ARTICLE
680

Swimming Pools, Spas, Hot Tubs, and Fountains

Introduction to Article 680—Swimming Pools, Spas, Hot Tubs, and Fountains

This article contains the requirements for electrical wiring and equipment for ***swimming pools, spas, hot tubs, fountains,*** and ***hydromassage bathtubs.*** Be careful to determine which parts of this article apply, as identified in the "General" section of each part, so you can correctly apply the rules. The definition of a pool doesn't include lakes, lagoons, surf parks, or other natural/man-made bodies of water that incorporate swimming and swimming areas. Natural/man-made bodies of water (such as lakes, lagoons, surf parks, or other similar bodies of water) are addressed in Article 682.

Pool. Manufactured or field-constructed equipment designed to contain water and intended for use by persons for swimming, wading, immersion, recreational, or therapeutic purposes. ▸Figure 680–1

▸Figure 680–1

Part I. General Requirements

680.1 Scope

This article contains the requirements for electric wiring and equipment for swimming pools, spas, hot tubs, fountains, and hydromassage bathtubs. ▸Figure 680–2 and ▸Figure 680–3

▸Figure 680–2

Figure 680–3

680.2 Listing Requirements

Electrical equipment covered by this article is required to be listed. Figure 680–4

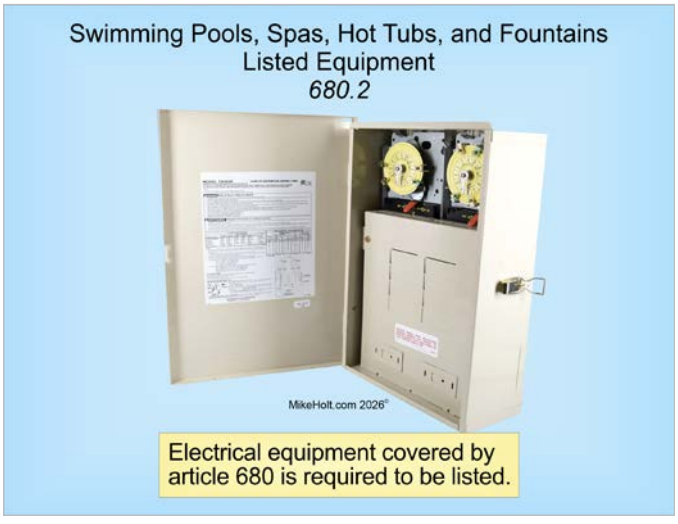


Figure 680–4

680.4 Inspections After Installation

The authority having jurisdiction (AHJ) is permitted to require periodic inspection and testing for wiring and equipment within the scope of this article.

680.5 Ground-Fault Protection

(A) General. The GFCI and SPGFCI requirements in this article are in addition to the requirements in 210.8, unless otherwise noted.

(B) GFCI Protection, 150V or Less to Ground. Where ground-fault protection is required in this article for branch circuits rated 150V or less to ground (120V, 208V, 240V, 120/208V, 120/240V), a GFCI protective device is required for the following:

(1) Single-phase branch circuits rated 60A or less

(2) Three-phase branch circuits rated 100A or less Figure 680–5

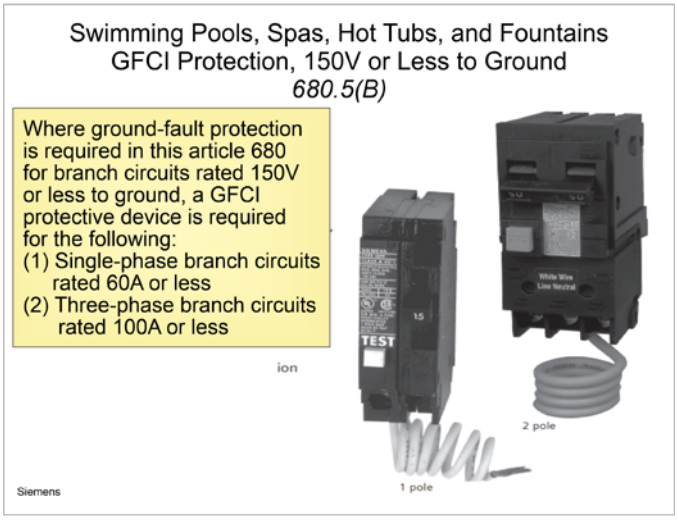


Figure 680–5

Ground-Fault Circuit Interrupter (Class A). A device intended to protect people by de-energizing a circuit when ground-fault current exceeds the value for a Class A device (6 mA or higher). Figure 680–6

(C) SPGFCI Protection, Over 150V to Ground. Where ground-fault protection is required in this article for branch circuits rated over 150V to ground (277V, 480V, 480Y/277V), a ***Special Purpose GFCI*** protective device not exceeding 20 mA ground-fault trip current is required. Figure 680–7

Ground-Fault Circuit Interrupter, Special Purpose Class C. A device intended to de-energize a circuit, with no conductor over 300V to ground, when the ground-fault current exceeds the value for a Class C device (20 mA or higher). Figure 680–8

