



DEPARTMENT OF BUILDINGS POOL AND SPA CODE REQUIREMENTS

The following guidelines are intended to assist residents with the minimum code requirements for pools and spas on residential properties. The references below highlight only a portion of the code, a registered design professional must be consulted for a full analysis.

Any questions regarding the process can be answered from 8:30 am – 4:30 pm, Monday to Friday by contacting the Building Department at 516.326.6319 or FPBuildings@FPVillage.org
The Building Department is located at 1 Pool and Garage Road, Floral Park, NY

VILLAGE OF FLORAL PARK ZONING ORDINANCE

§ 99-25. Swimming pools and prefabricated units. [Amended 12-6-2005 by L.L. No. 7-2005]

- A. Application of section. No outdoor swimming pool or prefabricated unit shall be constructed, erected or maintained in the Village of Floral Park except in conformity with this chapter, the Municipal Code and all applicable state laws, rules and regulations.
- B. Definitions. As used in this chapter, a swimming pool is hereby defined as any structure intended for swimming, bathing or wading, either above or below ground, having a depth for retaining water of 20 inches or more and a capacity of 200 gallons or more. As used in this chapter, a prefabricated unit is hereby defined as a self-contained portable hot tub or spa unit used for recreational purposes and having a maximum capacity of 300 gallons.
- C. Permit required. No swimming pool or prefabricated unit shall be constructed, erected or maintained unless a permit for the same shall have been issued by the Superintendent of Buildings. An application for such permit shall be on such form as may be furnished by the Building Department, and shall be accompanied by complete plans and specifications of the pool or prefabricated unit, the plan for the disposal of water, the type and location of fencing and a survey or map showing the location thereof with respect to the boundary lines of the land of the applicant. Permits may be issued only upon application of the owner of the land or his or her agent duly authorized, in writing, to make such application. Applications shall be accompanied by a permit fee established by resolution of the Board of Trustees.
- D. Annual renewal required. No swimming pool or prefabricated unit shall be maintained or used after the year of initial installation or construction thereof except after obtaining from the Building Department a permit for such maintenance and use. Such permit shall be obtained each year before any use is made of such swimming pool or prefabricated unit. A fee for said renewal permit shall be in such amount as the Board of Trustees shall determine by resolution.
- E. Materials of construction. No swimming pool or prefabricated unit shall be built, constructed or maintained except of materials having adequate strength to retain the water designed to be contained therein. Each swimming pool or prefabricated unit shall be designed in accordance with sound engineering practice.
- F. Water disposal. Water overflowing from the swimming pool or prefabricated unit and when the swimming pool or prefabricated unit is emptied shall be disposed of on the owner's land and shall be prevented from flowing over or into the land of any adjoining property owner or over or into any abutting street, or into any storm sewer. All water must be disposed of through the homeowner's sanitary sewer system.

- G. Fencing. Fencing shall be in compliance with the provisions of the New York State Residential Code.
- H. Perimeter required. There shall be a perimeter of at least five feet around a swimming pool, which perimeter shall be between the edge of the swimming pool and the fence erected around the swimming pool.
- I. Lighting. No lighting shall be permitted in, on or about said swimming pool, except such lighting that shall shine into or upon said swimming pool and cast no light or reflections onto abutting properties. All electrical work shall be performed by a licensed electrician in accordance with the provisions of the National Electrical Code.
- J. Abandonment. Should the owner abandon the swimming pool, he or she shall arrange to remove the depression and return the surface of the ground to its original grade and approximately in the same condition as before the swimming pool was constructed, and he or she shall further notify the Superintendent of Buildings of the abandonment so that the inspection of the site may be made and the records of the permit may be marked accordingly.
- K. Location. Every swimming pool and prefabricated unit shall conform to the following requirements as to location:
- (1) Not less than a distance of five feet from any rear or side line of the lot, but not less than 10 feet from any lot line along an abutting street or along a side or front yard on any contiguous lot; provided, however, that each of the foregoing distances shall be increased by one foot for each 100 square feet by which the area of the plane surface of water of any pool exceeds (or would exceed if the pool were completely filled) 500 square feet.
 - (2) Not less than a distance of 10 feet from any cesspool or any part of a sewage disposal system (other than a sewer main).
 - (3)
 - (a) All swimming pools shall have a distance of not less than 10 feet from any main building and not less than five feet from any accessory building.
 - (b) All prefabricated units shall have a distance of not less than five feet away from any accessory structure.
 - (4) In addition, a private outdoor pool shall be located only in a rear yard, and the coverage thereof shall not exceed 30% of the area of the rear yard for all accessory buildings and structures located therein; provided, however, that no such pool shall occupy more than 15% of the area of any rear yard.
- L. Enforcement. The Enforcement Office shall be empowered to enforce the regulations herein set forth and to compel the removal of any swimming pool or prefabricated unit that fails to meet the requirements as to installation or proper maintenance of the swimming pool or prefabricated unit, water disposal and appurtenances.
- M. Compliance. The owner of any land upon which a swimming pool or prefabricated unit shall have been constructed prior to the date of adoption of the local law from which this chapter is derived shall obtain a permit and comply with the requirements contained herein.
- N. Penalties. Any person violating any provisions of this chapter shall be punished as provided in § 99-63 of this Municipal Code.

NEW YORK STATE 2017 BUILDING CODE SUPPLEMENT
SECTION R326
SWIMMING POOLS, SPAS AND HOT TUBS

SECTION R326.1 GENERAL

R326.1 General. The provisions of this Section shall control the design and construction of swimming pools, spas and hot tubs installed in or on the lot of a one- or two-family dwelling.

SECTION R326.2 DEFINITIONS

R326.2 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, PERMANENT. A fence, wall, building wall or combination thereof which completely surrounds the swimming pool and obstructs access to the swimming pool.

BARRIER, TEMPORARY. An approved temporary fence, permanent fence, the wall of a permanent structure, any other structure, or any combination thereof that prevents access to the swimming pool by any person not engaged in the installation or construction of the swimming pool during its installation or construction.

HOT TUB. See "Swimming pool".

IN-GROUND POOL. See "Swimming pool".

RESIDENTIAL. That which is situated on the premises of a detached one- or two-family dwelling or a one-family townhouse not more than three stories in height.

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.

SUBSTANTIAL DAMAGE. For the purpose of determining compliance with the pool alarm provisions of this appendix, damage of any origin sustained by a swimming pool whereby the cost of restoring the swimming pool to its before-damaged condition would equal or exceed 50 percent of the market value of the swimming pool before the damage occurred.

SUBSTANTIAL MODIFICATION. For the purpose of determining compliance with the pool alarm provisions of this appendix, any repair, alteration, addition or improvement of a swimming pool, the cost of which equals or exceeds 50 percent of the market value of the swimming pool before the improvement or repair is started. If a swimming pool has sustained substantial damage, any repairs are considered substantial modification regardless of the actual repair work performed.

SWIMMING POOL. Any structure, basin, chamber or tank which is intended for swimming, diving, recreational bathing or wading and which contains, is designed to contain, or is capable of containing water more than 24 inches (610 mm) deep at any point. This includes in-ground, above-ground and on-ground pools; indoor 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 the walls of the enclosing structure.

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

SECTION R326.3 SWIMMING POOLS

R326.3.1 In-ground pools. In-ground pools shall be designed and constructed in conformance with ANSI/NSPI-5.

R326.3.2 Above-ground and on-ground pools. Above-ground and on-ground pools shall be designed and constructed in conformance with ANSI/NSPI-4.

SECTION R326.4 SPAS AND HOT TUBS

R326.4.1 Permanently installed spas and hot tubs. Permanently installed spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-3 (Standard for Permanently Installed Residential Spas, 1999).

R326.4.2 Portable spas and hot tubs. Portable spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-6.

SECTION R326.5 BARRIER REQUIREMENTS

R326.5.1 Application. The provisions of this section shall control the design of barriers for residential swimming pools, spas and hot tubs. These design controls are intended to provide protection against potential drowning and near-drowning by restricting access to swimming pools, spas and hot tubs.

R326.5.2 Temporary barriers. An outdoor swimming pool, including an in-ground, above-ground or on-ground pool, hot tub or spa shall be surrounded by a temporary barrier during installation or construction and shall remain in place until a permanent barrier in compliance with Section R326.5.3 is provided.

Exceptions:

1. Above-ground or on-ground pools where the pool structure is the barrier in compliance with Section R326.5.3.
2. Spas or hot tubs with a safety cover which complies with ASTM F 1346, provided that such safety cover is in place during the period of installation or construction of such hot tub or spa. The temporary removal of a safety cover as required to facilitate the installation or construction of a hot tub or spa during periods when at least one person engaged in the installation or construction is present is permitted.

R326.5.2.1 Height. The top of the temporary barrier shall be at least 48 inches (1219 mm) above grade measured on the side of the barrier which faces away from the swimming pool.

R326.5.2.2 Replacement by a permanent barrier. A temporary barrier shall be replaced by a complying permanent barrier within either of the following periods:

1. 90 days of the date of issuance of the building permit for the installation or construction of the swimming pool; or
2. 90 days of the date of commencement of the installation or construction of the swimming pool.

R326.5.2.2.1 Replacement extension. Subject to the approval of the code enforcement official, the time period for completion of the permanent barrier may be extended for good cause, including, but not limited to, adverse weather conditions delaying construction.

R326.5.3 Permanent barriers. An outdoor swimming pool, including an in-ground, above-ground or on-ground pool, hot tub or spa shall be surrounded by a barrier which shall comply with the following:

1. The top of the barrier shall be at least 48 inches (1219 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. 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 1³/₄ inches (44 mm) in width. Where

- there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed $1\frac{3}{4}$ 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 $1\frac{3}{4}$ inches (44 mm) in width.
 6. Maximum mesh size for chain link fences shall be a $2\frac{1}{4}$ -inch (57 mm) square unless the fence has slats fastened at the top or the bottom which reduce the openings to not more than $1\frac{3}{4}$ inches (44 mm).
 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 $1\frac{3}{4}$ inches (44 mm).
 8. Gates shall comply with the requirements of Section R326.5.3, Items 1 through 7, and with the following requirements:
 - 8.1 All gates shall be self-closing. In addition, if the gate is a pedestrian access gate, the gate shall open outward, away from the pool.
 - 8.2 All gates shall be self-latching, with the latch handle located within the enclosure (i.e., on the pool side of the enclosure) and at least 40 inches (1016 mm) above grade. In addition, if the latch handle is located less than 54 inches (1372 mm) from the bottom of the gate, the latch handle shall be located at least 3 inches (76 mm) below the top of the gate, and neither the gate nor the barrier shall have any opening greater than 0.5 inch (12.7 mm) within 18 inches (457 mm) of the latch handle.
 - 8.3 All gates shall be securely locked with a key, combination or other child proof lock sufficient to prevent access to the swimming pool through such gate when the swimming pool is not in use or supervised.
 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 powered safety cover in compliance with ASTM F 1346; or
 - 9.2 Doors with direct access to the pool through that wall shall be equipped with an alarm which produces an audible warning when the door and/or its screen, if present, are opened. The alarm shall be listed in accordance with UL 2017. The audible alarm shall activate within 7 seconds and sound continuously for a minimum of 30 seconds after the door and/or its screen, if present, are opened and be capable of being heard throughout the house during normal household activities. The alarm shall automatically reset under all conditions. The alarm system shall be equipped with a manual means, such as touch pad or switch, to temporarily deactivate the alarm for a single opening. Deactivation shall last for not more than 15 seconds. The deactivation switch(es) shall be located at least 54 inches (1372 mm) above the threshold of the door; or
 - 9.3 Other means of protection, such as self-closing doors with self-latching devices, shall be acceptable so long as the degree of protection afforded is not less than the protection afforded by Item 9.1 or 9.2 described above.
 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:
 - 10.1 The ladder or steps shall be capable of being secured, locked or removed to prevent access; or
 - 10.2 The ladder or steps shall be surrounded by a barrier which meets the requirements of Section R326.5.3, 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.

R326.5.4 Indoor swimming pool. Walls surrounding an indoor swimming pool shall comply with Section R326.5.3, Item 9.

R326.5.5 Prohibited locations. Barriers shall be located to prohibit permanent structures, equipment or similar objects from being used to climb them.

R326.5.6 Barrier exceptions. Spas or hot tubs with a safety cover which complies with ASTM F 1346 shall be exempt from the

provisions of this appendix.

