

## APPENDIX V

# SWIMMING POOLS, SPAS AND HOT TUBS

This appendix is a North Carolina addition and not part of the 2015 *International Residential Code*.  
There will be no underlined text.

*(The provisions contained in this appendix are adopted as part of this code.)*

### SECTION AV101 GENERAL

**AV101.1 General.** The provisions of this appendix 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.

**AV101.2 Pools in flood hazard areas.** Pools that are located in flood hazard areas established by Table R301.2(1), including above-ground pools, on-ground pools and in-ground pools that involve placement of fill, shall comply with Section AV101.2.1 or AV101.2.2.

**Exception:** Pools located in riverine flood hazard areas that are outside of designated floodways.

**AV101.2.1 Pools located in designated floodways.** Where pools are located in designated floodways, documentation shall be submitted to the *building official*, which demonstrates that the construction of the pool will not increase the design flood elevation at any point within the *jurisdiction*.

**AV101.2.2 Pools located where floodways have not been designated.** Where pools are located where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed pool will not increase the design flood elevation more than 1 foot (305 mm) at any point within the *jurisdiction*.

### SECTION AV102 DEFINITIONS

**AV102.1 General.** For the purposes of these requirements, the terms used shall be defined as follows and as set forth in Chapter 2.

**ABOVE-GROUND/ON-GROUND POOL.** See "Swimming pool."

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

**HOT TUB.** See "Swimming pool."

**IN-GROUND POOL.** See "Swimming pool."

**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.

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

**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 AV103 SWIMMING POOLS

**AV103.1 In-ground pools.** In-ground pools shall be designed and constructed in conformance with ANSI/NSPI-5 as listed in Section AV108.

**AV103.2 Above-ground and on-ground pools.** Above-ground and on-ground pools shall be designed and constructed in conformance with ANSI/NSPI-4 as listed in Section AV108.

**AV103.3 Pools in flood hazard areas.** In flood hazard areas established by Table R301.2(1), pools in coastal high hazard areas shall be designed and constructed in conformance with ASCE 24.

### SECTION AV104 SPAS AND HOT TUBS

**AV104.1 Permanently installed spas and hot tubs.** Permanently installed spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-3 as listed in Section AV108.

**AV104.2 Portable spas and hot tubs.** Portable spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-6 as listed in Section AV108.

### SECTION AV105 BARRIER REQUIREMENTS

**AV105.1 Application.** The provisions of this chapter shall control the design of barriers for residential swimming pools, spas and hot tubs. These design controls are intended to provide protection against potential drownings and near drown-

ings by restricting access to swimming pools, spas and hot tubs.

**AV105.2 Outdoor swimming pool.** 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) or 4 inches (102 mm) where concrete or fixed solid material is used 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 that do not have openings, such as a masonry or stone wall, shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.
4. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the swimming pool side of the fence. Spacing between vertical members shall not exceed  $1\frac{3}{4}$  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 that 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. Access gates shall comply with the requirements of Section AV105.2, Items 1 through 7, and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the pool and shall be self-closing and have a self-latching

device. Gates other than pedestrian access gates shall have a self-latching device. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from the bottom of the gate, the release mechanism and openings shall comply with the following:

- 8.1. The release mechanism shall be located on the pool side of the gate at least 3 inches (76 mm) below the top of the gate; and
- 8.2. The gate and barrier shall have no opening larger than  $\frac{1}{2}$  inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.
9. Where a wall of a *dwelling* serves as part of the barrier, one of the following conditions shall be met:
  - 9.1. The pool shall be equipped with a powered safety cover in compliance with ASTM F1346; or
  - 9.2. Doors with direct access to the pool through that wall shall be equipped with an alarm that produces an audible warning when the door and/or its screen, if present, are opened. The alarm shall be listed and labeled in accordance with UL 2017. 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, which are approved by the governing body, shall be acceptable as 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 that meets the requirements of Section AV105.2, Items 1 through 9. When the ladder or steps are secured, locked or removed, any opening created shall not allow the passage of a 4-inch-diameter (102 mm) sphere.

**AV105.3 Indoor swimming pool.** Walls surrounding an indoor swimming pool shall comply with Section AV105.2, Item 9.

**AV105.4 Prohibited locations.** Barriers shall be located to prohibit permanent structures, equipment or similar objects from being used to climb them.

**AV105.5 Barrier exceptions.** Spas or hot tubs with a safety cover that complies with ASTM F1346, as listed in Section AV107, shall be exempt from the provisions of this appendix.

