

CHAPTER 31

SPECIAL CONSTRUCTION

SECTION 3101 GENERAL

3101.1 Scope. The provisions of this chapter shall govern special building construction including membrane structures, temporary structures, pedestrian walkways and tunnels, awnings and canopies, marquees, signs, and towers and antennas.

SECTION 3102 MEMBRANE STRUCTURES

3102.1 General. The provisions of this section shall apply to air-supported, air-inflated, membrane-covered cable and membrane-covered frame structures, collectively known as membrane structures, erected for a period of 180 days or longer. Those erected for a shorter period of time shall comply with the *Phoenix Fire Code*. Membrane structures covering water storage facilities, water clarifiers, water treatment plants, sewage treatment plants, greenhouses and similar facilities not used for human occupancy, are required to meet only the requirements of Sections 3102.3.1 and 3102.7.

3102.2 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein:

AIR-INFLATED STRUCTURE. A building where the shape of the structure is maintained by air pressurization of cells or tubes to form a barrel vault over the usable area. Occupants of such a structure do not occupy the pressurized area used to support the structure.

AIR-SUPPORTED STRUCTURE. A building wherein the shape of the structure is attained by air pressure and occupants of the structure are within the elevated pressure area. Air-supported structures are of two basic types:

Double skin. Similar to a single skin, but with an attached liner that is separated from the outer skin and provides an airspace which serves for insulation, acoustic, aesthetic or similar purposes.

Single skin. Where there is only the single outer skin and the air pressure is directly against that skin.

CABLE-RESTRAINED, AIR-SUPPORTED STRUCTURE. A structure in which the uplift is resisted by cables or webbings which are anchored to either foundations or dead men. Reinforcing cable or webbing is attached by various methods to the membrane or is an integral part of the membrane. This is not a cable-supported structure.

MEMBRANE-COVERED CABLE STRUCTURE. A nonpressurized structure in which a mast and cable system provides support and tension to the membrane weather barrier and the membrane imparts stability to the structure.

MEMBRANE-COVERED FRAME STRUCTURE. A nonpressurized building wherein the structure is composed of a

rigid framework to support a tensioned membrane which provides the weather barrier.

NONCOMBUSTIBLE MEMBRANE STRUCTURE. A membrane structure in which the membrane and all component parts of the structure are noncombustible.

SHADE STRUCTURE. A freestanding structure which provides solar protection for otherwise outdoor property uses.

3102.3 Type of construction. Noncombustible membrane structures shall be classified as Type IIB construction. Noncombustible frame or cable-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IIB construction. Heavy timber frame-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IV construction. Other membrane structures shall be classified as Type V construction.

Exception: Plastic less than 30 feet (9144 mm) above any floor used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers, is not required to be flame resistant.

3102.3.1 Membrane and interior liner material. Membranes and interior liners shall be either noncombustible as set forth in Section 703.4, or flame resistant as determined in accordance with NFPA 701 and the manufacturer's test protocol.

Exception: Plastic less than 20 mil (0.51 mm) in thickness used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers, is not required to be flame resistant.

3102.4 Allowable floor areas. The area of a membrane structure shall not exceed the limitations set forth in Table 503, except as provided in Section 506.

3102.5 Maximum height. Membrane structures shall not exceed one story nor shall such structures exceed the height limitations in feet set forth in Table 503.

Exception: Noncombustible membrane structures serving as roofs only.

3102.6 Mixed construction. Membrane structures shall be permitted to be utilized as specified in this section as a portion of buildings of other types of construction. Height and area limits shall be as specified for the type of construction and occupancy of the building.

3102.6.1 Noncombustible membrane. A noncombustible membrane shall be permitted for use as the roof or as a skylight of any building or atrium of a building of any type of construction provided it is at least 20 feet (6096 mm) above any floor, balcony or gallery.

3102.6.1.1 Flame-resistant membrane. A flame-resistant membrane shall be permitted to be used as the roof or as a skylight on buildings of Type IIB, III, IV and V

construction provided it is at least 20 feet (6096 mm) above any floor, balcony or gallery.

3102.7 Engineering design. The structure shall be designed and constructed to sustain dead loads; loads due to tension or inflation; live loads including wind, snow or flood and seismic loads and in accordance with Chapter 16.

3102.8 Inflation systems. Air-supported and air-inflated structures shall be provided with primary and auxiliary inflation systems to meet the minimum requirements of Sections 3102.8.1 through 3102.8.3.

3102.8.1 Equipment requirements. This inflation system shall consist of one or more blowers and shall include provisions for automatic control to maintain the required inflation pressures. The system shall be so designed as to prevent overpressurization of the system.

3102.8.1.1 Auxiliary inflation system. In addition to the primary inflation system, in buildings exceeding 1,500 square feet (140 m²) in area, an auxiliary inflation system shall be provided with sufficient capacity to maintain the inflation of the structure in case of primary system failure. The auxiliary inflation system shall operate automatically when there is a loss of internal pressure and when the primary blower system becomes inoperative.

3102.8.1.2 Blower equipment. Blower equipment shall meet the following requirements:

1. Blowers shall be powered by continuous-rated motors at the maximum power required for any flow condition as required by the structural design.
2. Blowers shall be provided with inlet screens, belt guards and other protective devices as required by the building official to provide protection from injury.
3. Blowers shall be housed within a weather-protecting structure.
4. Blowers shall be equipped with backdraft check dampers to minimize air loss when inoperative.
5. Blower inlets shall be located to provide protection from air contamination. The location of inlets shall be approved.