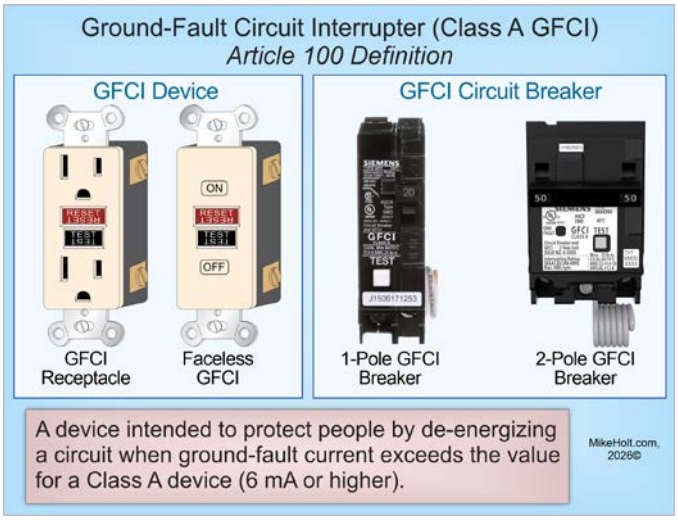


Figure 680–6

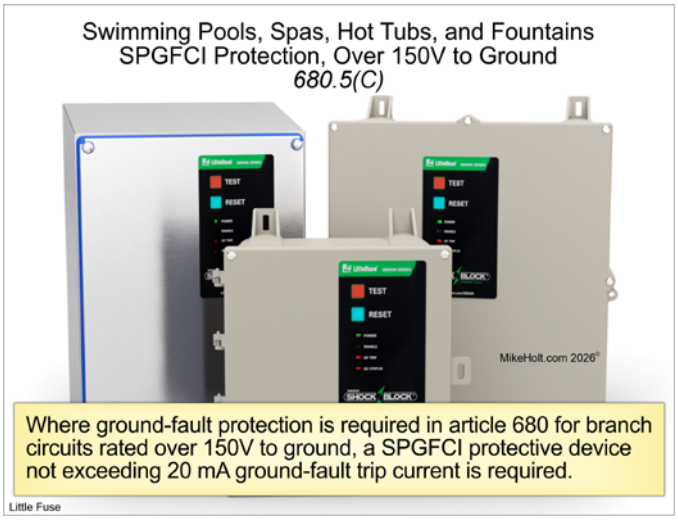


Figure 680–7

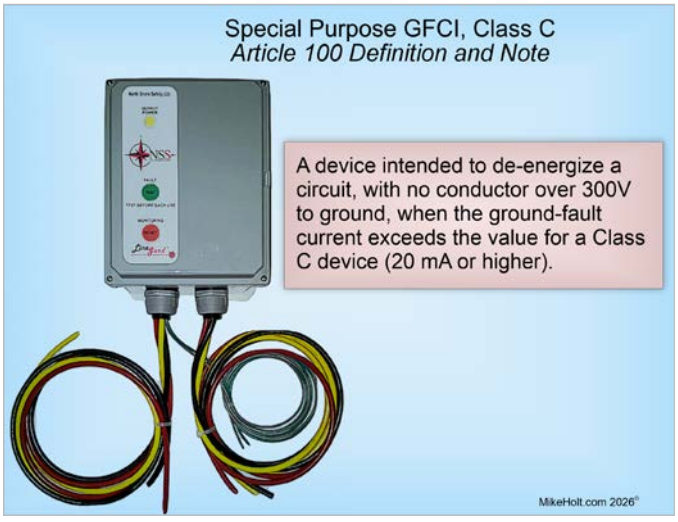


Figure 680–8

Author's Comment:

- A GFCI protective device is intended to protect humans against maximum let-go levels (muscle contraction) for circuits rated 120V, 208V, 240V, 120/240V, and 208Y/120V with a trip-open value of 6-mA. A SPGFCI protective device is intended to protect humans against ventricular fibrillation (electrocution) for circuits rated 277V, 480V, and 480Y/277V, with a trip-open value of 20 mA.

680.7 Grounding and Bonding

(A) Insulated Equipment Grounding Conductor. Circuits located in a ***corrosive environment*** or a wet location as determined by the AHJ must contain an insulated copper equipment grounding conductor sized in accordance with Table 250.122, but not smaller than 12 AWG. Figure 680–9

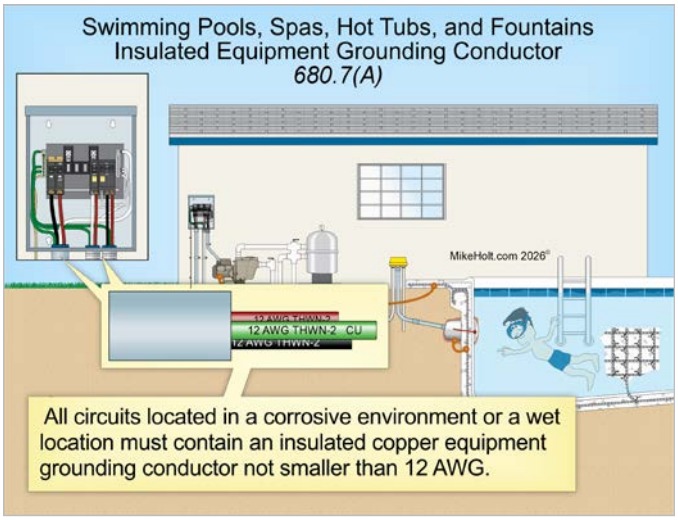


Figure 680–9

Corrosive Environment. Areas or spaces without adequate ventilation where electrical equipment is located, and pool sanitation chemicals are stored, handled, or dispensed. Figure 680–10

Author's Comment:

- UF cable with an uninsulated equipment grounding conductor is not permitted for circuits in corrosive environments or wet locations that supply swimming pools, spas, hot tubs, or fountains.