SECTION R326.6 ENTRAPMENT PROTECTION FOR SWIMMING POOL AND SPA SUCTION OUTLETS

R326.6.1 General. Suction outlets shall be designed to produce circulation throughout the pool or spa. Single-outlet systems, such as automatic vacuum cleaner systems, or multiple suction outlets, whether isolated by valves or otherwise, shall be protected against user entrapment.

R326.6.1.1 Compliance alternative. Suction outlets may be designed and installed in accordance with ANSI/APSP-7.

R326.6.2 Suction fittings. Pool and spa suction outlets shall have a cover that conforms to ANSI/ASME A112.19.8M, or an 18 inch by 23 inch (457 mm by 584 mm) drain grate or larger, or an approved channel drain system.

Exception: Surface skimmers.

R326.6.3 Atmospheric vacuum relief system required. Pool and spa single- or multiple- outlet circulation systems shall be equipped with atmospheric vacuum relief should grate covers located therein become missing or broken. This vacuum relief system shall include at least one approved or engineered method of the type specified herein, as follows:

1. Safety vacuum release system conforming to ASME A112.19.17; or
2. An approved gravity drainage system.

R326.6.4 Dual drain separation. Single or multiple pump circulation systems have a minimum of two suction outlets of the approved type. A minimum horizontal or vertical distance of 3 feet (914 mm) shall separate the outlets. These suction outlets shall be piped so that water is drawn through them simultaneously through a vacuum-relief-protected line to the pump or pumps.

R326.6.5 Pool cleaner fittings. Where provided, vacuum or pressure cleaner fitting(s) shall be located in an accessible position(s) at least 6 inches (152 mm) and not more than 12 inches (305 mm) below the minimum operational water level or as an attachment to the skimmer(s).

SECTION R326.7 SWIMMING POOL AND SPA ALARMS

R326.7.1 Applicability. A swimming pool or spa installed, constructed or substantially modified after December 14, 2006, shall be equipped with an approved pool alarm.

Exceptions:

1. A hot tub or spa equipped with a safety cover which complies with ASTM F1346.
2. A swimming pool (other than a hot tub or spa) equipped with an automatic power safety cover which complies with ASTM F1346.

Pool alarms shall comply with ASTM F2208 (Standard Specification for Pool Alarms), and shall be installed, used and maintained in accordance with the manufacturer's instructions and this section.

R326.7.2 Multiple alarms. A pool alarm must be capable of detecting entry into the water at any point on the surface of the swimming pool. If necessary, to provide detection capability at every point on the surface of the swimming pool, more than one pool alarm shall be provided.

R326.7.3 Alarm activation. Pool alarms shall activate upon detecting entry into the water and shall sound poolside and inside the dwelling.

R326.7.4 Prohibited alarms. The use of personal immersion alarms shall not be construed as compliance with this section.

SECTION R326.8 STANDARDS

R326.8.1 General. The following table lists the standards that are referenced in Section R326 that are neither listed in Chapter 44 of the 2015 IRC, nor Chapter 10 of this Supplement. The standards are listed by the promulgating agency of the standard, the standard identification, the effective date and title, and the section(s) of Section R326 that reference the standard. Referenced standards that have been incorporated by reference into 19 NYCRR Parts 1220 through 1228 are located in Chapter 10 of this Supplement. Application of referenced standards shall be as specified in Section 102.5.

Chapter 42: Swimming Pools

General Comments

This chapter addresses all aspects of wiring, fixtures, motors and electrical accessories for swimming pools, wading pools, hot tubs, spas and hydromassage bathtubs.

Purpose

This chapter focuses on protection of occupants from electrical shock. The dangers of using electricity around water, wet surfaces, grounded surfaces and plumbing are well known, and this chapter is intended to minimize or eliminate those hazards.

SECTION E4201 GENERAL

E4201.1 Scope. The provisions of this chapter shall apply to the construction and installation of electric wiring and equipment associated with all swimming pools, wading pools, decorative pools, fountains, hot tubs and spas, and hydromassage bathtubs, whether permanently installed or storable, and shall apply to metallic auxiliary equipment, such as pumps, filters and similar equipment. Sections E4202 through E4206 provide general rules for permanent pools, spas and hot tubs. Section E4207 provides specific rules for storable pools and storable/portable spas and hot tubs. Section E4208 provides specific rules for spas and hot tubs. Section E4209 provides specific rules for hydromassage bathtubs. (680.1)

❖ Because of a unique potential of electrical shock hazard around pools, a separate chapter is included in the code to provide specific detailed requirements regarding the wiring in and around swimming pools, wading pools, spas and hot tubs and hydromassage tubs. A conductive path for fault current can easily be established through the water to the earth. When a person in a pool touches a metallic surface that is energized, the fault-current path through the individual can be fatal. Also, a person in the pool not touching anything but the water could become part of a fault-current path. For example, if an energized device such as an electric appliance drops into the pool, an electrical potential could be established in the pool resulting in a voltage gradient that could cause the person to be surrounded by different levels of voltage in the water acting like a conductor. Because of these types of hazards, more stringent and unique code provisions apply to wiring around swimming pools.

E4201.2 Definitions. (680.2)

CORD-AND-PLUG-CONNECTED LIGHTING ASSEMBLY. A lighting assembly consisting of a cord-and-plug-connected transformer and a luminaire intended for installation in the wall of a spa, hot tub, or storable pool.

❖ This is a definition for a lighting fixture used in the wall of a storable swimming pool, spa, or hot tub. It is made

with a nonmetallic housing and is supplied with power from a cord- and plug-connected transformer.

DRY-NICHE LUMINAIRE. A luminaire intended for installation in the floor or wall of a pool, spa or fountain in a niche that is sealed against the entry of water.

❖ A dry-niche luminaire is installed behind a clear window below the water level and does not allow pool water to enter the forming shell or the area around the lamp housing. For swimming pool wiring in dwellings, access to the lamp would typically be through a deck box, and relamping is done from behind the waterproof lens or glass window. The dry-niche area where the lamp is installed must have drainage for any water that may enter from the deck area of the pool when the cover is off for servicing. The glass window is sealed against the entry of pool water.

FORMING SHELL. A structure designed to support a wet-niche luminaire assembly and intended for mounting in a pool or fountain structure.

❖ A forming shell is built into the wall of the pool and is the supporting part of the wet-niche luminaire.

FOUNTAIN. Fountains, ornamental pools, display pools, and reflection pools. The definition does not include drinking fountains.

❖ Decorative pools and fountains fall under the scope of this chapter.

HYDROMASSAGE BATHTUB. A permanently installed bathtub equipped with a recirculating piping system, pump, and associated equipment. It is designed so it can accept, circulate and discharge water upon each use.

❖ A hydromassage bathtub is similar to a normal bathtub in that the water is drained after each use. The hydromassage bathtub does not store water and is not left filled with water like a spa or hot tub. It has a pump and piping system for jetting water when filled. The pump must be plugged into a ground-fault circuit interrupter (GFCI) protected receptacle. All receptacles in the same bathroom with the hydromassage bathtub must be GFCI protected.

SWIMMING POOLS

LOW VOLTAGE CONTACT LIMIT. A voltage not exceeding the following values:

1. 15 volts (RMS) for sinusoidal AC
2. 21.2 volts peak for nonsinusoidal AC
3. 30 volts for continuous DC
4. 12.4 volts peak for DC that is interrupted at a rate of 10 to 200 Hz

MAXIMUM WATER LEVEL. The highest level that water can reach before it spills out.

❖ In the plumbing part of this code the term “flood-level rim” is used; the meaning is the same as “maximum water level.”

NO-NICHE LUMINAIRE. A luminaire intended for installation above or below the water without a niche.

❖ This is an underwater luminaire installed on the surface of the wall of the pool on a mounting bracket. For changing the lamp, the cord should be long enough to detach the fixture from the bracket underwater and bring it out of the water. A no-niche luminaire is typically used on an aboveground pool that does not have a forming shell.

PACKAGED SPA OR HOT TUB EQUIPMENT ASSEMBLY. A factory-fabricated unit consisting of water-circulating, heating and control equipment mounted on a common base, intended to operate a spa or hot tub. Equipment may include pumps, air blowers, heaters, luminaires, controls and sanitizer generators.

❖ The packaged unit comes already assembled from the manufacturer, minimizing the need to design and install each component in the field. The spa or hot tub vessel comes as a separate component and is installed on the job along with the packaged assembly of equipment.

PERMANENTLY INSTALLED SWIMMING, WADING, IMMERSION AND THERAPEUTIC POOLS. Those that are constructed in the ground or partially in the ground, and all others capable of holding water with a depth greater than 42 inches (1067 mm), and all pools installed inside of a building, regardless of water depth, whether or not served by electrical circuits of any nature.

❖ Special provisions are included in the code for swimming pools because of the high risk of electric shock resulting from the conductive path from a human body to the water surrounding a human body through the concrete and reinforcing steel in the wall of the pool to the earth.

POOL. Manufactured or field-constructed equipment designed to contain water on a permanent or semipermanent basis and used for swimming, wading, immersion, or therapeutic purposes.

POOL COVER, ELECTRICALLY OPERATED. Motor-driven equipment designed to cover and uncover the water surface of a pool by means of a flexible sheet or rigid frame.

❖ Because of the close proximity of the motor of an electrically operated pool cover to the edge of the pool, the

code has special provisions regarding these pool covers.

SELF-CONTAINED SPA OR HOT TUB. A factory-fabricated unit consisting of a spa or hot tub vessel with all water-circulating, heating and control equipment integral to the unit. Equipment may include pumps, air blowers, heaters, luminaires, controls and sanitizer generators.

❖ The equipment needed to operate the spa or hot tub such as pumps, heaters, controls, etc., is manufactured together with the spa or hot tub vessel and comes as a complete unit.

SPA OR HOT TUB. A hydromassage pool, or tub for recreational or therapeutic use, not located in health care facilities, designed for immersion of users, and usually having a filter, heater, and motor-driven blower. They are installed indoors or outdoors, on the ground or supporting structure, or in the ground or supporting structure. Generally, a spa or hot tub is not designed or intended to have its contents drained or discharged after each use.

❖ A hot tub is typically built with wood, such as redwood, but a spa is usually made of fiberglass, concrete or tile. They may have much the same equipment that a swimming pool could have, such as stainless-steel handrails and electric equipment for heating and circulating the water.

STORABLE SWIMMING, WADING OR IMMERSION POOLS; OR STORABLE/PORTABLE SPAS AND HOT TUBS. Those that are constructed on or above the ground and are capable of holding water with a maximum depth of 42 inches (1067 mm), or a pool with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension.

❖ This definition was included in the code to help differentiate between a storable pool and a permanent pool built in the ground. Also, the code provisions and definition for storable pools are included in the code because these structures have most of the same equipment that an in-ground pool could have. They are not built with concrete and reinforcing steel, but similar electrical hazards exist. Although storable pool are intended to be temporary, and many storable pools are disassembled during the cold months of the year, an on-ground pool that is left installed all year could still be defined as a storable pool.

THROUGH-WALL LIGHTING ASSEMBLY. A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall.

❖ Such assemblies allow the installations of pool lighting in above-ground pools. The components house the luminaire and also serve to seal the opening made in the wall of the pool.

WET-NICHE LUMINAIRE. A luminaire intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire will be completely surrounded by water.

❖ A wet-niche luminaire is designed to have the pool water completely surround the fixture within the forming shell. A wet-niche luminaire is connected with a

cord that extends to a junction box, typically at the pool deck. It has enough cord so that when the fixture is relamped, it is brought up out of the water without the cord being disconnected and then the cord is recoiled and placed behind the fixture in the forming shell.

**SECTION E4202
WIRING METHODS FOR POOLS, SPAS, HOT TUBS
AND HYDROMASSAGE BATHTUBS**

E4202.1 General. Wiring methods used in conjunction with permanently installed swimming pools, spas, hot tubs or hydromassage bathtubs shall be installed in accordance with Table E4202.1 and Chapter 38 except as otherwise stated in this section. Storable swimming pools shall comply with Section E4207. [680.7; 680.21(A); 680.23(B) and (F); 680.25(A); 680.42; 680.43; and 680.70]

❖ Table E4202.1 covers the rules for the raceways and cables that can be used in wiring associated with

swimming pools. The rules in Chapter 38 for wiring methods apply except as modified by the provisions of this chapter. It is important to consider the notes of Table E4202.1. For example, Note c indicates that EMT can be used only on or within buildings.