3102.8.2 Standby power. Wherever an auxiliary inflation system is required, an approved standby power-generating system shall be provided. The system shall be equipped with a suitable means for automatically starting the generator set upon failure of the normal electrical service and for automatic transfer and operation of all of the required electrical functions at full power within 60 seconds of such service failure. Standby power shall be capable of operating independently for a minimum of 4 hours.

3102.8.3 Support provisions. A system capable of supporting the membrane in the event of deflation shall be provided for in air-supported and air-inflated structures having an occupant load of more than 50 or where covering a swimming pool regardless of occupant load. The support system shall be capable of maintaining membrane structures used as a roof for Type I construction not less than 20 feet (6096

mm) above floor or seating areas. The support system shall be capable of maintaining other membranes at least 7 feet (2134 mm) above the floor, seating area or surface of the water.

SECTION 3103 TEMPORARY STRUCTURES

3103.1 General. The provisions of this section shall apply to structures erected for a period of less than 180 days. Tents and other membrane structures erected for a period of less than 180 days shall comply with the *Phoenix Fire Code*. Those erected for a longer period of time shall comply with applicable sections of this code.

Exception: Provisions of the *Phoenix Fire Code* shall apply to tents and membrane structures erected for a period of less than 180 days.

3103.1.1 Permit required. Temporary structures that cover an area in excess of 120 square feet (11.16 m²), including connecting areas or spaces with a common means of egress or entrance which are used or intended to be used for the gathering together of 10 or more persons, shall not be erected, operated or maintained for any purpose without obtaining a permit from the building official.

3103.2 Construction documents. A permit application and construction documents shall be submitted for each installation of a temporary structure. The construction documents shall include a site plan indicating the location of the temporary structure and information delineating the means of egress and the occupant load.

3103.3 Location. Temporary structures shall be located in accordance with the requirements of Table 602 based on the fire-resistance rating of the exterior walls for the proposed type of construction.

3103.4 Means of egress. Temporary structures shall conform to the means of egress requirements of Chapter 10 and shall have a maximum exit access travel distance of 100 feet (30 480 mm).

SECTION 3104 PEDESTRIAN WALKWAYS AND TUNNELS

3104.1 General. This section shall apply to connections between buildings such as pedestrian walkways or tunnels, located at, above or below grade level, that are used as a means of travel by persons. The pedestrian walkway shall not contribute to the building area or the number of stories or height of connected buildings.

3104.2 Separate structures. Connected buildings shall be considered to be separate structures.

Exceptions:

1. Buildings on the same lot in accordance with Section 503.1.3.
2. For purposes of calculating the number of Type B units required by Chapter 11, structurally connected buildings and buildings with multiple wings shall be considered one structure.

3104.3 Construction. The pedestrian walkway shall be of noncombustible construction.

Exception: Combustible construction shall be permitted where connected buildings are of combustible construction.

3104.4 Contents. Only materials and decorations approved by the building official shall be located in the pedestrian walkway.

3104.5 Fire barriers between pedestrian walkways and buildings. Walkways shall be separated from the interior of the building by fire barrier walls with a fire-resistance rating of not less than 2 hours. This protection shall extend vertically from a point 10 feet (3048 mm) above the walkway roof surface or the connected building roof line, whichever is lower, down to a point 10 feet (3048 mm) below the walkway and horizontally 10 feet (3048 mm) from each side of the pedestrian walkway. Openings within the 10-foot (3048 mm) horizontal extension of the protected walls beyond the walkway shall be equipped with devices providing a $\frac{3}{4}$ -hour fire protection rating in accordance with Section 715.

Exception: The walls separating the pedestrian walkway from a connected building are not required to have a fire-resistance rating by this section where any of the following conditions exist:

1. The distance between the connected buildings is more than 10 feet (3048 mm), the pedestrian walkway and connected buildings are equipped throughout with an automatic sprinkler system in accordance with NFPA 13 and the wall is constructed of a tempered, wired or laminated glass wall and doors subject to the following:
 - 1.1. The glass shall be protected by an automatic sprinkler system in accordance with NFPA 13 and the sprinkler system shall completely wet the entire surface of interior sides of the glass wall when actuated.
 - 1.2. The glass shall be in a gasketed frame and installed in such a manner that the framing system will deflect without breaking (loading) the glass before the sprinkler operates.
 - 1.3. Obstructions shall not be installed between the sprinkler heads and the glass.
2. The distance between the connected buildings is more than 10 feet (3048 mm), and both sidewalls of the pedestrian walkway are at least 50 percent open with the open area uniformly distributed to prevent the accumulation of smoke and toxic gases.
3. Buildings are on the same lot, in accordance with Section 503.1.3.
4. Where exterior walls of connected buildings are required by Section 704 to have a fire-resistance rating greater than 2 hours, the walkway shall be equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

The previous exceptions shall apply to pedestrian walkways having a maximum height above grade of three stories or 40 feet (12 192 mm), or five stories or 55 feet (16 764 mm) where sprinklered.

3104.6 Public way. Pedestrian walkways over a public way shall also comply with Chapter 32.

3104.7 Egress. Access shall be provided at all times to a pedestrian walkway that serves as a required exit.

3104.8 Width. The unobstructed width of pedestrian walkways shall not be less than 36 inches (914 mm). The total width shall not exceed 30 feet (9144 mm).

3104.9 Exit access travel. The length of exit access travel shall not exceed 200 feet (60 960 mm).

Exceptions:

1. Exit access travel distance on a pedestrian walkway equipped throughout with an automatic sprinkler system in accordance with NFPA 13 shall not exceed 250 feet (76 200 mm).
2. Exit access travel distance on a pedestrian walkway constructed with both sides at least 50 percent open shall not exceed 300 feet (91 440 mm).
3. Exit access travel distance on a pedestrian walkway constructed with both sides at least 50 percent open, and equipped throughout with an automatic sprinkler system in accordance with NFPA 13, shall not exceed 400 feet (122 m).