**SECTION AV106  
ENTRAPMENT PROTECTION FOR SWIMMING  
POOL AND SPA SUCTION OUTLETS**

**AV106.1 General.** Suction outlets shall be designed and installed in accordance with ANSI/APSP-7.

**SECTION AV107  
ABBREVIATIONS**

**AV107.1 General.**

**ANSI**

American National Standards Institute  
11 West 42nd Street  
New York, NY 10036

**APSP**

Association of Pool and Spa Professionals  
NSPI—National Spa and Pool Institute  
2111 Eisenhower Avenue  
Alexandria, VA 22314

**ASCE**

American Society of Civil Engineers  
1801 Alexander Bell Drive  
Reston, VA 98411-0700

**ASTM**

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

**UL**

Underwriters Laboratories, Inc.  
333 Pfingsten Road  
Northbrook, IL 60062-2096

**SECTION AV108  
STANDARDS**

**AV108.1 General.**

**ANSI/NSPI**

ANSI/  
NSPI-3—99 Standard for Permanently Installed  
Residential Spas ..... AV104.1

ANSI/  
NSPI—4-07 Standard for Above-ground/  
On-ground Residential Swimming  
Pools..... AV103.2

ANSI  
/NSPI-5—2003 Standard for Residential In-ground  
Swimming Pools ..... AV103.1

ANSI/  
NSPI-6—99 Standard for Residential Portable  
Spas ..... AV104.2

**ANSI/APSP**

ANSI/  
PSP-7—06 Standard for Suction Entrapment  
Avoidance in Swimming Pools,  
Wading Pools, Spas, Hot Tubs  
and Catch Basins .....AV106.1

**ASCE**

ASCE/  
SEI-24—05 Flood Resistant Design  
and Construction.....AV103.3

**ASTM**

F1346—91 (2003) Performance Specification  
for Safety Covers and Labeling  
Requirements for All Covers for  
Swimming Pools, Spas and Hot  
Tubs .....AV105.2, AV105.5

**UL**

2017—2000 Standard for General-purpose Signaling  
Devices and Systems—with Revisions  
through June 2004 .....AV105.2

NC Department of Insurance  
Office of the State Fire Marshal - Engineering Division  
1202 Mail Service Center, Raleigh, NC 27699-1202  
919-661-5880

Swimming Pool Equipotential Bonding Grid

Code: 2014 Electrical Code  
Section: 680.26 (B)(2)

Date: March 16, 2017

**Question:**

What is the requirement for an equipotential bonding grid around swimming pools?

**Answer:**

This question references a change from the 2005 Electrical Code with revisions in the 2008 Electrical Code requiring that an equipotential bonding grid be established around the perimeter of the pool. Equipotential bonding grids and their use are not new to the Code, yet are new to Article 680. There is no change in the requirements for bonding metallic components of the pool under previous Code language. This new Section adds to those requirements by installing an equipotential bonding grid under the paved walking surfaces extending outward to a minimum of 3 feet and encompassing the top edge of the pool wall following the contour of that edge, still meeting the concept that all metallic sections or parts of the pool be bonded together to eliminate differences of "potential" between any metal components of the pool or surrounding conductive surfaces.

In addition, an equipotential bonding grid is required whether a paved surface is installed or not, and applies to any permanent pool, inground or aboveground. This "grid" is manufactured by applying crisscrossed rebar, or minimum number 8 steel wire mesh, or a copper grid system comprised of minimum number 8 copper conductor installed in a uniformly spaced perpendicular grid pattern, placed between the earth and the concrete or within the concrete, with no insulating material separating the earth and concrete, or a single #8 bare copper conductor installed between 18 to 24 inches from the edge of the pool. This change in 2008, in Section 680.26(B)(2), would allow a single #8 bare copper conductor to be intalled within the area 18 inches from the edge of the pool, out to 24 inches. The purpose is to assure a grounding plane by which stray voltage might have a more effective path to earth.

- (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

(2) **Installation.**

(a) *Vertical Spacing.* The enclosure shall be located not less than 100 mm (4 in.), measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 200 mm (8 in.) above the maximum pool water level, whichever provides the greater elevation.

(b) *Horizontal Spacing.* The enclosure shall be located not less than 1.2 m (4 ft) from the inside wall of the pool, unless separated from the pool by a solid fence, wall, or other permanent barrier.

(C) **Protection.** 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, adjacent to fixed structures, and the like.

(D) **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 a number of grounding terminals that shall be no fewer than one more than the number of conduit entries.