E4202.2 Flexible cords. Flexible cords used in conjunction with a pool, spa, hot tub or hydromassage bathtub shall be installed in accordance with the following:

1. For other than underwater luminaires, fixed or stationary equipment shall be permitted to be connected with a flexible cord to facilitate removal or disconnection for maintenance or repair. For other than storable pools, the flexible cord shall not exceed 3 feet (914 mm) in length. Cords that supply swimming pool equipment shall have a copper equipment grounding conductor not smaller than 12 AWG and shall terminate in a grounding-type attachment plug. [680.7(A), (B), and (C); 680.21(A)(5)]

**TABLE E4202.1
ALLOWABLE APPLICATIONS FOR WIRING METHODS^{a, b, c, d, e, f, g, h, k}**

WIRING LOCATION OR PURPOSE (Application allowed where marked with an "A")	AC, FMC, NM, SR, SE	EMT	ENT	IMC ⁱ , RMC ⁱ , RNC ^h	LFMC	LFNMC	UF	MC ^j	FLEX CORD
Panelboard(s) that supply pool equipment: from service equipment to panelboard	A ^{b, e} SR not permitted	A ^c	A ^b	A	—	A	A ^c	A ^c	—
Wet-niche and no-niche luminaires: from branch circuit OCPD to deck or junction box	AC ^b only	A ^c	A ^b	A	—	A	—	A ^b	—
Wet-niche and no-niche luminaires: from deck or junction box to forming shell	—	—	—	A ^d	—	A	—	—	A ^g
Dry niche: from branch circuit OCPD to luminaires	AC ^b only	A ^c	A ^b	A	—	A	—	A ^b	—
Pool-associated motors: from branch circuit OCPD to motor	A ^b	A ^c	A ^b	A	A ^e	A ^e	A ^b	A	A ^g
Packaged or self-contained outdoor spas and hot tubs with underwater luminaire: from branch circuit OCPD to spa or hot tub	AC ^b only	A ^c	A ^b	A	A ^f	A ^f	—	A ^b	A ^g
Packaged or self-contained outdoor spas and hot tubs without underwater luminaire: from branch circuit OCPD to spa or hot tub	A ^b	A ^c	A ^b	A	A ^f	A ^f	A ^b	A	A ^g
Indoor spas and hot tubs, hydromassage bathtubs, and other pool, spa or hot tub associated equipment: from branch circuit OCPD to equipment	A ^b	A ^c	A ^b	A	A	A	A	A	A ^g
Connection at pool lighting transformers or power supplies	AC ^b only	A ^c	A ^b	A	A ^{l, f}	A ^f	—	A ^b	—

For SI: 1 foot = 304.8 mm.

- a. For all wiring methods, see Section E4205 for equipment grounding conductor requirements.
- b. Limited to use within buildings.
- c. Limited to use on or within buildings.
- d. Metal conduit shall be constructed of brass or other approved corrosion-resistant metal.
- e. Limited to where necessary to employ flexible connections at or adjacent to a pool motor.
- f. Sections installed external to spa or hot tub enclosure limited to individual lengths not to exceed 6 feet. Length not limited inside spa or hot tub enclosure.
- g. Flexible cord shall be installed in accordance with Section E4202.2.
- h. Nonmetallic conduit shall be rigid polyvinyl chloride conduit Type PVC or reinforced thermosetting resin conduit Type RTRC.
- i. Aluminum conduits shall not be permitted in the pool area where subject to corrosion.
- j. Where installed as direct burial cable or in wet locations, Type MC cable shall be listed and identified for the location.
- k. See Section E4202.3 for listed, double-insulated pool pump motors.
- l. Limited to use in individual lengths not to exceed 6 feet. The total length of all individual runs of LFMC shall not exceed 10 feet.

2. Other than listed low-voltage lighting systems not requiring grounding, wet-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. Such grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure and shall be not smaller than the supply conductors and not smaller than 16 AWG. [680.23(B)(3)]
 3. A listed packaged spa or hot tub installed outdoors that is GFCI protected shall be permitted to be cord-and-plug-connected provided that such cord does not exceed 15 feet (4572 mm) in length. [680.42(A)(2)]
 4. A listed packaged spa or hot tub rated at 20 amperes or less and installed indoors shall be permitted to be cord-and-plug-connected to facilitate maintenance and repair. (680.43 Exception No. 1)
 5. For other than underwater and storable pool lighting luminaire, the requirements of Item 1 shall apply to any cord-equipped luminaire that is located within 16 feet (4877 mm) radially from any point on the water surface. [680.22(B)(5)]
- ❖ Flexible cords are used to facilitate easy removal or repair of fixed or stationary equipment. For example, a pool cover motor could be connected by a flexible cord not over 3 feet (914 mm) long. Limiting the length of the cord will help prevent excessive cord length from being in the pool water or otherwise exposed. Underwater fixtures such as no-niche and wet-niche fixtures are permitted to have longer cords so that the fixture can be removed and brought up on the deck for servicing. Some equipment on a storable pool could have cords longer than 3 feet (914 mm) because it is not fixed or stationary, being installed so that it can be removed and stored.
- An example of a permitted flexible cord in the area of a swimming pool is one for a luminaire within 16 feet (4877 mm) of the edge of the water. It is permitted to be cord- and plug-connected if the cord is a maximum of 3 feet (914 mm) long, has a grounding conductor of at least size 12 AWG and has a grounding-type attachment plug (cap).
- E4202.3 Double insulated pool pumps.** A listed cord and plug-connected pool pump incorporating an approved system of double insulation that provides a means for grounding only the internal and nonaccessible, noncurrent-carrying metal parts of the pump shall be connected to any wiring method recognized in Chapter 38 that is suitable for the location. Where the bonding grid is connected to the equipment grounding conductor of the motor circuit in accordance with Section E4204.2, Item 6.1, the branch circuit wiring shall comply with Sections E4202.1 and E4205.5. [680.21(B)]
- ❖ See Sections E4202.1, E4204.2 and E4205.5.

SECTION E4203 EQUIPMENT LOCATION AND CLEARANCES

E4203.1 Receptacle outlets. Receptacle outlets shall be installed and located in accordance with Sections E4203.1.1 through E4203.1.5. Distances shall be measured as the shortest path that an appliance supply cord connected to the receptacle would follow without penetrating a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier. [680.22(A)(5)]

- ❖ The measurement between the edge of the pool and a receptacle is the shortest unobstructed route of an appliance supply cord plugged into the receptacle. The code considers such things as doors, windows, walls, floors and ceilings to be “effective permanent barriers” in determining the distance of a receptacle from the edge of the pool. When measuring the distance from the pool water to the receptacle, if the measurement is, for example, a total of 9 feet (2743 mm) from the pool to the receptacle, but the measurement is through a doorway that has a sliding or hinged door installed (not an opening without a door), the door is considered a barrier and the receptacle would not be considered 9 feet (2743 mm) from the edge of the pool and would not require GFCI protection because of the proximity of the swimming pool. The receptacle in this example could be required to have GFCI protection for a different reason, such as if it were in a bathroom (see commentary, Section E3902.1).

E4203.1.1 Location. Receptacles that provide power for water-pump motors or other loads directly related to the circulation and sanitation system shall be permitted to be located between 6 feet and 10 feet (1829 mm and 3048 mm) from the inside walls of pools and outdoor spas and hot tubs, where the receptacle is single and of the grounding type and protected by ground-fault circuit interrupters.

Other receptacles on the property shall be located not less than 6 feet (1829 mm) from the inside walls of pools and outdoor spas and hot tubs. [680.22(A)(2) and (A)(3)]

- ❖ Only receptacles for specific equipment are permitted between 6 and 10 feet (1524 mm and 3048 mm) from the inside wall of the pool, and they must be a single receptacle of the locking and grounding type so that a typical radio, for example, could not be plugged into it. The code prohibits receptacles that supply power to appliances from being installed within 6 feet (3048 mm) of the inside wall of the pool.

E4203.1.2 Where required. At least one 125-volt, 15- or 20-ampere receptacle supplied by a general-purpose branch circuit shall be located a minimum of 6 feet (1829 mm) from and not more than 20 feet (6096 mm) from the inside wall of pools and outdoor spas and hot tubs. This receptacle shall be located not more than 6 feet, 6 inches (1981 mm) above the floor, platform or grade level serving the pool, spa or hot tub. [680.22(A)(1)]

- ❖ At least one receptacle is required in the area between 6 and 20 feet (3048 mm and 6096 mm) from the inside

wall of a swimming pool and outdoor spas and hot tubs. This requirement is for indoor and outdoor swimming pools but only for outdoor spas and hot tubs. This provides a power source for appliances to be used near the pool without resorting to the use of extension cords. Because a typical appliance supply cord is about 6 feet (1829 mm), it is less likely that an appliance would be bumped and knocked into the pool where it is plugged into a receptacle located at least 6 feet from the pool water. This required receptacle could be on a wall above a raised deck, for example, as long as the receptacle is not over 78 inches (1981 mm) above the swimming pool deck (see Section E4203.1.3).

E4203.1.3 GFCI protection. All 15- and 20-ampere, single phase, 125-volt receptacles located within 20 feet (6096 mm) of the inside walls of pools and outdoor spas and hot tubs shall be protected by a ground-fault circuit-interrupter. Outlets supplying pool pump motors supplied from branch circuits rated at 120 volts through 240 volts, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel. [680.21(C) and 680.22(A)(4)]

❖ Pool pump motor receptacles must be GFCI protected regardless of their location. All receptacles within 20 feet (6096 mm) of the pool water must have GFCI protection including any single-, locking- and grounding-type receptacles installed for specific equipment. This applies to storable pools as well as permanently installed indoor and outdoor pools. It may not be common to have an indoor pool with a deck over 20 feet (6096 mm) wide, [20 feet (6096 mm) from the inside wall of the pool to the wall of the building], but where this occurs, any receptacle over 20 feet (6096 mm) from the pool would not have to be GFCI protected. Where a pool is installed outdoors, the 20-foot (6096 mm) rule is irrelevant since all outdoor receptacles at a dwelling require GFCI protection per Section E3902.3.

E4203.1.4 Indoor locations. Receptacles shall be located not less than 6 feet (1829 mm) from the inside walls of indoor spas and hot tubs. A minimum of one 125-volt receptacle shall be located between 6 feet (1829 mm) and 10 feet (3048 mm) from the inside walls of indoor spas or hot tubs. [680.43(A) and 680.43(A)(1)]

❖ This code provision is specifically for indoor spas and hot tubs. The rule to have at least one receptacle between 6 feet and 10 feet (1524 mm and 3048 mm) from the inside wall of the spa or hot tub is to help prevent the hazards inherent with the use of extension cords.

E4203.1.5 Indoor GFCI protection. All 125-volt receptacles rated 30 amperes or less and located within 10 feet (3048 mm) of the inside walls of spas and hot tubs installed indoors, shall be protected by ground-fault circuit-interrupters. [680.43(A)(2)]

❖ All receptacles (30 amp and smaller) within 10 feet (3048 mm) of the inside wall of the spa or hot tub require GFCI protection. The code provisions for locat-

ing receptacles around hydromassage bathtubs are different from those for spas and hot tubs. A receptacle is not prohibited in the area within 6 feet (1524 mm) and is not required between 6 feet and 10 feet (1524 and 3048 mm) from a hydromassage bathtub, but any receptacles located within 6 feet (1524 mm) of the inside wall of a hydromassage bathtub must be GFCI protected.

E4203.2 Switching devices. Switching devices shall be located not less than 5 feet (1524 mm) horizontally from the inside walls of pools, spas and hot tubs except where separated from the pool, spa or hot tub by a solid fence, wall, or other permanent barrier or the switches are listed for use within 5 feet (1524 mm). Switching devices located in a room or area containing a hydromassage bathtub shall be located in accordance with the general requirements of this code. [680.22(C); 680.43(C); and 680.72]

❖ This section refers not only to ordinary light switches but also to such devices as a timer, panelboard, etc. By requiring these devices to be at least 5 feet (1524 mm) from the inside walls of the pool, spa or hot tub, the code intends that they cannot be reached by someone in the pool. People will need to get out of the pool, spa or hot tub to operate the switching device, thus reducing the possible shock hazard. This specific rule does not pertain to switching devices around hydromassage bathtubs.