3104.10 Tunneled walkway. Separation between the tunneled walkway and the building to which it is connected shall not be less than 2-hour fire-resistant construction and openings therein shall be protected in accordance with Table 715.3.

3104.11 Ventilation. Smoke and heat vents shall be provided for enclosed walkways and tunneled walkways as required for Group F-1 occupancies in accordance with Section 910.

SECTION 3105

AWNINGS, CANOPIES AND SHADE STRUCTURES

3105.1 General. Awnings, shade structures or canopies shall comply with the requirements of this section and other applicable sections of this Code.

3105.2 Definition. The following terms shall, for the purposes of this section and as used elsewhere in this Code, have the meanings shown herein.

INDUSTRIAL SHADE CANOPY. An industrial shade canopy is an awning, canopy or roof structure which provides solar protection for outdoor Group F or Group S factory, industrial or storage uses or equipment. Industrial shade canopies shall be classified as an occupancy group in accordance with Chapter 3 of this Code.

MERCANTILE SHADE CANOPY. A mercantile shade canopy is an awning, canopy or roof structure which provides solar protection for the outdoor storage, display or sale of merchandise as part of a Group M occupancy and includes the following:

1. A roof structure with not less than 50 percent of its perimeter wall area unenclosed; or
2. A slatted, lattice or louvered roof structure with not less than 25 percent of the roof area open to the sky; or

3. An open structural framework covered with shade cloth fabric as specified in Section 3105.5.2.

NONRESIDENTIAL PATIO COVER. A nonresidential patio cover is an awning, canopy or roof structure which provides solar protection for outdoor seating, dining, walkway or pedestrian entry areas accessory to a building of any occupancy and includes the following:

1. A roof structure with not less than 50 percent of its perimeter wall area unenclosed; or
2. A slatted, lattice or louvered roof structure with not less than 25 percent of the roof area open to the sky; or
3. An open structural framework covered with shade cloth fabric as specified in Section 3105.5.2.

Nonresidential patio covers shall not apply to canopies or roof structures over vehicle drive-through lanes or porte cocheres used by motor vehicles.

PARKING LOT SHADE STRUCTURE. A parking lot shade structure is a modified Group S-2 open parking garage. A parking lot shade structure is a freestanding roof supported on columns and entirely open on all sides with no enclosures beneath the roof.

3105.3 Design and construction. Awnings, shade structures and canopies shall be designed and constructed to withstand wind or other lateral loads and live loads as required by Chapter 16 with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration. Awnings shall have frames of noncombustible material, fire-retardant-treated wood, wood of Type IV size, or 1-hour construction with combustible or noncombustible covers and shall be either fixed, retractable, folding or collapsible.

3105.4 Canopy and shade structure materials. Canopies and shade structures shall be constructed of a rigid framework with an approved covering, that is flame resistant in accordance with NFPA 701 or has a flame spread index not greater than 25 when tested in accordance with ASTM E 84.

3105.5 Industrial shade canopies. Industrial shade canopies shall comply with the provisions of Chapter 3 for their designated occupancy except as specifically modified below.

3105.5.1 Construction and height. Industrial shade canopies shall be limited to one story in height and shall be entirely of Type I or Type II noncombustible construction. Industrial shade canopies shall meet the design requirements of Chapter 16.

3105.5.2 Location on property and exterior walls. Industrial shade canopies shall comply with Section 602 for the fire-resistive protection of exterior walls and the protection of openings as determined by the location on property. Shade canopies attached to unlimited area buildings shall not encroach within the required 60 foot (18 288 mm) open yard area. Not less than 50 percent of the shade canopy perimeter wall area shall be unenclosed.

3105.5.3 Allowable area. Industrial shade canopies may be attached to a Group F or a Group S occupancy building of any construction type when the total combined area of the building and the shade canopy does not exceed the area lim-

its specified in Sections 503 and 506 for the type of construction for the building.

3105.5.4 Sprinkler systems. Industrial shade canopies shall be protected by an automatic sprinkler system as specified in Chapter 9.

Exceptions:

1. Industrial shade canopies attached to buildings not otherwise required to be protected by an automatic sprinkler system.
2. Industrial shade canopies which do not exceed 100 square feet (9.3 m²) in area.
3. Industrial shade canopies which do not exceed 1,000 square feet (93 m²) in area and are separated from the building by not less than a 1-hour fire-resistive occupancy separation.
4. Industrial shade canopies which do not exceed 2,500 square feet (232 m²) in area and which are separated from the building by not less than a 2-hour area separation wall.

3105.5.5 Special hazards. Outdoor hazardous material storage areas including compressed gas storage tanks, portable tanks or cylinders and related equipment, required by the *Phoenix Fire Code* to be weather protected, may be covered by a noncombustible industrial shade canopy when all of the following additional conditions are met. In all cases, the most restrictive requirement of the *International Building Code* or the *Phoenix Fire Code* shall apply:

3105.5.5.1 Fire code requirements. The location of outdoor hazardous material storage areas and weather-protection shade canopies shall comply with the *Phoenix Fire Code* for distance to buildings, property lines, streets, alleys, public ways and exits to a public way based upon the type and quantity of material stored. No hazardous material shall be stored or used under an industrial shade canopy except in compliance with the *Phoenix Fire Code*.

3105.5.5.2 Building code requirements. In addition to *Phoenix Fire Code* requirements, weather-protection shade canopies attached to buildings shall also comply with Section 602 for the fire-resistive protection of exterior walls and the protection of openings as determined by the location on the property for the building. Weather-protection shade canopies shall not encroach into or obstruct any yard area, fire access or exit path required by this Code.