(E) **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.

(F) **Grounding.** The equipment grounding conductor terminals of a 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 connected to the equipment grounding terminal of the panelboard. This terminal shall be directly connected to the panelboard enclosure.

**680.25 Feeders.** These provisions shall apply to any feeder on the supply side of panelboards supplying branch circuits for pool equipment covered in Part II of this article and on the load side of the service equipment or the source of a separately derived system.

(A) **Feeders.** Where feeders are installed in corrosive environments as described in 680.14, the wiring method of that portion of the feeder shall be as required in 680.14(B) or shall be liquidtight flexible nonmetallic conduit. Wiring methods installed in corrosive environments as described in 680.14 shall contain an insulated copper equipment grounding conductor sized in accordance with Table 250.122, but not smaller than 12 AWG.

Where installed in noncorrosive environments, feeders shall comply with the general requirements in Chapter 3.

(B) **Aluminum Conduit.** Aluminum conduit shall not be permitted in the pool area where subject to corrosion.

**680.26 Equipotential Bonding.**

(A) **Performance.** The equipotential bonding required by this section shall be installed to reduce voltage gradients in the pool area.

(B) **Bonded Parts.** The parts specified in 680.26(B)(1) through (B)(7) shall be bonded together using solid copper conductors, insulated covered, or bare, not smaller than 8 AWG or with rigid metal conduit of brass or other identified corrosion-resistant metal. Connections to bonded parts shall be made in accordance with 250.8. An 8 AWG or larger solid copper bonding conductor provided to reduce voltage gradients in the pool area shall not be required to be extended or attached to remote panelboards, service equipment, or electrodes.

(1) **Conductive Pool Shells.** Bonding to conductive pool shells shall be provided as specified in 680.26(B)(1)(a) or (B)(1)(b). Poured concrete, pneumatically applied or sprayed concrete, and concrete block with painted or plastered coatings shall all be considered conductive materials due to water permeability and porosity. Vinyl liners and fiberglass composite shells shall be considered to be nonconductive materials.

(a) *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 680.26(B)(1)(b).

(b) *Copper Conductor Grid.* A copper conductor grid shall be provided and shall comply with (b)(1) through (b)(4).

- (1) Be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing. The bonding shall be in accordance with 250.8 or other approved means.
- (2) Conform to the contour of the pool
- (3) Be arranged in a 300-mm (12-in.) by 300-mm (12-in.) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 100 mm (4 in.)
- (4) Be secured within or under the pool no more than 150 mm (6 in.) from the outer contour of the pool shell

(2) **Perimeter Surfaces.** The perimeter surface to be bonded shall be considered to extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces and other types of paving. Perimeter surfaces separated from the pool by a permanent wall or building 1.5 m (5 ft) in height or more shall require equipotential bonding only on the pool side of the permanent wall or building. Bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a) or (2)(b) and shall be attached to the pool reinforcing steel or copper conductor grid at a minimum of four (4) points uniformly spaced around the perimeter of the pool. For nonconductive pool shells, bonding at four points shall not be required.

(a) *Structural Reinforcing Steel.* Structural reinforcing steel shall be bonded in accordance with 680.26(B)(1)(a).

(b) *Alternate Means.* Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) shall be utilized where the following requirements are met:

- (1) At least one minimum 8 AWG bare solid copper conductor shall be provided.
- (2) The conductors shall follow the contour of the perimeter surface.
- (3) Only listed splices shall be permitted.
- (4) The required conductor shall be 450 mm to 600 mm (18 in. to 24 in.) from the inside walls of the pool.
- (5) The required conductor shall be secured within or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below the subgrade.

(3) **Metallic Components.** All metallic parts of the pool structure, including reinforcing metal not addressed in 680.26(B)(1)(a), shall be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, the reinforcing steel shall not be required to be bonded.

(4) **Underwater Lighting.** All metal forming shells and mounting brackets of no-niche luminaires shall be bonded.

*Exception: Listed low-voltage lighting systems with nonmetallic forming shells shall not require bonding.*

(5) **Metal Fittings.** All metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 100 mm (4 in.) in any dimension and do not penetrate into the pool structure more than 25 mm (1 in.) shall not require bonding.

(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.

*Exception: Metal parts of listed equipment incorporating an approved system of double insulation shall not be bonded.*

(a) **Double-Insulated Water Pump Motors.** Where a double-insulated water pump motor is installed under the provisions of this rule, 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.

(b) **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.