E4203.3 Disconnecting means. One or more means to simultaneously disconnect all ungrounded conductors for all utilization equipment, other than lighting, shall be provided. Each of such means shall be readily accessible and within sight from the equipment it serves and shall be located at least 5 feet (1524 mm) horizontally from the inside walls of a pool, spa, or hot tub unless separated from the open water by a permanently installed barrier that provides a 5-foot (1524 mm) or greater reach path. This horizontal distance shall be measured from the water's edge along the shortest path required to reach the disconnect. (680.12)

❖ The disconnect must be at least 5 feet (1524 mm) away from the inside walls of pools spas and hot tubs and must be within sight from the pool, spa or hot tub. (Note the exception for an effective barrier) This means it must be visible and not more than 50 feet (15240 mm) away. This allows the power to equipment such as motors and heaters to be turned off while some-one is working on these units.

E4203.4 Luminaires and ceiling fans. Lighting outlets, luminaires, and ceiling-suspended paddle fans shall be installed and located in accordance with Sections E4203.4.1 through E4203.4.6. [680.22(B)]

❖ Compliance with these prescriptive code provisions will help reduce the increased hazards of electrocution near water.

E4203.4.1 Outdoor location. In outdoor pool, outdoor spas and outdoor hot tubs areas, luminaires, lighting outlets, and ceiling-suspended paddle fans shall not be installed over the pool or over the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool except where no part of the

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luminaire or ceiling-suspended paddle fan is less than 12 feet (3658 mm) above the maximum water level. [680.22(B)(1)]

- ❖ For an outdoor pool, spa or hot tub; luminaires and paddle fans are not permitted in the zone that is over the water and including the area extending 5 feet (1524 mm) horizontally from the inside edges of the pool and extending upward to a distance of 12 feet (3658 mm) above the water level. There are no exceptions to this rule. See Section E4203.4.3.

E4203.4.2 Indoor locations. In indoor pool areas, the limitations of Section E4203.4.1 shall apply except where the luminaires, lighting outlets and ceiling-suspended paddle fans comply with all of the following conditions:

1. The luminaires are of a totally enclosed type;
 2. Ceiling-suspended paddle fans are identified for use beneath ceiling structures such as porches and patios.
 3. A ground-fault circuit interrupter is installed in the branch circuit supplying the luminaires or ceiling-suspended paddle fans; and
 4. The distance from the bottom of the luminaire or ceiling-suspended paddle fan to the maximum water level is not less than 7 feet, 6 inches (2286 mm). [680.22(B)(2)]
- ❖ Where provided with GFCI protection, fixtures of the totally enclosed type and paddle fans identified for use on porches and patios, are permitted as close as 7¹/₂ feet (2286 mm) above the water level. A totally enclosed luminaire is one that completely conceals the lamp and lampholder from view and contact.

E4203.4.3 Low-voltage luminaires. Listed low-voltage luminaires not requiring grounding, not exceeding the low-voltage contact limit, and supplied by listed transformers or power supplies that comply with Section E4206.1 shall be permitted to be located less than 1.5 m (5 ft) from the inside walls of the pool. [680.22(B)(6)]

- ❖ This section is written as an exception to the previous Sections E4203.4.1 and E4203.4.2, and essentially states that low-voltage luminaires meeting all of the stated conditions can be located at any distance from the inside walls of the pool. The product listing and manufacturer's installation instructions might dictate a minimum distance. Because this section only addresses the area within 5 feet horizontally of the inside wall of the pool, there appears to be no allowance to locate such luminaires over the area of the pool.

E4203.4.4 Existing lighting outlets and luminaires. Existing lighting outlets and luminaires that are located within 5 feet (1524 mm) horizontally from the inside walls of pools and outdoor spas and hot tubs shall be permitted to be located not less than 5 feet (1524 mm) vertically above the maximum water level, provided that such luminaires and outlets are rigidly attached to the existing structure and are protected by a ground-fault circuit-interrupter. [680.22(B)(3)]

- ❖ This section covers luminaires that are already installed on a house or structure when the construction

of the pool begins. This rule on existing lighting outlets and fixtures is for indoor and outdoor pools but only for outdoor spas and hot tubs. If the existing luminaires are rigidly attached to the house or structure and end up being within 5 feet (1524 mm) horizontally from the inside walls, they must be at least 5 feet (1524 mm) above the maximum water level, and the supply circuit must have GFCI protection.

E4203.4.5 Indoor spas and hot tubs.

1. Luminaires, lighting outlets, and ceiling-suspended paddle fans located over the spa or hot tub or within 5 feet (1524 mm) from the inside walls of the spa or hot tub shall be not less than 7 feet, 6 inches (2286 mm) above the maximum water level and shall be protected by a ground-fault circuit interrupter. [680.43(B)(1)(b)]

Luminaires, lighting outlets, and ceiling-suspended paddle fans that are located 12 feet (3658 mm) or more above the maximum water level shall not require ground-fault circuit interrupter protection. [680.43(B)(1)(a)]

2. Luminaires protected by a ground-fault circuit interrupter and complying with Item 2.1 or 2.2 shall be permitted to be installed less than 7 feet, 6 inches (2286 mm) over a spa or hot tub.

2.1. Recessed luminaires shall have a glass or plastic lens and nonmetallic or electrically isolated metal trim, and shall be suitable for use in damp locations.

2.2. Surface-mounted luminaires shall have a glass or plastic globe and a nonmetallic body or a metallic body isolated from contact. Such luminaires shall be suitable for use in damp locations. [680.43(B)(1)(c)]

- ❖ The general rules for luminaires and paddle fans over indoor spas and hot tubs are the same as for indoor swimming pools found in Section E4203.4.2. However, where lighting is desired above an indoor spa or hot tub, the ceiling is often not high enough to meet the 7¹/₂ foot (2286 mm) rule. The room containing the spa or hot tub would need to have a high enough ceiling so that the bottom of a luminaire or fan would be at least 7¹/₂ feet above the water level. Recessed or surface mounted light fixtures are permitted to be less than 7¹/₂ feet above the water level of the spa or hot tub but must have GFCI protection, and the fixtures must be suitable for use in damp locations, must be all nonmetallic or any metallic parts must be electrically isolated from the fixture and must have a suitable lens or cover so that the lamp is not exposed. Cord-hung or pendant fixtures and paddle fans are not permitted above an indoor spa or hot tub at a height less than 7¹/₂ feet above the water level.

E4203.4.6 GFCI protection in adjacent areas. Luminaires and outlets that are installed in the area extending between 5 feet (1524 mm) and 10 feet (3048 mm) from the inside walls of pools and outdoor spas and hot tubs shall be protected by ground-fault circuit-interrupters except where such fixtures and outlets are installed not less than 5 feet (1524 mm) above

the maximum water level and are rigidly attached to the structure. [680.22(B)(4)]

- ❖ In the area extending horizontally between 5 feet and 10 feet from the inside wall of a pool or outdoor spa, outlets or hot tub, luminaires and lighting outlets (not receptacle) are permitted, but they must have GFCI protection. In the same area, but at a height of over 5 feet (1524 mm) above the water level, the circuits feeding rigidly attached light fixtures need not have GFCI protection.

E4203.5 Other outlets. Other outlets such as for remote control, signaling, fire alarm and communications shall be not less than 10 feet (3048 mm) from the inside walls of the pool. Measurements shall be determined in accordance with Section E4203.1. [680.22(D)]

- ❖ This section addresses the outlets for telephone, cable TV, internet, security systems, thermostats, fire alarm, etc., all of which can pose some electrical shock hazard.

E4203.6 Overhead conductor clearances. Except where installed with the clearances specified in Table E4203.6, the following parts of pools and outdoor spas and hot tubs shall not be placed under existing service-drop conductors, overhead service conductor, or any other open overhead wiring; nor shall such wiring be installed above the following:

1. Pools and the areas extending not less than 10 feet, (3048 mm) horizontally from the inside of the walls of the pool.
2. Diving structures and the areas extending not less than 10 feet (3048 mm) horizontally from the outer edge of such structures.
3. Observation stands, towers, and platforms and the areas extending not less than 10 feet (3048 mm) horizontally from the outer edge of such structures.

Overhead conductors of network-powered broadband communications systems shall comply with the provisions in Table E4203.6 for conductors operating at 0 to 750 volts to ground.

Utility-owned, -operated and -maintained communications conductors, community antenna system coaxial cables and the supporting messengers shall be permitted at a height of not less than 10 feet (3048 mm) above swimming and wading

pools, diving structures, and observation stands, towers, and platforms. [680.8(A), (B), and (C)]

- ❖ Service drop conductors are not permitted above a pool or within 10 feet (3048 mm) horizontally from the edge of the pool unless they are at least 22.5 feet (6858 mm) above the water in any direction and 14.5 feet (4420 mm) above a diving platform. Telephone and cable TV lines must be at least 10 feet (3048 mm) above a pool or diving platform. Typically, swimming pools are not installed under the service drop lines because this minimum height is difficult to maintain. Overhead conductors of network-powered broadband communications systems must comply with the column in the table that is applicable to conductors operating at 0 to 750 volts to ground.

E4203.7 Underground wiring. Underground wiring shall not be installed under or within the area extending 5 feet (1524 mm) horizontally from the inside walls of pools and outdoor hot tubs and spas except where the wiring is installed to supply pool, spa or hot tub equipment or where space limitations prevent wiring from being routed 5 feet (1524 mm) or more horizontally from the inside walls. Where installed within 5 feet (1524 mm) of the inside walls, the wiring method shall be a complete raceway system of rigid metal conduit, intermediate metal conduit or a nonmetallic raceway system. Metal conduit shall be corrosion resistant and suitable for the location. The minimum cover depth shall be in accordance with Table E4203.7. (680.10)

- ❖ Where underground wiring is installed, corrosion of the raceway is possible that could result in a hazardous situation under ground-fault conditions. Because of dampness and the presence of chemicals such as chlorine in the area, corrosion of metallic parts is more likely in a pool area and in the ground around a pool. For this reason, where it is necessary to install wiring underground within 5 feet (1524 mm) of the pool, it must be in rigid metal conduit, intermediate metal conduit or nonmetallic raceway. A typical corrosion-resistant rigid metal conduit has an outer nonmetallic covering. The other option that is commonly used is to run the wiring in a nonmetallic raceway such as PVC conduit. Such raceway/conduits must be complete systems as opposed to only sections of conduit that are within 5 feet of the pool, spa or tub.

**TABLE E4203.6 [Table 680.8(A)]
OVERHEAD CONDUCTOR CLEARANCES**

	INSULATED SUPPLY OR SERVICE DROP CABLES, 0-750 VOLTS TO GROUND, SUPPORTED ON AND CABLED TOGETHER WITH AN EFFECTIVELY GROUNDED BARE MESSENGER OR EFFECTIVELY GROUNDED NEUTRAL CONDUCTOR (feet)	ALL OTHER SUPPLY OR SERVICE DROP CONDUCTORS (feet)	
		Voltage to ground	
		0-15 kV	Greater than 15 to 50 kV
A. Clearance in any direction to the water level, edge of water surface, base of diving platform, or permanently anchored raft	22.5	25	27
B. Clearance in any direction to the diving platform	14.5	17	18

For SI: 1 foot = 304.8 mm.

TABLE E4203.7 (680.10)
MINIMUM BURIAL DEPTHS

WIRING METHOD	UNDERGROUND WIRING (inches)
Rigid metal conduit	6
Intermediate metal conduit	6
Nonmetallic raceways listed for direct burial and under concrete exterior slab not less than 4 inches in thickness and extending not less than 6 inches (162 mm) beyond the underground installation	6
Nonmetallic raceways listed for direct burial without concrete encasement	18
Other approved raceways ^a	18

For SI: 1 inch = 25.4 mm.

a. Raceways approved for burial only where concrete-encased shall require a concrete envelope not less than 2 inches in thickness.

SECTION E4204

BONDING

E4204.1 Performance. The equipotential bonding required by this section shall be installed to reduce voltage gradients in the prescribed areas of permanently installed swimming pools and spas and hot tubs other than the storable/portable type.