3105.5.5.3 Extent of enclosure. Weather-protection shade canopy supports and walls shall not obstruct more than 25 percent of the perimeter wall area of the canopy or storage area. Openings shall be arranged to permit natural ventilation and air flow through the space.

1. Where a weather-protection shade canopy is located less than 5 feet (1524 mm) from a building or a property line, a 4-hour fire-resistive concrete or masonry separation wall without openings shall be provided.

2. Where a weather-protection shade canopy is located 5 feet (1524 mm) or more but less than 20 feet (6096 mm) from a building or a property line, a 2-hour fire-resistive concrete or masonry separation wall without openings shall be provided. Where allowed by the *Phoenix Fire Code*, this 2-hour separation wall may be a line of sight shield or protective structure less than the full height of the canopy.
3. Where a weather-protection shade canopy is located 20 feet (6096) or more from a building or a property line, the requirement for installation of a fire-resistive separation wall, shield or protective structure shall be as determined by the *Phoenix Fire Code*.

3105.5.5.4 Sprinkler systems. Weather-protection shade canopies shall be protected by an automatic sprinkler system when required by Section 3105.5.5 or when required by the *Phoenix Fire Code*.

3105.6 Mercantile shade canopies. Mercantile shade canopies shall comply with the provisions of Section 309, except as specifically modified below.

3105.6.1 Construction and height. Mercantile shade canopies shall be limited to one story in height and shall be entirely of Type I or Type II noncombustible construction.

Exception: Membrane fabric shall be permitted to have a combustible covering that is flame resistant, as determined in accordance with NFPA 701 when supported by a noncombustible structural framework.

Mercantile shade canopies including the supporting framework for membrane fabric shall meet the design requirements of Chapter 16.

3105.6.2 Location on property and exterior walls. Mercantile shade canopies shall comply with the fire-resistive protection of exterior walls and the protection of openings as specified in Table 602 and in Section 704.

Exception: Exterior wall opening protection and opening limitations shall not apply when the shade canopy is not less than 90 percent open to the sky within the setback distance from the property line where Section 704 requires protection of openings.

Mercantile shade canopies attached to unlimited area buildings shall not encroach within the required 60-foot (18 288 mm) open yard area.

3105.6.3 Allowable area. Mercantile shade canopies may be attached to a Group M occupancy building of any construction type when the total combined area of the building and the shade canopy does not exceed the area limits specified in Sections 503 and 506 for the type of construction of the building.

3105.6.4 Sprinkler systems. Mercantile shade canopies shall be protected by an automatic sprinkler system as specified in Chapter 9.

Exceptions:

1. Where the total combined area of the shade canopy and any attached building does not exceed 12,000 square feet (1114 mm); or

2. Where a slatted, lattice or louvered canopy roof system is not less than 50 percent open to the sky; or
3. Where shade membrane fabric is used to cover garden, greenhouse, landscaping or plant nursery products or materials, and the unsprinklered shade canopy is separated from any attached building by not less than a 2-hour area separation wall.

3105.7 Nonresidential patio covers. Nonresidential patio covers shall comply with the provisions of Chapter 3 for their designated occupancy, except as specifically modified below.

3105.7.1 Construction and height. Nonresidential patio covers shall be limited to one story in height and shall be entirely of Type I or Type II noncombustible construction.

Exceptions:

1. Shade membrane fabric which does not support combustion and has a Class I or Class II flame-spread rating may be used when supported by a noncombustible structural framework.
2. Patio covers may be of combustible construction when attached to buildings of Type III or Type V construction.

Nonresidential patio covers including the supporting framework for shade cloth fabric shall meet the design requirements of Chapter 16.

3105.7.2 Location on property and exterior walls. Nonresidential patio covers shall comply with the fire-resistive protection of exterior walls and the protection of openings as specified in Table 602 and in Section 704.

Exception: Exterior wall opening protection and opening limitation shall not apply when the patio cover is not less than 90 percent open to the sky within the setback distance from the property line where Section 704 requires protection of openings.

Nonresidential patio covers attached to unlimited area buildings shall not encroach within the required 60-foot (18 288 mm) open yard area.

3105.7.3 Allowable area. Nonresidential patio covers may be attached to a building of any occupancy when the total combined area of the building and the patio cover does not exceed the area limits specified in Sections 503 and 506 for the occupancy and type of construction of the building.

3105.7.4 Sprinkler systems. Nonresidential patio covers shall be protected by an automatic sprinkler system as specified in Chapter 9.

Exceptions:

1. Patio covers attached to buildings not otherwise required to be protected by an automatic sprinkler system.
2. Patio covers which do not exceed 400 square feet (37 m²) in area.
3. Where a slatted, lattice or louvered patio roof system is not less than 50 percent open to the sky.
4. Where shade membrane fabric is used and the patio cover is separated from any attached building

by not less than a 1-hour fire-resistive occupancy separation.

5. Where sprinkler deletion is permitted for noncombustible shaded walkway or pedestrian entry areas.

3105.8 Parking lot shade structures. Parking lot shade structures shall be used exclusively for the solar protection of parked motor vehicles and shall not be used to shelter any other use.

3105.8.1 Construction and height. Parking lot shade structures shall be constructed entirely of noncombustible materials, except that the roof covering may have a flame spread rating of not more than 50. Parking lot shade structures shall meet the design requirements of Chapter 16.

Parking lot shade structures shall have a clear height of not less than 7 feet (2134 mm). Where van accessible shaded parking is required by this Code or by the *Phoenix Zoning Ordinance*, the clear height shall be not less than 98 inches (2490 mm).