(7) **Fixed Metal Parts.** All fixed metal parts shall be bonded including, but not limited to, metal-sheathed cables and raceways, metal piping, metal awnings, metal fences, and metal door and window frames.

*Exception No. 1: Those separated from the pool by a permanent barrier that prevents contact by a person shall not be required to be bonded.*

*Exception No. 2: Those greater than 1.5 m (5 ft) horizontally from the inside walls of the pool shall not be required to be bonded.*

*Exception No. 3: Those greater than 3.7 m (12 ft) 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.*

(C) **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 5800 mm<sup>2</sup> (9 in.<sup>2</sup>) 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 680.26(B).

### 680.27 Specialized Pool Equipment.

(A) **Underwater Audio Equipment.** All underwater audio equipment shall be identified.

(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.

(2) **Wiring Methods.** Rigid metal conduit of brass or other identified corrosion-resistant metal, liquidtight flexible nonmetallic conduit (LFNC), rigid polyvinyl chloride conduit, or reinforced thermosetting resin conduit shall extend from the forming shell to a listed junction box or other enclosure as provided in 680.24. Where rigid polyvinyl chloride conduit, reinforced thermosetting resin conduit, or liquidtight flexible nonmetallic conduit is used, an 8 AWG insulated solid or stranded copper bonding jumper shall be installed in this conduit. The bonding jumper shall be terminated 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 listed potting compound to protect such connection from the possible deteriorating effect of pool water.

(3) **Forming Shell and Metal Screen.** The forming shell and metal screen shall be of brass or other approved corrosion-resistant metal. All forming shells shall include provisions for terminating an 8 AWG copper conductor.

(B) **Electrically Operated Pool Covers.**

(1) **Motors and Controllers.** The electric motors, controllers, and wiring shall be located not less than 1.5 m (5 ft) from the inside wall of the pool unless 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 device that controls the operation of the motor for an electrically operated pool cover shall be located such that the operator has full view of the pool.

*Exception: Motors that are part of listed systems with ratings not exceeding the low-voltage contact limit that are supplied by listed transformers or power supplies that comply with 680.23(A)(2) shall be permitted to be located less than 1.5 m (5 ft) from the inside walls of the pool.*

(2) **Protection.** The electric motor and controller shall be connected to a branch circuit protected by a ground-fault circuit interrupter.

*Exception: Motors that are part of listed systems with ratings not exceeding the low-voltage contact limit that are supplied by listed transformers or power supplies that comply with 680.23(A)(2).*

(C) **Deck Area Heating.** The provisions of this section shall apply to all pool deck areas, including a covered pool, where electrically operated comfort heating units are installed within 6.0 m (20 ft) of the inside wall of the pool.

(1) **Unit Heaters.** Unit heaters shall be rigidly mounted to the structure and shall be of the totally enclosed or guarded type. Unit heaters shall not be mounted over the pool or within the area extending 1.5 m (5 ft) horizontally from the inside walls of a pool.

(2) **Permanently Wired Radiant Heaters.** Radiant electric heaters shall be suitably guarded and securely fastened to their mounting device(s). Heaters shall not be installed over a pool or within the area extending 1.5 m (5 ft) horizontally from the inside walls of the pool and shall be mounted at least 3.7 m (12 ft) vertically above the pool deck unless otherwise approved.

(3) **Radiant Heating Cables Not Permitted.** Radiant heating cables embedded in or below the deck shall not be permitted.

**680.28 Gas-Fired Water Heater.** Circuits serving gas-fired swimming pool and spa water heaters operating at voltages above the low-voltage contact limit shall be provided with ground-fault circuit-interrupter protection for personnel.

### Part III. Storable Pools, Storable Spas, and Storable Hot Tubs

**680.30 General.** Electrical installations at storable pools, storable spas, or storable hot tubs shall comply with the provisions of Part I and Part III of this article.

**680.31 Pumps.** A cord-connected pool filter pump shall incorporate an approved system of double insulation or its equivalent and shall be provided with means for grounding only the internal and nonaccessible non-current-carrying metal parts of the appliance.

The means for grounding shall be an equipment grounding conductor run with the power-supply conductors in the flexible cord that is properly terminated in a grounding-type attachment plug having a fixed grounding contact member.

Cord-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 300 mm (12 in.) of the attachment plug.

**680.32 Ground-Fault Circuit Interrupters Required.** All electrical equipment, including power-supply cords, used with storable pools shall be protected by ground-fault circuit interrupters.

All 125-volt, 15- and 20-ampere receptacles located within 6.0 m (20 ft) 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 the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

Informational Note: For flexible cord usage, see 400.4.