❖ “Equipotential” means equal potential (the same voltage). A difference in voltage between two bodies, objects or surfaces is referred to as a potential because of the potential energy that exists from the voltage (i.e., pressure). Potential energy is converted to current flow when the two bodies, objects or surfaces are electrically connected. The intent of such bonding is to eliminate or reduce voltage gradients (differences) between any and all conductive parts between which a living creature could place itself and thereby endanger itself. Voltage differences of only a few volts can be dangerous to occupants in the water or near the water.

E4204.2 Bonded parts. The parts of pools, spas, and hot tubs specified in Items 1 through 7 shall be bonded together using insulated, covered or bare solid copper conductors not smaller than 8 AWG or using rigid metal conduit of brass or other identified corrosion-resistant metal. An 8 AWG or larger solid copper bonding conductor provided to reduce voltage gradients in the pool, spa, or hot tub area shall not be required to be extended or attached to remote panelboards, service equipment, or electrodes. Connections shall be made by exothermic welding, by listed pressure connectors or clamps that are labeled as being suitable for the purpose and that are made of stainless steel, brass, copper or copper alloy, machine screw-type fasteners that engage not less than two threads or are secured with a nut, thread-forming machine screws that engage not less than two-threads, or terminal bars. Connection devices or fittings that depend solely on solder shall not be used. Sheet metal screws shall not be used to connect bonding conductors or connection devices: [680.26(B)]

1. Conductive pool shells. Bonding to conductive pool shells shall be provided as specified in Item 1.1 or 1.2. Poured concrete, pneumatically applied or sprayed concrete, and concrete block with painted or plastered coatings shall be considered to be conductive materials because of their water permeability and porosity. Vinyl liners and fiberglass composite shells shall be considered to be nonconductive materials.

- 1.1. Structural reinforcing steel. Unencapsulated structural reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where structural reinforcing steel is encapsulated in a nonconductive compound, a copper conductor grid shall be installed in accordance with Item 1.2.

- 1.2. Copper conductor grid. A copper conductor grid shall be provided and shall comply with Items 1.2.1 through 1.2.4:

- 1.2.1. It shall be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing.

- 1.2.2. It shall conform to the contour of the pool.

- 1.2.3. It shall be arranged in a 12-inch (305 mm) by 12-inch (305 mm) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 4 inches (102 mm).

- 1.2.4. It shall be secured within or under the pool not more than 6 inches (152 mm) from the outer contour of the pool shell. [680.26(B)(1)]

2. Perimeter surfaces. The perimeter surface shall extend for 3 feet (914 mm) horizontally beyond the inside walls of the pool and shall include unpaved surfaces, poured concrete surfaces and other types of paving. Perimeter surfaces that extend less than 3 feet (914 mm) beyond the inside wall of the pool and that are separated from the pool by a permanent wall or building 5 feet (1524 mm) or more in height shall require equipotential bonding on the pool side of the permanent wall or building. Bonding to perimeter surfaces shall be provided as specified in Item 2.1 or 2.2 and shall be attached to the pool, spa, or hot tub reinforcing steel or copper conductor grid at a minimum of four points uniformly spaced around the perimeter of the pool, spa, or hot tub. For nonconductive pool shells, bonding at four points shall not be required.

Exceptions:

1. Equipotential bonding of perimeter surfaces shall not be required for spas and hot tubs where all of the following conditions apply:

- 1.1. The spa or hot tub is listed as a self-contained spa for aboveground use.
 - 1.2. The spa or hot tub is not identified as suitable only for indoor use.
 - 1.3. The installation is in accordance with the manufacturer's instructions and is located on or above grade.
 - 1.4. The top rim of the spa or hot tub is not less than 28 in. (711 mm) above all perimeter surfaces that are within 30 in. (762 mm), measured horizontally from the spa or hot tub. The height of nonconductive external steps for entry to or exit from the self-contained spa is not used to reduce or increase this rim height measurement.
2. The equipotential bonding requirements for perimeter surfaces shall not apply to a listed self-contained spa or hot tub located indoors and installed above a finished floor.
 - 2.1. Structural reinforcing steel. Structural reinforcing steel shall be bonded in accordance with Item 1.1.
 - 2.2. Alternate means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) shall be used in accordance with Items 2.2.1 through 2.2.5:
 - 2.2.1. At least one minimum 8 AWG bare solid copper conductor shall be provided.
 - 2.2.2. The conductors shall follow the contour of the perimeter surface.
 - 2.2.3. Splices shall be listed.
 - 2.2.4. The required conductor shall be 18 to 24 inches (457 to 610 mm) from the inside walls of the pool.
 - 2.2.5. The required conductor shall be secured within or under the perimeter surface 4 to 6 inches (102 mm to 152 mm) below the subgrade. [680.26(B)(2)]
 3. Metallic components. All metallic parts of the pool structure, including reinforcing metal not addressed in Item 1.1, shall be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, the reinforcing steel shall not be required to be bonded. [680.26(B)(3)]
 4. Underwater lighting. All metal forming shells and mounting brackets of no-niche luminaires shall be bonded. [680.26(B)(4)]

Exception: Listed low-voltage lighting systems with nonmetallic forming shells shall not require bonding. [680.26(B)(4) Exception]
 5. Metal fittings. All metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 4 inches (102 mm) in any dimension and do not penetrate into the pool structure more than 1 inch (25.4 mm) shall not require bonding. [680.26(B)(5)]
6. Electrical equipment. Metal parts of electrical equipment associated with the pool water circulating system, including pump motors and metal parts of equipment associated with pool covers, including electric motors, shall be bonded. [680.26(B)(6)]

Exception: Metal parts of listed equipment incorporating an approved system of double insulation shall not be bonded. [680.26(B)(6) Exception]

 - 6.1. Double-insulated water pump motors. Where a double-insulated water pump motor is installed under the provisions of this item, a solid 8 AWG copper conductor of sufficient length to make a bonding connection to a replacement motor shall be extended from the bonding grid to an accessible point in the vicinity of the pool pump motor. Where there is no connection between the swimming pool bonding grid and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit. [680.26(B)(6)(a)]
 - 6.2. Pool water heaters. For pool water heaters rated at more than 50 amperes and having specific instructions regarding bonding and grounding, only those parts designated to be bonded shall be bonded and only those parts designated to be grounded shall be grounded. [680.26(B)(6)(b)]
 7. All fixed metal parts including, but not limited to, metal-sheathed cables and raceways, metal piping, metal awnings, metal fences and metal door and window frames. [680.26(B)(7)]

Exceptions:

 1. Those separated from the pool by a permanent barrier that prevents contact by a person shall not be required to be bonded. [680.26(B)(7) Exception No. 1]
 2. Those greater than 5 feet (1524 mm) horizontally from the inside walls of the pool shall not be required to be bonded. [680.26(B)(7) Exception No. 2]
 3. Those greater than 12 feet (3658 mm) measured vertically above the maximum water level of the pool, or as measured vertically above any observation stands, towers, or platforms, or any diving structures, shall not be required to be bonded. [680.26(B)(7) Exception No. 3]
- ❖ Bonding is the joining of metallic parts to form an electrically conductive path that will result in electrical continuity between components of a common grid to ensure that the electrical potential will be the same throughout. Keeping the electrical potential at the same level will reduce the shock hazard created by any stray currents in the pool or in the ground around the pool. The risk of electric shock is great in damp

locations, and it is increased where a person is in a pool of water. An electrical potential may occur in a pool because of such things as lightning, ground faults or the operation of electrical equipment in close proximity. Bonding together of all of the metallic items in and around a pool will help eliminate the voltage gradients or differences in electrical potential from one part of the pool to another or from metallic equipment to the pool water. The intent is to prevent the occupants/users of the pool, spa and hot tub from being subjected to voltage potentials that could cause current to flow through their bodies. The various items enumerated in the seven parts of this section provide a clear description of what parts must be bonded together and what parts are exempt from bonding.

Many of the bonding connections, such as the tie wires connecting the reinforcing steel together, must be inspected prior to concealment. Item 2 requires the bonding of walking surfaces around a pool, spa and hot tub, whether paved or unpaved bare earth. Where a permanent wall or building having a height of 5 feet or more is located such that it separates a portion of the 3-foot perimeter from the inside wall of the pool, only the portion of the wall or building on the poolside is required to be bonded.

Spas and hot tubs that meet all of the conditions of Exception 1 of Item 2, "perimeter surfaces," are exempt from the perimeter surface bonding requirements because the listing of the unit has evaluated the potential risks. Steps for the unit that are constructed of nonconductive material are not to be used as a reference elevation to determine compliance with the required 28-inch minimum height above perimeter surfaces. Steps of conductive material would impact the rim height measurement because such steps are another type of surface that could have a voltage potential difference. Note that wood, stone and concrete steps would be considered as conductive.

E4204.3 Pool water. Where none of the bonded parts is in direct connection with the pool water, the pool water shall be in direct contact with an approved corrosion-resistant conductive surface that exposes not less than 9 in.² (5800 mm²) of surface area to the pool water at all times. The conductive surface shall be located where it is not exposed to physical damage or dislodgement during usual pool activities, and it shall be bonded in accordance with Section E4204.2.

❖ This section requires that the water itself be bonded utilizing a conductive surface as an electrode. The electrode can be metal parts that are submerged in the water such as ladders, lighting components and drain bodies. The electrode can also be a metal body that is constructed specifically for that purpose.

E4204.4 Bonding of outdoor hot tubs and spas. Outdoor hot tubs and spas shall comply with the bonding requirements of Sections E4204.1 through E4204.3. Bonding by metal-to-metal mounting on a common frame or base shall be permitted. The metal bands or hoops used to secure wooden staves

shall not be required to be bonded as required in Section E4204.2. [680.42 and 680.42(B)]

❖ Wooden staves are used to build wooden tubs in the same manner as wooden barrels are made (see Sections E4204.1 through E4204.3).

This section applies to indoor hot tubs and spas. Item 3 requires copper and galvanized steel water supply piping to be bonded if within 5 feet of the inside walls. This would also apply to copper, steel and cast iron drain and vent piping. Item 5 applies to electrical devices that are not related to the spa or hot tub, but happen to be located within 5 feet of the inside walls.

E4204.5 Bonding of indoor hot tubs and spas. The following parts of indoor hot tubs and spas shall be bonded together:

1. All metal fittings within or attached to the hot tub or spa structure. [680.43(D)(1)]
2. Metal parts of electrical equipment associated with the hot tub or spa water circulating system, including pump motors unless part of a listed self-contained spa or hot tub. [680.43(D)(2)]
3. Metal raceway and metal piping that are within 5 feet (1524 mm) of the inside walls of the hot tub or spa and that are not separated from the spa or hot tub by a permanent barrier. [680.43(D)(3)]
4. All metal surfaces that are within 5 feet (1524 mm) of the inside walls of the hot tub or spa and that are not separated from the hot tub or spa area by a permanent barrier. [680.43(D)(4)]
 - Exception:** Small conductive surfaces not likely to become energized, such as air and water jets and drain fittings, where not connected to metallic piping, towel bars, mirror frames, and similar nonelectrical equipment, shall not be required to be bonded. [680.43(D)(4) Exception]
5. Electrical devices and controls that are not associated with the hot tubs or spas and that are located less than 5 feet (1524 mm) from such units. [680.43(D)(5)]

❖ See the commentary to Sections E4204.1 and E4204.2.

E4204.5.1 Methods. All metal parts associated with the hot tub or spa shall be bonded by any of the following methods:

1. The interconnection of threaded metal piping and fittings. [680.43(E)(1)]
2. Metal-to-metal mounting on a common frame or base. [680.43(E)(2)]
3. The provision of an insulated, covered or bare solid copper bonding jumper not smaller than 8 AWG. It shall not be the intent to require that the 8 AWG or larger solid copper bonding conductor be extended or attached to any remote panelboard, service equipment, or any electrode, but only that it shall be employed to eliminate voltage gradients in the hot tub or spa area as prescribed. [680.43(E)(3)]

❖ The methods of bonding are the same as allowed in Sections E4204.2 and E4204.4.

E4204.5.2 Connections. Connections to bonded parts shall be made in accordance with Section E3406.13.1.

- ❖ Connection devices used for bonding must be listed and labeled for the application, such as listed for direct burial in concrete or soil or listed for submersion in water.