3105.8.2 Location on property. Parking lot shade structures shall be located not less than 3 feet (915 mm) from any building or property line. A clear separation of not less than 16 feet (4877 mm) shall be maintained between shade structures on the same property. No shade structure shall cover or encroach into any required fire lane.

Parking lot shade structures which meet all the requirements of this section shall be permitted in any required yard without affecting any of the general building limitations specified in Chapter 5 of this Code.

3105.8.3 Allowable area. Parking lot shade structures shall not exceed 300 feet (91 440 mm) in length or 40 feet (12 192 mm) in width.

3105.8.4 Roof-top shade structures. Parking lot shade structures complying with the provisions of this section may be installed to shade open parking on the roof of Group S-2 parking garages. This installation shall not be construed as affecting the construction type, allowable area, height or number of tiers of the parking garage. Where the parking garage is required to be protected by an automatic sprinkler system, all parking lot shade structures on the roof shall also be so protected.

SECTION 3106 MARQUEES

3106.1 General. Marquees shall comply with this section and other applicable sections of this code.

3106.2 Thickness. The maximum height or thickness of a marquee measured vertically from its lowest to its highest point shall not exceed 3 feet (914 mm) where the marquee projects more than two-thirds of the distance from the property line to the curb line, and shall not exceed 9 feet (2743 mm) where the marquee is less than two-thirds of the distance from the property line to the curb line.

3106.3 Roof construction. Where the roof or any part thereof is a skylight, the skylight shall comply with the requirements of Chapter 24. Every roof and skylight of a marquee shall be

sloped to downspouts that shall conduct any drainage from the marquee in such a manner so as not to spill over the sidewalk.

3106.4 Location prohibited. Every marquee shall be so located as not to interfere with the operation of any exterior standpipe, and such that the marquee does not obstruct the clear passage of stairways or exit discharge from the building or the installation or maintenance of street lighting.

3106.5 Construction. A marquee shall be supported entirely from the building and constructed of noncombustible materials. Marquees shall be designed as required in Chapter 16. Structural members shall be protected to prevent deterioration.

SECTION 3107 SIGNS

3107.1 General. Signs shall be designed, constructed and maintained in accordance with this code and the *Phoenix Zoning Ordinance*.

SECTION 3108 RADIO AND TELEVISION TOWERS

3108.1 General. Subject to the provisions of Chapter 16 and the requirements of Chapter 15 governing the fire-resistance ratings of buildings for the support of roof structures, radio and television towers shall be designed and constructed as herein provided.

3108.2 Location and access. Towers shall be located and equipped with step bolts and ladders so as to provide ready access for inspection purposes. Guy wires or other accessories shall not cross or encroach upon any street or other public space, or over above-ground electric utility lines, or encroach upon any privately owned property without written consent of the owner of the encroached-upon property, space or above-ground electric utility lines.

3108.3 Construction. Towers shall be constructed of approved corrosion-resistant noncombustible material. The minimum type of construction of isolated radio towers not more than 100 feet (30 480 mm) in height shall be Type IIB.

3108.4 Loads. Towers shall be designed to resist wind loads in accordance with TIA/EIA-222. Consideration shall be given to conditions involving wind load on ice-covered sections in localities subject to sustained freezing temperatures.

3108.4.1 Dead load. Towers shall be designed for the dead load plus the ice load in regions where ice formation occurs.

3108.4.2 Wind load. Adequate foundations and anchorage shall be provided to resist two times the calculated wind load.

3108.5 Grounding. Towers shall be permanently and effectively grounded.

SECTION 3109 SWIMMING POOL ENCLOSURES AND SAFETY DEVICES

3109.1 General. The provisions of this section shall control the design and construction of swimming pools, spas and hot tubs.

3109.2 Definitions. For the purposes of these requirements, the terms used shall be defined as follows and as set forth in Chapter 2.

ABOVE-GROUND/ON-GROUND POOL. See “Swimming pool.”

BARRIER. A fence, wall, building wall or combination thereof that completely surrounds the swimming pool and obstructs access to the swimming pool.

HOT TUB. See “Swimming pool.”

IN-GROUND POOL. See “Swimming pool.”

SPA, NONPORTABLE. See “Swimming pool.”

SPA, PORTABLE. A nonpermanent structure intended for recreational bathing, in which all controls, water-heating and water-circulating equipment are an integral part of the product.

SWIMMING POOL. Any structure intended for swimming or recreational bathing that contains water over 24 inches (610 mm) deep. This includes in-ground, above ground and on-ground swimming pools, hot tubs, spas and fixed-in-place wading pools.

SWIMMING POOL, INDOOR. A swimming pool which is totally contained within a structure and surrounded on all four sides by walls of said structure.

SWIMMING POOL, OUTDOOR. Any swimming pool which is not an indoor pool.

3109.3 Swimming pools.

3109.3.1 In-ground pools. In-ground pools shall be designed and constructed in conformance with ANSI/NSPI-5 as listed in Section 3109.7

3109.3.2 Above-ground and on-ground pools. Above-ground and on-ground pools shall be designed and constructed in conformance with ANSI/NSPI-4 as listed in Section 3109.7.

3109.4 Spas and hot tubs.

3109.4.1 Permanently installed spas and hot tubs. Permanently installed spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-3 as listed in Section 3109.7.

3109.4.2 Portable spas and hot tubs. Portable spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-6 as listed in Section 3109.7.

3109.5 Barrier requirements.

3109.5.1 Application. The provisions of this chapter shall control the design of barriers for all swimming pools, spas and hot tubs. These design controls are intended to provide protection against potential drownings and near drownings by restricting access to swimming pools, spas and hot tubs.

