inch high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches. For roof slopes of (25-percent slope) and over, the valley flashing shall have a 36 inch-wide (914 mm) underlayment of one layer of Type I underlayment running the full length of the valley, in addition to other required underlayment. In areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for slopes under (58-percent slope).

1507.10 Built-up roofs. The installation of built-up roofs shall comply with the provisions of this section.

1507.10.1 Slope. Built-up roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage, except for coal-tar built-up roofs that shall have a design slope of a minimum one-eighth unit vertical in 12 units horizontal (1-percent slope).

1507.10.2 Material standards. Built-up roof covering materials shall comply with the standards in Table 1507.10.2.

1507.11 Modified bitumen roofing. The installation of modified bitumen roofing shall comply with the provisions of this section.

**TABLE 1507.10.2
BUILT-UP ROOFING MATERIAL STANDARDS**

MATERIAL STANDARD	STANDARD
Acrylic coatings used in roofing	ASTM D 6083
Aggregate surfacing	ASTM D 1863
Asphalt adhesive used in roofing	ASTM D 3747
Asphalt cements used in roofing	ASTM D 3019; D 2822; D 4586
Asphalt-coated glass fiber base sheet	ASTM D 4601
Asphalt coatings used in roofing	ASTM D1227; D 2823; D 4479
Asphalt glass felt	ASTM D 2178
Asphalt primer used in roofing	ASTM D 41
Asphalt-saturated and asphalt-coated organic felt base sheet	ASTM D 2626
Asphalt-saturated organic felt (perforated)	ASTM D 226
Asphalt used in roofing	ASTM D 312
Coal-tar cements used in roofing	ASTM D 4022; D 5643
Coal-tar saturated organic felt	ASTM D 227
Coal-tar pitch used in roofing	ASTM D 450; Types I or II
Glass mat, coal tar	ASTM D 4990
Glass mat, venting type	ASTM D 4897
Mineral-surfaced inorganic cap sheet	ASTM D 3909
Thermoplastic fabrics used in roofing	ASTM D 5665, D 5726

1507.11.1 Slope. Modified bitumen membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.11.2 Material standards. Modified bitumen roof coverings shall comply with CGSB 37-GP-56M, ASTM D 6162, ASTM D 6163, and ASTM D 6164.

1507.12 Thermoset single-ply roofing. The installation of thermoset single-ply roofing shall comply with the provisions of this section.

1507.12.1 Slope. Thermoset single-ply membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.12.2 Material standards. Thermoset single-ply roof coverings shall comply with RMA RP-1, RP-2, or RP-3, or ASTM D 4637 or CGSB 37-GP-52M.

1507.13 Thermoplastic single-ply roofing. The installation of thermoplastic single-ply roofing shall comply with the provisions of this section.

1507.13.1 Slope. Thermoplastic single-ply membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope).

1507.13.2 Material standards. Thermoplastic single-ply roof coverings shall comply with ASTM D 4434 or CGSB 37-GP-54M.

1507.14 Sprayed polyurethane foam roofing. The installation of sprayed polyurethane foam roofing shall comply with the provisions of this section.

1507.14.1 Slope. Sprayed polyurethane foam roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.14.2 Material standards. Spray-applied polyurethane-foam insulation shall comply with ASTM C 1029.

1507.14.3 Application. Foamed-in-place roof insulation shall be installed in accordance with the manufacturer's installation instructions. A liquid-applied protective coating that complies with Section 1507.15 shall be applied no less than 2 hours nor more than 72 hours following the application of the foam.

1507.14.4 Foam plastics. Foam plastic materials and installation shall comply with Chapter 26.

1507.15 Liquid-applied coatings. The installation of liquid-applied coatings shall comply with the provisions of this section.

1507.15.1 Slope. Liquid-applied roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope).

1507.15.2 Material standards. Liquid-applied roof coatings shall comply with ASTM C 836, C 957, D 6083, D 1227 or D 3468.

SECTION 1508 ROOF INSULATION

1508.1 General. The use of above-deck thermal insulation shall be permitted provided such insulation is covered with an approved roof covering and passes the tests of FM 4450 or UL 1256 when tested as an assembly.

Exception: Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 26.

1508.1.1 Cellulosic fiberboard. Cellulosic fiberboard roof insulation shall conform to the material and installation requirements of Chapter 23.

SECTION 1509 ROOFTOP STRUCTURES

1509.1 General. The provisions of this section shall govern the construction of rooftop structures.

1509.2 Penthouses. A penthouse or other projection above the roof in structures of other than Type I construction shall not exceed 28 feet (8534 mm) above the roof where used as an enclosure for tanks or for elevators that run to the roof and in all other cases shall not extend more than 12 feet (3658 mm) above the roof. The aggregate area of penthouses and other rooftop structures shall not exceed one-third the area of the supporting roof. A penthouse, bulkhead, or any other similar projection above the roof shall not be used for purposes other than shelter of me-

chanical equipment or shelter of vertical shaft openings in the roof. Provisions, such as louvers, louver blades or flashing, shall be made to protect the mechanical equipment and the building interior from the elements. Penthouses or bulkheads used for purposes other than permitted by this section shall conform to the requirements of this code for an additional story. The restrictions of this section shall not prohibit the placing of wood flagpoles or similar structures on the roof of any building.