SECTION E4205 GROUNDING

E4205.1 Equipment to be grounded. The following equipment shall be grounded:

1. Through-wall lighting assemblies and underwater luminaires other than those low-voltage lighting products listed for the application without a grounding conductor.
 2. All electrical equipment located within 5 feet (1524 mm) of the inside wall of the pool, spa or hot tub.
 3. All electrical equipment associated with the recirculating system of the pool, spa or hot tub.
 4. Junction boxes.
 5. Transformer and power supply enclosures.
 6. Ground-fault circuit-interrupters.
 7. Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the pool, spa or hot tub. (680.7)
- ❖ Grounding and bonding are required for different reasons. Bonding is required for all metal parts of the electrical equipment and for nonelectrical metal parts of the structure to establish an equipotential grid. Bonding conductors in many cases are permitted to be externally clamped or connected to the noncurrent-carrying metal parts of equipment. The attachment need not be accessible. Bonding of metal parts of electrical equipment is required to ensure a low-impedance path for fault current back to the source of the circuit to facilitate the operation of the overcurrent device. For equipment grounding, a separate grounding conductor is connected to the equipment's grounding terminal.

E4205.2 Luminaires and related equipment. Other than listed low-voltage luminaires not requiring grounding, all through-wall lighting assemblies, wet-niche, dry-niche, or no-niche luminaires shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table E3908.12 but not smaller than 12 AWG. The equipment grounding conductor between the wiring chamber of the secondary winding of a transformer and a junction box shall be sized in accordance with the overcurrent device in such circuit. The junction box, transformer enclosure, or other enclosure in the supply circuit to a wet-niche or no-niche luminaire and the field-wiring chamber of a dry-niche luminaire shall be grounded to the equipment grounding terminal of the panelboard. The equipment grounding terminal shall be directly connected to the panelboard enclosure. The equipment grounding conductor shall be installed without joint or splice. [680.23(F)(2) and 680.23(F)(2) Exception]

Exceptions:

1. Where more than one underwater luminaire is supplied by the same branch circuit, the equipment

grounding conductor, installed between the junction boxes, transformer enclosures, or other enclosures in the supply circuit to wet-niche luminaires, or between the field-wiring compartments of dry-niche luminaires, shall be permitted to be terminated on grounding terminals. [680.23(F)(2)(a)]

2. Where an underwater luminaire is supplied from a transformer, ground-fault circuit-interrupter, clock-operated switch, or a manual snap switch that is located between the panelboard and a junction box connected to the conduit that extends directly to the underwater luminaire, the equipment grounding conductor shall be permitted to terminate on grounding terminals on the transformer, ground-fault circuit-interrupter, clock-operated switch enclosure, or an outlet box used to enclose a snap switch. [680.23(F)(2)(b)]

- ❖ Of particular note here is the requirement that the equipment grounding conductor must be insulated and sized in accordance with Table E3908.12. An insulated conductor run within the metal raceway is used because the conduit could corrode and open the conductive grounding path. The junction box or enclosure in the supply circuit to an underwater luminaire or related equipment must be grounded to the equipment grounding terminal of the panelboard. This is done by running a minimum size 12-AWG insulated equipment grounding conductor directly between the terminals of the junction box or enclosure and the panelboard. This conductor must not be confused with the size 8-AWG bonding conductor used to connect the forming shell to the bonding grid.

E4205.3 Nonmetallic conduit. Where a nonmetallic conduit is installed between a forming shell and a junction box, transformer enclosure, or other enclosure, a 8 AWG insulated copper bonding jumper shall be installed in this conduit except where a listed low-voltage lighting system not requiring grounding is used. The bonding jumper shall be terminated in the forming shell, junction box or transformer enclosure, or ground-fault circuit-interrupter enclosure. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a listed potting compound to protect such connection from the possible deteriorating effect of pool water. [680.23(B)(2)(b)]

- ❖ In this section, the size 8-AWG conductor that must be run within the nonmetallic-conduit is not the same bonding conductor used to connect the forming shell to the common bonding grid. The size 8-AWG or larger bonding conductor connects to the forming shell and must be insulated. Note that Section E3406.4 requires 8-AWG and larger conductors to be stranded where installed in raceways and there is no exemption indicated for Section E4205. Stranded conductors are far less likely to have the insulation damaged during installation. The size 8-AWG conductor run within the nonmetallic-conduit provides electrical continuity between the forming shell and the junction box or transformer enclosure. The 8-AWG conductor must have green insulation in accordance with Section

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E3407.2. Corrosion can occur when the connection is exposed to pool water, and thus the connection must be encapsulated in a listed potting compound.

E4205.4 Flexible cords. Other than listed low-voltage lighting systems not requiring grounding, wet-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG. [680.23(B)(3)]

❖ See Section E4205.2.

E4205.5 Motors. Pool-associated motors shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table E3908.12, but not smaller than 12 AWG. Where the branch circuit supplying the motor is installed in the interior of a one-family dwelling or in the interior of accessory buildings associated with a one-family dwelling, using a cable wiring method permitted by Table E4202.1, an uninsulated equipment grounding conductor shall be permitted provided that it is enclosed within the outer sheath of the cable assembly. [680.21(A)(1) and (A)(4)]

❖ Motors used with pool equipment must be grounded with a minimum size 12-AWG equipment grounding conductor. This conductor must be insulated or within an overall sheath such as it would be in nonmetallic-sheathed cable.

E4205.6 Feeders. An equipment grounding conductor shall be installed with the feeder conductors between the grounding terminal of the pool equipment panelboard and the grounding terminal of the applicable service equipment. The equipment grounding conductor shall be insulated, shall be sized in accordance with Table E3908.12, and shall be not smaller than 12 AWG.

❖ Where a separate panelboard that supplies swimming pool equipment is fed from service equipment, it must have an insulated equipment grounding conductor not smaller than size 12-AWG run with the feeders from the service equipment.

E4205.6.1 Separate buildings. A feeder to a separate building or structure shall be permitted to supply swimming pool equipment branch circuits, or feeders supplying swimming pool equipment branch circuits, provided that the grounding arrangements in the separate building meet the requirements of Section E3607.3. The feeder equipment grounding conductor shall be an insulated conductor. (680.25(B)(2))

❖ See Section E3607.3.

E4205.7 Cord-connected equipment. Where fixed or stationary equipment is connected with a flexible cord to facilitate removal or disconnection for maintenance, repair, or storage, as provided in Section E4202.2, the equipment grounding conductors shall be connected to a fixed metal part

of the assembly. The removable part shall be mounted on or bonded to the fixed metal part. [680.7(C)]

❖ The equipment grounding conductor is required in order to provide a path of low impedance that helps limit the voltage to ground and serves to carry enough current to trip the overcurrent protective device. Flexible cord is used in some cases to supply power to equipment that may need to be removed for replacement or repair, and the equipment grounding conductor must be connected to a part of the equipment that is not removable.

E4205.8 Other equipment. Other electrical equipment shall be grounded in accordance with Section E3908. (Article 250, Parts V, VI, and VII; and 680.6)

❖ Equipment not addressed specifically in this section must comply with the grounding provisions of Section E3908.

SECTION E4206 EQUIPMENT INSTALLATION

E4206.1 Transformers and power supplies. Transformers and power supplies used for the supply of underwater luminaires, together with the transformer or power supply enclosure, shall be listed for swimming pool and spa use. The transformer or power supply shall incorporate either a transformer of the isolated-winding type with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings, or a transformer that incorporates an approved system of double insulation between the primary and secondary windings. [680.23(A)(2)]

❖ Transformers used to supply power for underwater swimming pool and spa luminaires are of the independent two-winding type and must be listed for such application. They are of the isolated-winding type, meaning they have a shield or metal barrier between the primary and secondary windings. The metal barrier is grounded by an equipment grounding conductor connected to the equipment grounding terminal in the transformer housing. Without a metal barrier or shield, deterioration of the insulation of the primary and secondary windings could cause the two windings to come into contact with each other, creating a higher voltage on the secondary windings. As an alternative to isolated-winding-type transformers, the code official can approve transformers that employ a double insulation system that separates the primary and secondary windings, thereby providing a level of safety equivalent to the isolated-winding-type transformers.

E4206.2 Ground-fault circuit-interrupters. Ground-fault circuit-interrupters shall be self-contained units, circuit-breaker types, receptacle types or other approved types. (680.5)

❖ A GFCI is a device designed to interrupt or open the circuit when a fault current to ground exceeds a certain value that is less than that required to trip the circuit

breaker supplying the branch circuit. A Class A GFCI trips when the ground-fault current is from 4 to 6 milliamperes. Class A GFCIs are suitable for use in branch circuits feeding swimming pool equipment. However, existing branch circuits in older swimming pool installations might have sufficient leakage current to cause a Class A GFCI to trip.

E4206.3 Wiring on load side of ground-fault circuit-interrupters and transformers. For other than grounding conductors, conductors installed on the load side of a ground-fault circuit-interrupter or transformer used to comply with the provisions of Section E4206.4, shall not occupy raceways, boxes, or enclosures containing other conductors except where the other conductors are protected by ground-fault circuit interrupters or are grounding conductors. Supply conductors to a feed-through type ground-fault circuit interrupter shall be permitted in the same enclosure. Ground-fault circuit interrupters shall be permitted in a panelboard that contains circuits protected by other than ground-fault circuit interrupters. [680.23(F)(3)]

- ❖ Except within panelboard cabinets, the load side conductors of a GFCI circuit are not permitted to share the same wiring space with other conductors that are not GFCI protected other than for equipment grounding conductors. Note the exception for conductors that supply feed-through type GFCI devices where the supply conductors and the GFCI device are allowed to be in the same box. The magnetic inductance caused by current flow in adjacent conductors could cause current to flow in circuit conductors on the load side of GFCI device. Also, insulation failure could energize GFCI protected conductors.

E4206.4 Underwater luminaires. The design of an underwater luminaire supplied from a branch circuit either directly or by way of a transformer or power supply meeting the requirements of Section E4206.1, shall be such that, where the fixture is properly installed without a ground-fault circuit-interrupter, there is no shock hazard with any likely combination of fault conditions during normal use (not relamping). In addition, a ground-fault circuit-interrupter shall be installed in the branch circuit supplying luminaires operating at more than the low-voltage contact limit, such that there is no shock hazard during relamping. The installation of the ground-fault circuit-interrupter shall be such that there is no shock hazard with any likely fault-condition combination that involves a person in a conductive path from any ungrounded part of the branch circuit or the luminaire to ground. Compliance with this requirement shall be obtained by the use of a listed underwater luminaire and by installation of a listed ground-fault circuit-interrupter in the branch circuit or a listed transformer or power supply for luminaires operating at more than the low-voltage contact limit. Luminaires that depend on submersion for safe operation shall be inherently protected against the hazards of overheating when not submerged. [680.23(A)(1), (A)(3), (A)(7) and (A)(8)]

- ❖ An underwater light fixture must be listed and of such a design that will not pose an electric shock hazard during operation of the fixture without a GFCI device in the circuit. Any light fixture operating at over the low-

voltage contact limit must have GFCI protection. This will provide safety from electric shock during relamping. Wet-niche and no-niche fixtures are detached and brought above the water level for relamping (see definition of “Low voltage contact limit”).

E4206.4.1 Maximum voltage. Luminaires shall not be installed for operation on supply circuits over 150 volts between conductors. [680.23(A)(4)]

- ❖ Where luminaires are designed to operate at 120 volts, the circuit must have GFCI protection.

E4206.4.2 Luminaire location. Luminaires mounted in walls shall be installed with the top of the fixture lens not less than 18 inches (457 mm) below the normal water level of the pool, except where the luminaire is listed and identified for use at a depth of not less than 4 inches (102 mm) below the normal water level of the pool. A luminaire facing upward shall have the lens adequately guarded to prevent contact by any person or shall be listed for use without a guard. [680.23(A)(5) and (A)(6)]

- ❖ If a person is hanging onto the edge in the deep end of a pool, directly in front of a wet-niche luminaire with a broken bulb or damaged lens, fault current could leak into the pool directly to the person. Where the luminaire is at least 18 inches (457 mm) below the normal water level, the person’s chest, the most sensitive area for shock hazard, would most likely be above water or above the luminaire and not be directly in line with the fixture.