The swimming pool barrier detail requirements of this section apply to all new swimming pools installed on or after May 4, 1990 and to all additions, alterations, repairs or replacements made to existing swimming pool barriers. All swimming pools installed prior to May 4, 1990 shall be completely enclosed as required in this section on or before May 4, 1991, except as provided in Section 3109.5.5.3.

3109.5.2 Outdoor swimming pool. It is the responsibility of the property owner and any other person in responsible charge of a swimming pool to ensure that the required swimming pool barrier, including all gates, doors, locks, latches and other portions of the barrier, is maintained safe and in good working order at all times. No person shall alter or remove any portion of a swimming pool barrier except to repair, reconstruct or replace the barrier in compliance with the provisions of this section. All barriers shall be installed, inspected and approved prior to plastering or filling with water. An outdoor swimming pool, including an in-ground, aboveground or on-ground pool, hot tub or spa shall be provided with a barrier that shall comply with the following:

1. The top of the barrier shall be at least 5 feet (1524 mm) above grade measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches (51 mm) measured on the side of the barrier which faces away from the swimming pool. The maximum clearance at the bottom of the barrier may be increased to 4 inches (102 mm) when grade is a solid, nonremovable surface. Where the top of the pool structure is above grade, such as an above-ground pool, the barrier may be at ground level, such as the pool structure, or mounted on top of the pool structure. Where the barrier is mounted on top of the pool structure, the maximum vertical clearance between the top of the pool structure and the bottom of the barrier shall be 4 inches (102 mm).
2. Openings in the barrier shall not allow passage of a 4-inch-diameter (102 mm) sphere.
3. Solid barriers which do not have openings, such as a masonry or stone wall, shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.
4. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the swimming pool side of the fence. Spacing between vertical members shall not exceed 1.75 inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 inches (44 mm) in width.
5. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 inches (44 mm) in width.
6. Maximum mesh size for chain link fences shall be a 2.25-inch (57 mm) square and provided with slats fastened at the top or the bottom which reduce the

openings to not more than 1.75 inches (44 mm). The mesh shall not be less than 11 gage.

7. Where the barrier is composed of diagonal members, such as a lattice fence, the maximum opening formed by the diagonal members shall not be more than 1.75 inches (44 mm).
8. Access gates shall comply with the requirements of Section 3109.4.2, Items 1 through 7, and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the pool and shall be self-closing and have a self-latching device. Gates other than pedestrian access gates need not be self-closing or self-latching and shall be equipped with a padlock or similar locking device. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from the bottom of the gate, the release mechanism and openings shall comply with the following:
 - 8.1. The release mechanism shall be located on the pool side of the gate at least 3 inches (76 mm) below the top of the gate, and
 - 8.2. The gate and barrier shall have no opening greater than 0.5 inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.
9. Where a wall of a dwelling serves as part of the barrier, one of the following conditions shall be met:
 - 9.1. The pool shall be equipped with a key-operated powered safety cover in compliance with ASTM F 1346. The keyed pool cover switch shall be located not less than 54 inches (1372 mm) above the floor or adjacent ground level and where the entire pool cover can be visually inspected; or
 - 9.2. All doors leading from the dwelling unit or guest room, directly into a yard with a swimming pool, shall swing away from the pool, shall be self-closing and self-latching and shall be equipped with a locking device. The release mechanism for the latch or a secondary locking device, shall be located not less than 54 inches (1372 mm) above the floor. A locking latch which uses a key, electronic opener or integral combination lock may be located at any height on the door. Sliding doors shall not form any part of a required barrier unless the self-closing and self-latching mechanism is specifically approved.

Windows used for emergency escape or rescue which face into a yard with a swimming pool shall be equipped with a latching device located not less than 54 inches (1372 mm) above the floor. All other operable dwelling unit windows facing into a yard with a swimming pool shall be equipped with a screwed-in-place wire mesh screen, a keyed lock that prevents opening the window more than 4 inches (102 mm) or a latching device

not less than 54 inches (1372 mm) above the floor.

10. Where an above-ground pool structure is used as a barrier or where the barrier is mounted on top of the pool structure, and the means of access is a ladder or steps, then:
 - 10.1. The ladder or steps shall be capable of being secured in an inaccessible position with a lock or latch located 54 inches (1372 mm) above the adjacent ground level, or
 - 10.2. The ladder or steps shall be surrounded by a barrier that meets the requirements of Section 3109.4.2, Items 1 through 9. When the ladder or steps are secured, locked or removed, any opening created shall not allow the passage of a 4-inch-diameter (102 mm) sphere.
11. Where there are natural barriers between properties, such as lakes and solid rock vertical cliffs not less than 10 feet (3050 mm) in height and a slope of not less than 1 horizontal to 10 vertical, fence barriers shall not be required between properties where the natural barriers exist. To ensure proper natural barriers are maintained, barrier fences shall project a minimum of 24 inches (610 mm) into lakes to where there is at least 24 inches (610 mm) depth from the lake surface to the top of the submerged horizontal member or the lake bottom when there is no submerged horizontal member. There shall be no horizontal member less than 45 inches (1143 mm) above the lake surface. Where the solid rock cliff extends above the property, the intersecting barriers, with the solid rock cliff, shall not allow passage of a 4-inch-diameter (102 mm) sphere.

3109.5.3 Indoor swimming pool. All walls surrounding an indoor swimming pool shall comply with Section 3109.4.2, Item 9.

3109.5.4 Prohibited locations. Barriers shall be located not less than 45 inches (1143 mm), measured horizontally from permanent structures, equipment or similar objects from being used to climb the barriers.