**680.33 Luminaires.** An underwater luminaire, if installed, shall be installed in or on the wall of the storable pool, storable spa, or storable hot tub. It shall comply with either 680.33(A) or (B).

(A) **Within the Low Voltage Contact Limit.** A luminaire shall be part of a cord-and plug connected lighting assembly. This assembly shall be listed as an assembly for the purpose and have the following construction features:

- (1) No exposed metal parts
- (2) A luminaire lamp that is suitable for use at the supplied voltage
- (3) An impact-resistant polymeric lens, luminaire body, and transformer enclosure

(4) A transformer or power supply meeting the requirements of 680.23(A)(2) with a primary rating not over 150 V

(B) **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 not over 150 volts shall be permitted to be cord-and-plug-connected where the assembly is listed as an assembly for the purpose. The installation shall comply with 680.23(A)(5), and the assembly shall have the following construction features:

- (1) No exposed metal parts
- (2) An impact-resistant polymeric lens and luminaire body
- (3) A ground-fault circuit interrupter with open neutral conductor protection as an integral part of the assembly
- (4) The luminaire lamp permanently connected to the ground-fault circuit interrupter with open-neutral protection
- (5) Compliance with the requirements of 680.23(A)

**680.34 Receptacle Locations.** Receptacles shall not be located less than 1.83 m (6 ft) 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 the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

### Part IV. Spas and Hot Tubs

**680.40 General.** Electrical installations at spas and hot tubs shall comply with the provisions of Part I and Part IV of this article.

**680.41 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 readily accessible to the users and not less than 1.5 m (5 ft) away, adjacent to, and within sight of the spa or hot tub. This requirement shall not apply to one-family dwellings.

**680.42 Outdoor Installations.** A spa or hot tub installed outdoors shall comply with the provisions of Parts I and II of this article, except as permitted in 680.42(A) and (B), that would otherwise apply to pools installed outdoors.

(A) **Flexible Connections.** Listed packaged spa or hot tub equipment assemblies or self-contained spas or hot tubs utilizing a factory-installed or assembled control panel or panel-board shall be permitted to use flexible connections as covered in 680.42(A)(1) and (A)(2).

(1) **Flexible Conduit.** Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit shall be permitted.

(2) **Cord-and-Plug Connections.** Cord-and-plug connections with a cord not longer than 4.6 m (15 ft) shall be permitted where protected by a ground-fault circuit interrupter.

(B) **Bonding.** 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 680.26.

Equipotential bonding of perimeter surfaces in accordance with 680.26(B)(2) shall not be required to be provided for spas and hot tubs where all of the following conditions apply:

- (1) The spa or hot tub shall be listed, labeled, and identified as a self-contained spa for aboveground use.
- (2) The spa or hot tub shall not be identified as suitable only for indoor use.
- (3) The installation shall be in accordance with the manufacturer's instructions and shall be located on or above grade.
- (4) The top rim of the spa or hot tub shall be at least 710 mm (28 in.) above all perimeter surfaces that are within 760 mm (30 in.), measured horizontally from the spa or hot tub. The height of nonconductive external steps for entry to or exit from the self-contained spa shall not be used to reduce or increase this rim height measurement.

**Informational Note:** For information regarding listing requirements for self-contained spas and hot tubs, see ANSI/UL 1563-2010, *Standard for Electric Spas, Equipment Assemblies, and Associated Equipment*.

**(C) Interior Wiring to Outdoor Installations.** In the interior of a dwelling unit or in the interior of another building or structure associated with a dwelling unit, any of the wiring methods recognized or permitted in Chapter 3 of this Code shall be permitted to be used for the connection to motor disconnecting means and the motor, heating, and control loads that are part of a self-contained spa or hot tub or a packaged spa or hot tub equipment assembly. Wiring to an underwater luminaire shall comply with 680.23 or 680.33.

**Informational Note:** See 680.25 for feeders.

**680.43 Indoor Installations.** A spa or hot tub installed indoors shall comply with the provisions of Parts I and II of this article except as modified by this section and shall be connected by the wiring methods of Chapter 3.