E4206.5 Wet-niche luminaires. Forming shells shall be installed for the mounting of all wet-niche underwater luminaires and shall be equipped with provisions for conduit entries. Conduit shall extend from the forming shell to a suitable junction box or other enclosure located as provided in Section E4206.9. Metal parts of the luminaire and forming shell in contact with the pool water shall be of brass or other approved corrosion-resistant metal. [680.23(B)(1)]

The end of flexible-cord jackets and flexible-cord conductor terminations within a luminaire shall be covered with, or encapsulated in, a suitable potting compound to prevent the entry of water into the luminaire through the cord or its conductors. If present, the grounding connection within a luminaire shall be similarly treated to protect such connection from the deteriorating effect of pool water in the event of water entry into the luminaire. [680.23(B)(4)]

Luminaires shall be bonded to and secured to the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to remove the luminaire from the forming shell. [680.23(B)(5)]

- ❖ These fixtures are typically installed in the wall of a pool or field-fabricated spa. A forming shell is installed before concrete is placed. The forming shell is not sealed from pool water, and the fixture is designed to be surrounded by water. Wet-niche fixtures that are UL listed have a permanently attached, factory installed flexible cord at least 12 feet (3658 mm) long. With this length of flexible cord, the fixture can be removed from the housing or forming shell and brought up to the pool deck for relamping without lowering the water level and

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without disconnecting the cord from the junction box above the pool deck.

E4206.5.1 Servicing. All wet-niche luminaires shall be removable from the water for inspection, relamping, or other maintenance. The forming shell location and length of cord in the forming shell shall permit personnel to place the removed luminaire on the deck or other dry location for such maintenance. The luminaire maintenance location shall be accessible without entering or going into the pool water. [680.23(B)(6)]

❖ This requirement protects the person performing the maintenance and also helps prevent water from entering the luminaire as it is serviced.

E4206.6 Dry-niche luminaires. Dry-niche luminaires shall have provisions for drainage of water. Other than listed low-voltage luminaires not requiring grounding, a dry-niche luminaire shall have means for accommodating one equipment grounding conductor for each conduit entry. Junction boxes shall not be required but, if used, shall not be required to be elevated or located as specified in Section E4206.9 if the luminaire is specifically identified for the purpose. [680.23(C)(1) and (C)(2)]

❖ These underwater luminaires are designed to be serviced or relamped from the rear in a passageway behind the pool wall. This is not very common in residential pools. A no-niche lighting fixture could be installed in the wall of a pool or spa that is partially above ground level where an elevated deck is built above ground to match the top edge of the pool. Some dry-niche fixtures are installed with a box flush with the deck (where listed for use with the dry-niche fixture, it need not be raised above the deck) from which the lamp can be replaced.

E4206.7 No-niche luminaires. No-niche luminaires shall be listed for the purpose and shall be installed in accordance with the requirements of Section E4206.5. Where connection to a forming shell is specified, the connection shall be to the mounting bracket. [680.23(D)]

❖ See Section E4206.5.

E4206.8 Through-wall lighting assembly. A through-wall lighting assembly shall be equipped with a threaded entry or hub, or a nonmetallic hub, for the purpose of accommodating the termination of the supply conduit. A through-wall lighting assembly shall meet the construction requirements of Section E4205.4 and be installed in accordance with the requirements of Section E4206.5. Where connection to a forming shell is specified, the connection shall be to the conduit termination point. [680.23(E)]

❖ See Sections E4205.4 and E4206.5.

E4206.9 Junction boxes and enclosures for transformers or ground-fault circuit interrupters. Junction boxes for underwater luminaires and enclosures for transformers and ground-fault circuit-interrupters that supply underwater luminaires shall comply with the following: [680.24(A)]

❖ The branch-circuit wiring for underwater swimming pool fixtures is brought to a junction box, transformer or

enclosure installed a relatively short distance from the pool or spa. A flexible cord from the fixture is installed in a raceway and connected in the junction box or transformer enclosure, which must be listed specifically for use with underwater luminaires. It must be labeled as a swimming pool junction box.

E4206.9.1 Junction boxes. A junction box connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be:

1. Listed as a swimming pool junction box; [680.24(A)(1)]
2. Equipped with threaded entries or hubs or a nonmetallic hub; [680.24(A)(1)(1)]
3. Constructed of copper, brass, suitable plastic, or other approved corrosion-resistant material; [680.24(A)(1)(2)]
4. Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass, or other approved corrosion-resistant metal that is integral with the box; and [680.24(A)(1)(3)]
5. Located not less than 4 inches (102 mm), measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 8 inches (203 mm) above the maximum pool water level, whichever provides the greatest elevation, and shall be located not less than 4 feet (1219 mm) from the inside wall of the pool, unless separated from the pool by a solid fence, wall or other permanent barrier. Where used on a lighting system operating at the low-voltage contact limit or less, a flush deck box shall be permitted provided that an approved potting compound is used to fill the box to prevent the entrance of moisture; and the flush deck box is located not less than 4 feet (1219 mm) from the inside wall of the pool. [680.24(A)(2)]

❖ The junction box must be sized according the provisions of Section E3905. The junction box must be large enough to accommodate the raceways connected to it. A nonmetallic conduit between a wet-niche luminaire and the deck junction box must be sized large enough for both a size 8 AWG insulated copper bonding conductor and the flexible cord that supplies the fixture. Terminals must be provided within the box for connection of the bonding conductors. A box that is listed under swimming pool junction boxes will have the correct number of integral grounding and bonding terminals for the number of conduit entries it has. The box must have at least one grounding terminal for each conduit entry plus one. Field installation of a grounding terminal or grounding bar is not permitted (see Section E4206.9.4).

E4206.9.2 Other enclosures. An enclosure for a transformer, ground-fault circuit-interrupter or a similar device connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be:

1. Listed and labeled for the purpose, comprised of copper, brass, suitable plastic, or other approved corrosion-resistant material; [680.24(B)(1)]

2. Equipped with threaded entries or hubs or a nonmetallic hub; [680.24(B)(2)]
 3. Provided with an approved seal, such as duct seal at the conduit connection, that prevents circulation of air between the conduit and the enclosures; [680.24(B)(3)]
 4. Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass or other approved corrosion-resistant metal that is integral with the enclosures; and [680.24(B)(4)]
 5. Located not less than 4 inches (102 mm), measured from the inside bottom of the enclosure, above the ground level or pool deck, or not less than 8 inches (203 mm) above the maximum pool water level, whichever provides the greater elevation, and shall be located not less than 4 feet (1219 mm) from the inside wall of the pool, except where separated from the pool by a solid fence, wall or other permanent barrier. [680.24(B)(2)]
- ❖ A transformer enclosure that has conduits that extend directly to the underwater luminaire must have the conduit entries sealed against air circulation. Corrosion of internal components of the enclosure could occur at a faster rate if not sealed.

E4206.9.3 Protection of junction boxes and enclosures. Junction boxes and enclosures mounted above the grade of the finished walkway around the pool shall not be located in the walkway unless afforded additional protection, such as by location under diving boards or adjacent to fixed structures. [680.24(C)]

- ❖ Junction boxes must not be installed in the open at walkways and similar locations where subject to damage from foot traffic, carts, patio furniture, etc. Above-grade boxes would also present a serious tripping hazard.

E4206.9.4 Grounding terminals. Junction boxes, transformer and power supply enclosures, and ground-fault circuit-interrupter enclosures connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be provided with grounding terminals in a quantity not less than the number of conduit entries plus one. [680.24(D)]

- ❖ See the commentary to Section E4206.9.1.

E4206.9.5 Strain relief. The termination of a flexible cord of an underwater luminaire within a junction box, transformer or power supply enclosure, ground-fault circuit-interrupter, or other enclosure shall be provided with a strain relief. [680.24(E)]

- ❖ A flexible cord installed from an underwater luminaire within a raceway must be connected within the box with a strain relief device. When the fixture is removed from the housing or forming shell for relamping, the cord is pulled out of the forming shell and it could be pulled against the connections in the junction box, resulting in bad connections or damage to the cord.

E4206.10 Underwater audio equipment. Underwater audio equipment shall be identified for the purpose. [680.27(A)]

- ❖ Underwater audio equipment can pose an electrical shock hazard and is installed under provisions similar to those for underwater luminaires (see commentary, Section E4206.4).

E4206.10.1 Speakers. Each speaker shall be mounted in an approved metal forming shell, the front of which is enclosed by a captive metal screen, or equivalent, that is bonded to and secured to the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to open for installation or servicing of the speaker. The forming shell shall be installed in a recess in the wall or floor of the pool. [680.27(A)(1)]

- ❖ Underwater speakers are installed in a listed forming shell that is recessed into the wall of the pool. A metal screen must be installed over the forming shell to prevent contact with the speaker. The screen must require a tool to open. Typically, the screen is attached with screws so that it is not easily removed.

E4206.10.2 Wiring methods. Rigid metal conduit of brass or other identified corrosion-resistant metal, rigid polyvinyl chloride conduit, rigid thermosetting resin conduit or liquid-tight flexible nonmetallic conduit (LFNC-B) shall extend from the forming shell to a suitable junction box or other enclosure as provided in Section E4206.9. Where rigid non-metallic conduit or liquid-tight flexible nonmetallic conduit is used, an 8 AWG solid or stranded insulated copper bonding jumper shall be installed in this conduit with provisions for terminating in the forming shell and the junction box. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a suitable potting compound to protect such connection from the possible deteriorating effect of pool water. [680.27(A)(2)]

- ❖ The wiring method of extending a conduit from the speaker forming shell to a deck junction box is the same as for a wet-niche lighting fixture.

E4206.10.3 Forming shell and metal screen. The forming shell and metal screen shall be of brass or other approved corrosion-resistant metal. Forming shells shall include provisions for terminating an 8 AWG copper conductor. [680.27(A)(3)]

- ❖ Listed equipment is available for installation of underwater audio equipment.

E4206.11 Electrically operated pool covers. The electric motors, controllers, and wiring for pool covers shall be located not less than 5 feet (1524 mm) from the inside wall of the pool except where separated from the pool by a wall, cover, or other permanent barrier. Electric motors installed below grade level shall be of the totally enclosed type. The electric motor and controller shall be connected to a branch circuit protected by a ground-fault circuit-interrupter. The device that controls the operation of the motor for an electrically operated pool cover shall be located so that the operator has full view of the pool. [680.27(B)(1) and (B)(2)]

- ❖ Pool cover motors and their controllers are typically located at the side of the pool in a box or recessed with

a cover flush with the pool deck. Obviously, the box or recessed enclosure must be provided with means to drain water that will accumulate, and the motor must be totally enclosed and served by a GFCI-protected circuit.

The operating control for an electrically operated pool cover must be located to allow the person operating the device to see that people are clear of moving parts. This is a common-sense safety approach for the operation of all machinery.

E4206.12 Electric pool water heaters. Electric pool water heaters shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not more than 60 amperes. The ampacity of the branch-circuit conductors and the rating or setting of overcurrent protective devices shall be not less than 125 percent of the total nameplate load rating. (680.9)

❖ See Sections E4101.4.1 and E3702.10.

E4206.13 Pool area heating. The provisions of Sections E4206.13.1 through E4206.13.3 shall apply to all pool deck areas, including a covered pool, where electrically operated comfort heating units are installed within 20 feet (6096 mm) of the inside wall of the pool. [680.27(C)]

❖ Where electric heating is installed in an area within 20 feet (6096 mm) of the inside wall of the pool, specific code rules apply to the wiring for heating units.

E4206.13.1 Unit heaters. Unit heaters shall be rigidly mounted to the structure and shall be of the totally enclosed or guarded types. Unit heaters shall not be mounted over the pool or within the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool. [680.27(C)(1)]

❖ Where unit heaters are used in a pool, spa or hot tub area, they must be kept at least 5 feet (1524 mm) horizontally from the inside walls of the pool. They must be guarded or enclosed. These two terms have clear definitions, given in Chapter 35.

E4206.13.2 Permanently wired radiant heaters. Electric radiant heaters shall be suitably guarded and securely fastened to their mounting devices. Heaters shall not be installed over a pool or within the area extending 5 feet (1524 mm) horizontally from the inside walls of the pool and shall be mounted not less than 12 feet (3658 mm) vertically above the pool deck. [680.27(C)(2)]

❖ Radiant heaters in a pool area must be at least 12 feet (3058 mm) above the pool deck. Although these heating units must be securely fastened, there is no exception that would permit installation over the pool. They must be at least 5 feet horizontally from the inside walls of the pool.