3109.5.5 Barrier exceptions.

1. For portable spas and hot tubs with a safety cover which complies with ASTM F 1346, as listed in Section 3109.4.2, shall be exempt from the provisions of this section.
2. For spas and hot tubs, a hard safety cover that is latched or locked may be used, provided the spa or hot tub is not more than 8 feet (2.44 m) in width at any point.
3. Existing swimming pools located on one-family dwelling property on or before May 4, 1990 need not be retroactively fitted with a barrier between the dwelling and the pool, provided all occupants of the dwelling are at least six years of age or older. All other portions of the swimming pool barrier separating

properties shall be installed and maintained as required by Section 105.2 of the *Phoenix Building Construction Code—Administrative Provisions*.

- a. This exception does not eliminate an owner's responsibility for providing a temporary barrier or otherwise physically restricting visiting children's direct access from the dwelling to the swimming pool.
- b. This exception shall expire and the required permanent barrier shall be retroactively installed between the dwelling and the swimming pool whenever:
 - i. One or more children under six years of age become occupants of the property.
 - ii. There is a change of use or character to the primary building occupancy on the property.
 - iii. A new pool or spa is being installed on the same property, including spa additions to the existing swimming pool.

3109.6 Protection for swimming pool and spa suction outlets.

3109.6.1 Suction entrapment avoidance. Pools, spas, hot tubs, catch basins and other similar bather accessible bodies of water associated with swimming pool construction shall be designed to produce circulation throughout the body of water and provide means to protect against user suction entrapment.

3109.6.2 Surface skimming or perimeter overflow system. To avoid suction entrapment, fully submerged suction outlets (main drains) shall not be required in swimming pools, wading pools, spas, hot tubs and catch basins. A surface skimming or perimeter overflow system shall be permitted in lieu of fully submerged suction outlet fittings and shall provide 100 percent of the required system flow.

3109.6.3 Fully submerged suction outlets (main drains). Fully submerged manufactured suction outlets (main drains) for use in swimming pools, wading pools, hot tubs and catch basins shall be listed by a nationally recognized testing laboratory in accordance with ASME/ANSI A112.19.9M.

Exception: Custom-designed suction outlet fittings certified by a licensed professional engineer that conform to ASME/ANSI A112.19.8M.

3109.6.4 Methods of entrapment avoidance. Entrapment avoidance of fully submerged suction outlets can be achieved by one of the following methods:

3109.6.4.1 Dual drains. A minimum of two suction outlets shall be provided for each pump or pumps in the suction outlet system, separated by a minimum of 3 feet (914 mm) measured from center to center of suction pipes or located on two different planes; i.e. one on the bottom and one on the vertical wall, or one each on two separate vertical walls. These suction outlets shall be plumbed such that water is drawn through them simultaneously through a common line to the system. Each suction outlet fitting shall be rated for the maximum system flow.

3109.6.4.2 Channel drain system. One or more channel gates shall be acceptable as protection against suction entrapment if they are 3 inches (76 mm) or greater in width and 31 inches (787 mm) or greater in length and fastened to prevent removal as specified in ASME/ANSI A112.19.8M.

3109.6.4.3 Gravity flow system. A gravity flow system shall be acceptable as protection against suction entrapment if it has one or more submerged suction outlet(s) with approved cover/grates in any combination fed by gravity into a collection tank vented to the atmosphere. However, a modulating float valve allowing direct suction is not permitted.

3109.6.4.4 Combination inlet/outlet fixtures for swim jets. Combination inlet/outlet fixtures shall be acceptable as protection against suction entrapment for a swim jet system not related to the filtration system, if they are manufactured and have their own dedicated pump(s), and the suction outlet and the return are located in a single fitting.

3109.6.4.5 Venturi debris removal systems. Venturi debris removal systems shall be acceptable as protection against suction entrapment if they are intended to remove debris through a single, floor-mount suction outlet where low pressure is created by the entrainment of water within a deck-mount canister that is not directly or indirectly connected to a pump's suction. The single-action outlet shall have an approved cover/gate.

3109.6.5 Shallow water suction outlets. Where all suction fittings are located less than 24 inches (609 mm) below normal operating water level, one of the following shall be required:

1. Gravity flow system.
2. One additional drain.
3. Vent system to atmosphere.
4. Suction vacuum release device tested and approved for the purpose by a nationally recognized testing laboratory in accordance with ASME A112.19.17.

3109.6.6 Wall vacuum fittings. Where provided, the vacuum cleaner fitting(s) shall be located in an accessible position(s) at least 6 inches (152 mm) and no greater than 18 inches (457 mm) below the water level and shall comply with IAPMO SPS 4.

3109.7 Abbreviations.

3109.7.1 General.

ANSI. American National Standards Institute
25 West 43rd Street, New York, NY 10036

ASTM. ASTM International
100 Barr Harbor Drive, Conshohocken, PA 19428

NSPI. National Spa and Pool Institute
2111 Eisenhower Avenue, Alexandria, VA 22314

3109.8 Standards.

3109.8.1 General.**IAPMO**

IAPMO SPS-4-2000, Special Use Suction Fittings for Swimming Pools, Spas and Hot Tubs (for suction side automatic swimming pool cleaners)

ANSI/NSPI

ANSI/NSPI-3-99, Standard for Permanently Installed Residential Spas (3109.3.4)

ANSI/NSPI-4-99, Standard for Above-ground/On-ground Residential Swimming Pools (3109.3.2)

ANSI/NSPI-5-99, Standard for Residential In-ground Swimming Pools (3109.3.1)

ANSI/NSPI-6-99, Standard for Residential Portable Spas (3109.3.5)

ANSI/ASME A112.19.8M-1987, Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathing Appliances (3109.5)

ASTM

ASTM F 1346-91 (1996), Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs (3109.4.2, 3109.5.5)

ASME

ASME A112.19.17, Manufacturers Safety Vacuum Release Systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub and Wading Pool (3109.5.3)

SECTION 3110 FACTORY-BUILT BUILDINGS

3110.1 General. Factory-built buildings, manufactured homes and mobile homes shall comply with applicable laws of the State of Arizona and this Code. The provisions of this section for factory-built buildings, manufactured homes and mobile homes take precedence over other code provisions which are inconsistent therewith. The general provisions of this Code shall apply in all areas where there are not specific provisions in this section.