*Exception No. 1: Listed spa and hot tub packaged units rated 20 amperes or less shall be permitted to be cord-and-plug-connected to facilitate the removal or disconnection of the unit for maintenance and repair.*

*Exception No. 2: The equipotential bonding requirements for perimeter surfaces in 680.26(B)(2) shall not apply to a listed self-contained spa or hot tub installed above a finished floor.*

*Exception No. 3: For a dwelling unit(s) only, where a listed spa or hot tub is installed indoors, the wiring method requirements of 680.42(C) shall also apply.*

**(A) Receptacles.** At least one 125-volt, 15- or 20-ampere receptacle on a general-purpose branch circuit shall be located not less than 1.83 m (6 ft) from, and not exceeding 3.0 m (10 ft) from, the inside wall of the spa or hot tub.

**(1) Location.** Receptacles shall be located at least 1.83 m (6 ft) measured horizontally from the inside walls of the spa or hot tub.

**(2) Protection, General.** Receptacles rated 125 volts and 30 amperes or less and located within 3.0 m (10 ft) of the inside walls of a spa or hot tub shall be protected by a ground-fault circuit interrupter.

**(3) Protection, Spa or Hot Tub Supply Receptacle.** Receptacles that provide power for a spa or hot tub shall be ground-fault circuit-interrupter protected.

**(4) Measurements.** In determining the dimensions in this section addressing receptacle spacings, the distance to be measured shall be the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

**(B) Installation of Luminaires, Lighting Outlets, and Ceiling-Suspended (Paddle) Fans.**

**(1) Elevation.** Luminaires, except as covered in 680.43(B)(2), lighting outlets, and ceiling-suspended (paddle) fans located over the spa or hot tub or within 1.5 m (5 ft) from the inside walls of the spa or hot tub shall comply with the clearances specified in (B)(1)(a), (B)(1)(b), and (B)(1)(c) above the maximum water level.

**(a) Without GFCI.** Where no GFCI protection is provided, the mounting height shall be not less than 3.7 m (12 ft).

**(b) With GFCI.** Where GFCI protection is provided, the mounting height shall be permitted to be not less than 2.3 m (7 ft 6 in.).

**(c) Below 2.3 m (7 ft 6 in.).** Luminaires meeting the requirements of item (1) or (2) and protected by a ground-fault circuit interrupter shall be permitted to be installed less than 2.3 m (7 ft 6 in.) over a spa or hot tub:

- (1) Recessed luminaires with a glass or plastic lens, nonmetallic or electrically isolated metal trim, and suitable for use in damp locations
- (2) Surface-mounted luminaires with a glass or plastic globe, a nonmetallic body, or a metallic body isolated from contact, and suitable for use in damp locations

**(2) Underwater Applications.** Underwater luminaires shall comply with the provisions of 680.23 or 680.33.

**(C) Switches.** Switches shall be located at least 1.5 m (5 ft), measured horizontally, from the inside walls of the spa or hot tub.

**(D) Bonding.** The following parts shall be bonded together:

- (1) All metal fittings within or attached to the spa or hot tub structure.
- (2) Metal parts of electrical equipment associated with the spa or hot tub water circulating system, including pump motors, unless part of a listed, labeled, and identified self-contained spa or hot tub.
- (3) Metal raceway and metal piping that are within 1.5 m (5 ft) of the inside walls of the spa or hot tub and that are not separated from the spa or hot tub by a permanent barrier.
- (4) All metal surfaces that are within 1.5 m (5 ft) of the inside walls of the spa or hot tub and that are not separated from the spa or hot tub area by a permanent barrier.

*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.*

**(5)** Electrical devices and controls that are not associated with the spas or hot tubs and that are located less than 1.5 m (5 ft) from such units; otherwise, they shall be bonded to the spa or hot tub system.

**(E) Methods of Bonding.** All metal parts associated with the spa or hot tub shall be bonded by any of the following methods:



**AMENDMENTS 680.21(C)(1) & (2)**

Amend NEC 2017, page 546:

**(C) GFCI Protection.** Outlets supplying pool pump motors connected to single-phase, 120-volt through 240-volt branch circuits, whether by receptacle or by direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.

**(1) Pool Pump Motor Replacement.** Whenever a pool pump motor requires replacing and the existing branch circuit or receptacle providing power to the pump motor does not provide ground-fault circuit-interrupter protection for personnel as required by 680.21(C), the branch circuit or receptacle shall be updated to provide ground-fault circuit-interrupter protection for personnel.

**(2) Existing Pool Pump Motor Branch Circuit and Overcurrent Protection.** All existing single-phase, 120-volt through 240-volt branch circuits and overcurrent devices that supply power to a pool pump motor by direct connection or outlet shall comply with the provisions of 680.21(C) when the branch circuits or overcurrent devices are altered, installed, modified, relocated, repaired, or replaced.