E4206.13.3 Radiant heating cables prohibited. Radiant heating cables embedded in or below the deck shall be prohibited. [680.27(C)(3)]

❖ Installation of heating cables is prohibited in the deck of the pool area because of the possible breakdown of the insulation on the cable causing a ground fault or current leakage.

SECTION E4207 STORABLE SWIMMING POOLS, STORABLE SPAS, AND STORABLE HOT TUBS

E4207.1 Pumps. A cord and plug-connected pool filter pump for use with storable pools shall incorporate an approved system of double insulation or its equivalent and shall be provided with means for grounding only the internal and nonaccessible noncurrent-carrying metal parts of the appliance.

The means for grounding shall be an equipment grounding conductor run with the power-supply conductors in a flexible cord that is properly terminated in a grounding-type attachment plug having a fixed grounding contact. Cord and plug-connected pool filter pumps shall be provided with a ground-fault circuit interrupter that is an integral part of the attachment plug or located in the power supply cord within 12 inches (305 mm) of the attachment plug. (680.31)

❖ Filter pumps must be protected by a system of double insulation or the equivalent. The means for grounding the internal noncurrent-carrying metal parts must be an equipment grounding conductor run with the power-supply conductors in the flexible cord terminated with a grounding-type attachment plug.

E4207.2 Ground-fault circuit-interrupters required. Electrical equipment, including power-supply cords, used with storable pools shall be protected by ground-fault circuit-interrupters. 125-volt, 15- and 20-ampere receptacles located within 20 feet (6096 mm) of the inside walls of a storable pool, storable spa, or storable hot tub shall be protected by a ground-fault circuit interrupter. In determining these dimensions, the distance to be measured shall be the shortest path that the supply cord of an appliance connected to the receptacle would follow without passing through a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier. (680.32)

❖ Similar requirements are found in Section E4203.1.3. The 20-foot distance is measured for the worst case condition along the shortest path that the cord could be laid in order to reach the receptacle.

E4207.3 Luminaires. Luminaires for storable pools, storable spas, and storable hot tubs shall not have exposed metal parts and shall be listed for the purpose as an assembly. In addition, luminaires for storable pools shall comply with the requirements of Section E4207.3.1 or E4207.3.2. (680.33)

❖ Luminaires for storable pools, spas and hot tubs are intended for temporary installation on or in the wall of the pool, generally between 8 and 10 inches (203 and 254 mm) below the top of the pool wall. These luminaires are manufactured as an assembly with flexible cords of 25 feet (7620 mm) or more so that they can be routed away from the pool to an enclosure for a transformer or GFCI enclosure. The transformer or GFCI assembly typically has a 3- to 6-foot-long (914 to 1829 mm) power supply cord, and the unit is designed for temporary installation on a structure near a receptacle.

E4207.3.1 Within the low-voltage contact limit. A luminaire installed in or on the wall of a storable pool shall be part of a cord and plug-connected lighting assembly. The assembly shall:

1. Have a luminaire lamp that is suitable for the use at the supplied voltage;
2. Have an impact-resistant polymeric lens, luminaire body, and transformer enclosure;
3. Have a transformer meeting the requirements of section E4206.1 with a primary rating not over 150 volts; and
4. Have no exposed metal parts. [680.33(A)]

❖ For use on a storable pool, a cord-and-plug-connected low-voltage light fixture is a listed assembly that receives its power through a flexible cord plugged into a transformer. The primary of the transformer is supplied from a 120-volt branch circuit.

E4207.3.2 Over the low-voltage contact limit but not over 150 volts. A lighting assembly without a transformer or power supply, and with the luminaire lamp(s) operating at over the low-voltage contact limit, but not over 150 volts, shall be permitted to be cord and plug-connected where the assembly is listed as an assembly for the purpose and complies with all of the following:

1. It has an impact-resistant polymeric lens and luminaire body.
2. A ground-fault circuit interrupter with open neutral conductor protection is provided as an integral part of the assembly.
3. The luminaire lamp is permanently connected to the ground-fault circuit interrupter with open-neutral protection.
4. It complies with the requirements of Section E4206.4.
5. It has no exposed metal parts. [680.33(B)]

❖ These fixtures are connected through flexible cords plugged into GFCI devices that have open-neutral protection. A typical GFCI device monitors the current in the ungrounded and grounded conductors, and when it is not balanced, it will trip. A GFCI with open-neutral protection will trip if the neutral is opened or lost.

E4207.4 Receptacle locations. Receptacles shall be located not less than 6 feet (1829 mm) from the inside walls of a storable pool, storable spa or storable hot tub. In determining these dimensions, the distance to be measured shall be the shortest path that the supply cord of an appliance connected to the receptacle would follow without passing through a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier. (680.34)

❖ This section is more stringent in that all receptacles must be at least 10 feet from the inside walls of the storable pool, spa and hot tub (see Sections E4203.1 through E4203.1.2).

E4207.5 Clearances. Overhead conductor installations shall comply with Section E4203.6 and underground conductor installations shall comply with Section E4203.7.

❖ See Sections E4203.6 and E4203.7.

E4207.6 Disconnecting means. Disconnecting means for storable pools and storable/portable spas and hot tubs shall comply with Section E4203.3.

❖ See Section E4203.3.

E4207.7 Ground-fault circuit interrupters. Ground-fault circuit interrupters shall comply with Section E4206.2.

❖ See Section E4206.2.

E4207.8 Grounding of equipment. Equipment shall be grounded as required by Section E4205.1.

❖ See Section E4205.1.

E4207.9 Pool water heaters. Electric pool water heaters shall comply with Section E4206.12.

❖ See Section E4206.12.

SECTION E4208 SPAS AND HOT TUBS

E4208.1 Ground-fault circuit-interrupters. The outlet(s) that supplies a self-contained spa or hot tub, or a packaged spa or hot tub equipment assembly, or a field-assembled spa or hot tub with a heater load of 50 amperes or less, shall be protected by a ground-fault circuit-interrupter. (680.44)

A listed self-contained unit or listed packaged equipment assembly marked to indicate that integral ground-fault circuit-interrupter protection is provided for all electrical parts within the unit or assembly, including pumps, air blowers, heaters, lights, controls, sanitizer generators and wiring, shall not require that the outlet supply be protected by a ground-fault circuit interrupter. [680.44(A)]

❖ The definitions provided at the beginning of this chapter for “Packaged spa or hot tub equipment assembly” and “Self-contained spa or hot tub” are useful in understanding and applying the rules on GFCI protection. Where these units are listed and have integral GFCI protection, the flexible cord need not be plugged into a GFCI receptacle.

E4208.2 Electric water heaters. Electric spa and hot tub water heaters shall be listed and shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not more than 60 amperes. The ampacity of the branch-circuit conductors, and the rating or setting of over-current protective devices, shall be not less than 125 percent of the total nameplate load rating. (680.9)

❖ The ampere load on the circuits supplying water heaters for spas and hot tubs is limited to 80 percent of the branch circuit rating. The maximum load that can be protected by a single over-current device is 48

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amperes, therefore, 60 amperes ($0.8 \times 60 = 48$ or $1.25 \times 48 = 60$) is the maximum rating for an overcurrent device protecting this water heater circuit. If the water heater total load consists of more than 48 amperes, the load must be divided into subgroups such that no subgroup load is more than 48 amperes. Heaters with loads over 48 amperes will have multiple circuit breakers or sets of fuses integral with the heater.

E4208.3 Underwater audio equipment. Underwater audio equipment used with spas and hot tubs shall comply with the provisions of Section E4206.10. [680.43(G)]

❖ See Section E4206.10.

E4208.4 Emergency switch for spas and hot tubs. A clearly labeled emergency shutoff or control switch for the purpose of stopping the motor(s) that provides power to the recirculation system and jet system shall be installed at a point that is readily accessible to the users, adjacent to and within sight of the spa or hot tub and not less than 5 feet (1524 mm) away from the spa or hot tub. This requirement shall not apply to single-family dwellings. (680.41)

❖ The emergency switch must be located to allow quick access in an emergency, but must also be a safe distance from the spa or hot tub. This section applies only to spas and hot tubs intended for use by the occupants of more than one dwelling.

SECTION E4209 HYDROMASSAGE BATHTUBS

E4209.1 Ground-fault circuit-interrupters. Hydromassage bathtubs and their associated electrical components shall be supplied by an individual branch circuit(s) and protected by a readily accessible ground-fault circuit-interrupter. All 125-volt, single-phase receptacles not exceeding 30 amperes and located within 6 feet (1829 mm) measured horizontally of the inside walls of a hydromassage tub shall be protected by a ground-fault circuit interrupter(s). (680.71)

❖ Hydromassage bathtubs typically have a cord- and plug-connected motor as part of the unit package. A flexible cord, usually from 18 inches to 3 feet (457 mm to 914 mm) long, is provided for the power supply to the motor. A GFCI-protected receptacle is typically located in the accessible area near the pump, behind an access panel; however, based on the definition of "Readily accessible," one could interpret this section as requiring the GFCI device to be exterior to the bathtub enclosure so that access panels would not have to be removed to gain access to the device. This may necessitate the use of a GFCI circuit breaker in the panelboard. Note that this section requires a dedicated circuit for these bathtubs.

Where located farther than 6 feet from the inside walls of a bathtub, receptacles not supplying the bathtub do not need GFCI protection because they are not easily accessed by and are not within the immediate reach of bathers. Receptacles located where the occupants would be able to use electrical appliances and electronic products in close proximity to the bathtub

should be avoided; however, if they are installed within 6 feet, they must be GFCI protected.

Section E3902.1 requires that all receptacles in a bathroom be GFCI protected; therefore, if a hydromassage bathtub is located in a room defined as a bathroom, the distance between the receptacles and the bathtub is irrelevant.

E4209.2 Other electric equipment. Luminaires, switches, receptacles, and other electrical equipment located in the same room, and not directly associated with a hydromassage bathtub, shall be installed in accordance with the requirements of this code relative to the installation of electrical equipment in bathrooms. (680.72)

❖ Receptacles and lighting fixtures in the area are subject to the code provisions for bathrooms. There are no specific rules for locating receptacles at a certain distance from the hydromassage bathtub as there are for pool, spas or hot tubs.

E4209.3 Accessibility. Hydromassage bathtub electrical equipment shall be accessible without damaging the building structure or building finish. Where the hydromassage bathtub is cord- and plug-connected with the supply receptacle accessible only through a service access opening, the receptacle shall be installed so that its face is within direct view and not more than 12 inches (305 mm) from the plane of the opening. (680.73)

❖ The equipment, usually at the base of the hydromassage bathtub, must be accessible. This access is usually provided through an access panel. The cover or door must not be permanently sealed by tile, etc. See Section P2720.1 for specific pump access requirements. The receptacle serving cord- and plug-connected units is typically located under the unit and behind an access panel. This receptacle must be within easy reach and in plain view to allow the cord to be unplugged, to allow replacement of the receptacle and to allow resetting or replacement of any GFCI device.

E4209.4 Bonding. Both metal piping systems and grounded metal parts in contact with the circulating water shall be bonded together using an insulated, covered or bare solid copper bonding jumper not smaller than 8 AWG. The bonding jumper shall be connected to the terminal on the circulating pump motor that is intended for this purpose. The bonding jumper shall not be required to be connected to a double-insulated circulating pump motor. The 8 AWG or larger solid copper bonding jumper shall be required for equipotential bonding in the area of the hydromassage bathtub and shall not be required to be extended or attached to any remote panelboard, service equipment, or any electrode. Where a double-insulated circulating pump motor is used, the 8 AWG or larger solid copper bonding jumper shall be long enough to terminate on a replacement nondouble-insulated pump motor and shall be terminated to the equipment grounding conductor of the branch circuit for the motor. (680.74)

❖ Metal parts of the hydromassage bathtub must be bonded together with at least a size 8-AWG solid copper conductor. This is usually done at the base of the unit where the equipment is located. Because the typ-

ical hydromassage bathtub is constructed entirely of nonconductive materials, such as plastics and fiberglass, and the water supply and drain piping is commonly plastic, there may not be any components that require bonding to the pump motor. However, metal water supply and drain piping serving the bathtub would be required to be bonded.

Bibliography

The following resource materials were used in the preparation of the commentary for this chapter of the code:

NFPA 70–14, *National Electrical Code*. Quincy, MA: National Fire Protection Association, 2013.