3110.1.1 Arizona law. The construction of factory-built buildings and manufactured homes is regulated by the State of Arizona, Arizona Revised Statutes, ARS 41-2142 et seq, and is not included in this Code.

3110.1.2 Manufactured home installation. The installation of manufactured homes and mobile homes, including connection to utilities, is regulated by the State of Arizona, except that a City of Phoenix on-site permit is required for *Phoenix Zoning Ordinance* administration purposes. Connection to a city water or sewer tap requires a separate permit from the Development Services Department.

3110.1.3 Factory-built building installation. The installation of factory-built buildings, including their foundations and direct connection to sewer, water, gas or electric utilities, is regulated by the State of Arizona, except that a City of Phoenix on-site permit is required for compliance with *Phoenix Zoning Ordinance* requirements and with building code requirements pertaining to location on property and

setback from other buildings or structures on the property. A City of Phoenix building permit is required for all on-site construction (except foundations) including connection to or alteration of existing on-site sewer, water, gas or electrical systems, and for construction of all site improvements required by the *Phoenix Zoning Ordinance* such as design review elements, signs, parking, landscaping, site amenities and disabled accessibility. Connection to a city water or sewer tap requires a separate permit from the Development Services Department.

3110.1.4 Alterations and additions. Repairs, alterations and site-built additions to factory-built buildings, mobile homes and manufactured homes are regulated by this Code and by the *Phoenix Zoning Ordinance* and require City of Phoenix permits.

3110.1.5 Occupancy and use. Occupancy and use of a factory-built building, manufactured home or mobile home is prohibited without first obtaining inspection approval and a Certificate of Occupancy, to verify compliance with the *Phoenix Zoning Ordinance* and other applicable city codes and ordinances.

3110.2 Definitions. For the purpose of this section, the following definitions shall apply:

FACTORY-BUILT BUILDING. Any residential or nonresidential building including a dwelling unit or habitable room thereof which is either wholly or in substantial part manufactured at an off-site location to be assembled on site, except it does not include a manufactured home, recreational vehicle or mobile home (ARS 41-2142).

MANUFACTURED HOME. Any structure built in accordance with the National Manufactured Home Construction and Safety Standards Act.

MOBILE HOME. Any structure built prior to June 15, 1976 on a permanent chassis, capable of being transported in one or more sections and designed to be used with or without a permanent foundation as a dwelling when connected to on-site utilities except that it does not include recreational vehicles or factory-built buildings.

ON-SITE PERMIT. A permit issued by the building official which authorizes the placement of a factory-built building, manufactured home or mobile home on a site. The on-site permit shall authorize only the placement, foundation or unit tie-down and specific connections to utility services which are authorized by a permit issued by the State of Arizona Office of Manufactured Housing. All other work on the site shall require a building permit in accordance with Section 105 of the *Phoenix Building Construction Code-Administrative Provisions*. Connection to a city water or sewer tap requires a separate permit from the Development Services Department.

3110.3 Installation requirements. No factory-built building, manufactured home or mobile home shall be moved onto or installed on any lot or site in the City of Phoenix except in compliance with these provisions.

3110.3.1 State insignia required. No person, firm or corporation shall move onto any site, any factory-built building or manufactured home building unless such building bears a current, valid insignia of approval from the State of Arizona.

3110.3.2 State permit required. No person, firm or corporation shall move onto any site, any factory-built building, manufactured home or mobile home unless and until a permit for such installation has been obtained from the State of Arizona.

3110.3.3 On-site permit required. No person, firm or corporation shall move onto any site, or relocate on any site, any factory-built building, manufactured home or mobile home until an on-site permit has been issued by the City of Phoenix.

A site plan shall be submitted which shows all utility connections and all other information necessary to ascertain compliance with the separation and area restrictions of other sections of this code and with all provisions of the *Phoenix Zoning Ordinance*. If the work described by the documents submitted conforms to this section and other applicable laws, the on-site permit shall be issued to the owner of the site or his or her authorized agent.

3110.3.4 Building permit required. The person, firm or corporation obtaining the on-site permit shall also apply for and obtain a building permit when one or more of the following conditions apply:

1. For all on-site construction which connects to or alters existing buildings or existing on-site sewer, water, gas or electrical systems.
2. For all on-site construction which is required by or regulated by the *Phoenix Zoning Ordinance*, such as for design review elements, signs, parking, landscaping, site amenities and disabled accessibility.
3. For all construction or alteration which is not part of the state-approved factory-built building, manufactured home or mobile home, including all interior fit-up, tenant improvement or remodeling work which is not specifically included in such state permit.
4. When a City of Phoenix inspection is requested by the installer for work otherwise included in the State of Arizona installation permit, including but not limited to requests for utility clearance inspections.

All work subject to a building permit under this section is subject to all inspections and all technical requirements of this Code and all other applicable city codes and ordinances. For administrative purposes, the building official may combine the on-site permit and the city building permit into a single document.

3110.4 Repairs, alterations and additions. No person shall repair, alter or add on to a factory-built building, manufactured home or a mobile home after the unit has been installed without first having obtained a permit for the specific work to be performed. All such work shall comply with the requirements of this Code.

3110.5 Fire protection. Factory-built buildings shall be protected pursuant to the *Phoenix Fire Code*.