1509.2.1 Type of construction. Penthouses shall be constructed with walls, floors, and roof as required for the building.

Exceptions:

1. On buildings of Types I and Type II construction, the exterior walls and roofs of penthouses that are more than 5 feet (1524 mm) and less than 20 feet (6096 mm) from a common property line shall be of at least 1-hour fire-resistance-rated noncombustible construction. Walls and roofs that are over 20 feet (6096 mm) from a common property line shall be of noncombustible construction. Interior framing and walls shall be of noncombustible construction.
2. On buildings of Types III, IV, and V construction, the exterior walls of penthouses that are more than 5 feet (1524 mm) and less than 20 feet (6096 mm) from a common property line shall be at least 1-hour fire-resistance-rated construction. Walls that are over 20 feet (6096 mm) from a common property line shall be of Type IV construction or noncombustible construction. Roofs shall be constructed of materials and fire-resistance rated as required in Table 601. Interior framing and walls shall be Type IV construction or noncombustible construction.
3. Unprotected noncombustible enclosures housing only mechanical equipment and located at least 20 feet (6096 mm) from adjacent property lines shall be permitted.
4. On one-story buildings, combustible unroofed mechanical equipment screens, fences or similar enclosures are permitted where located at least 20 feet (6096 mm) from adjacent property lines and where not exceeding 4 feet (1219 mm) in height above the roof surface.
5. Dormers shall be of the same type of construction as the roof on which they are placed, or of the exterior walls of the building.

1509.3 Tanks. Tanks having a capacity of more than 500 gallons (2 m³) placed in or on a building shall be supported on masonry, reinforced concrete, steel or Type IV construction; provided that, where such supports are located in the building above the lowest story, the support shall be fire-resistance rated as required for Type IA construction.

1509.3.1 Valve. Such tanks shall have in the bottom or on the side near the bottom, a pipe or outlet, fitted with a suitable quick opening valve for discharging the contents in an emergency through an adequate drain.

1509.3.2 Location. Such tanks shall not be placed over or near a line of stairs or an elevator shaft, unless there is a solid roof or floor underneath the tank.

1509.3.3 Tank cover. Unenclosed roof tanks shall have covers sloping toward the outer edges.

1509.4 Cooling towers. Cooling towers in excess of 250 square feet (23.2 m²) in base area or in excess of 15 feet (4572 mm) high where located on buildings more than 50 feet (15 240 mm) high shall be of noncombustible construction. Cooling towers shall not exceed one-third of the supporting roof area.

Exception: Drip boards and the enclosing construction of wood not less than 1 inch (25.4 mm) nominal thickness, provided the wood is covered on the exterior of the tower with noncombustible material.

1509.5 Towers, spires, domes and cupolas. Any tower, spire, dome or cupola shall be of a type of construction not less in fire-resistance rating than required for the building to which it is attached except that any such tower, spire, dome or cupola that exceeds 60 feet (18 288 mm) in height above grade, and construction upon which it is supported, shall be of Type I or II construction where the area at any horizontal section of such tower, spire, dome or cupola exceeds 200 square feet (18.6 m²) or where it is used for any purpose other than a belfry or an architectural embellishment.

1509.5.1 Noncombustible construction required. Any tower, spire, dome or cupola that exceeds 25 feet (7620 mm) in height above the highest point at which it comes in contact with the roof, or that exceeds 200 square feet (18.6 m²) in area at any horizontal section, or which is intended to be used for any purpose other than a belfry or architectural embellishment, shall be entirely constructed of and supported by noncombustible materials. Such structures shall be separated from the building below by construction having a fire-resistance rating of not less than 1.5 hours with openings protected with a minimum 1.5-hour fire-protection rating. Structures, except aerial supports 12 feet (3658 mm) high or less, flag poles, water tanks and cooling towers, placed above the roof of any building more than 50 feet (15 240 mm) in height, shall be of noncombustible material and shall be supported by construction of noncombustible material.

1509.5.2 Towers and spires. Towers and spires where enclosed shall have exterior walls as required for the building to which they are attached. The roof covering of spires shall be of a class of roof covering as required for the main roof of the rest of the structure.

SECTION 1510 REROOFING

1510.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15. Roof repairs to existing roofs and roof coverings shall comply with the provisions of Chapter 34, but more than 25 percent of the roof covering of any building shall not be removed and replaced within any 12-month period unless the entire roof covering is made to conform to the requirements for new roofing.

Exception: Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 for roofs that provide positive roof drainage.

1510.2 Structural and construction loads. The structural roof components shall be capable of supporting the roof covering system and the material and equipment loads that will be encountered during installation of the roof covering system.

1510.3 Recovering vs. replacement. New roof coverings shall not be installed without first removing existing roof coverings where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Exceptions:

1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
2. Metal panel, metal shingle, and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1510.4.

1510.4 Roof recovering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other approved materials securely fastened in place.

1510.5 Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

1510.6 Flashings. Flashings shall be reconstructed in accordance with approved manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.