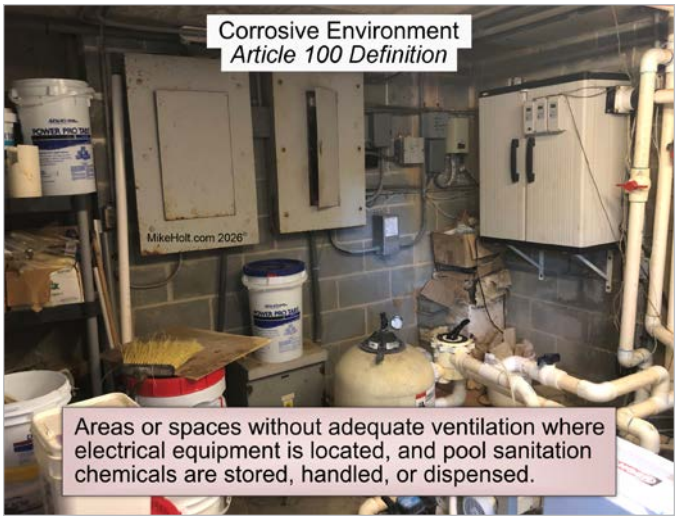


Figure 680–10

(C) Terminals. Field-installed terminals for bonding in damp or wet locations, or corrosive environments must be listed for direct burial use. Figure 680–11

Figure 680–11

680.9 Overhead Conductor Clearance

(A) Overhead Power Conductors. Overhead conductors must have a clearance from the ***maximum water level*** in accordance with Table 680.9(A). Figure 680–12

Maximum Water Level. The highest level that water can reach before it spills out. Figure 680–13

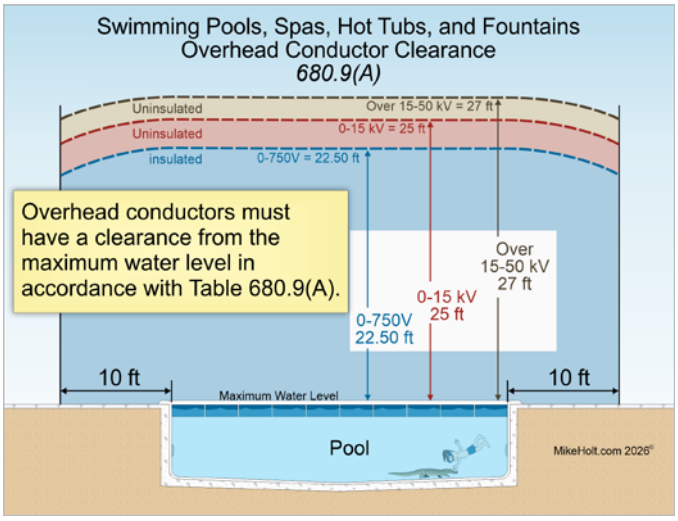


Figure 680–12

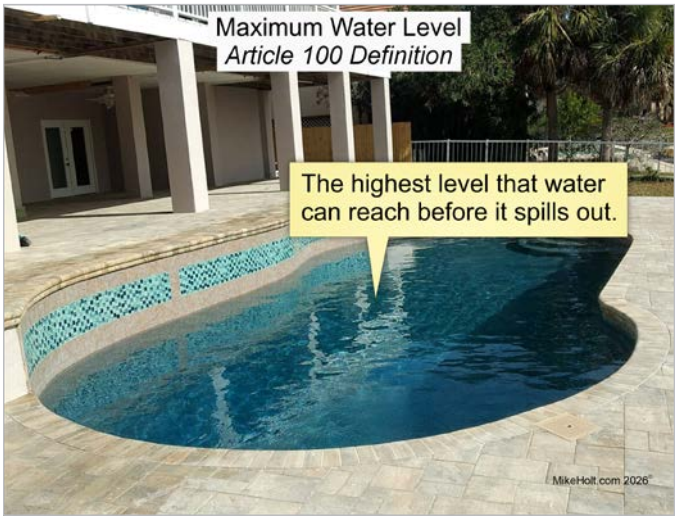


Figure 680–13

680.10 Electric Pool Water Heaters and Heat Pumps

(A) Water Heaters.

(2) Branch Circuit Conductors and Overcurrent Protective Devices. The ampacity of branch-circuit conductors and the ampere rating of overcurrent protective devices for pool water heaters must be sized at not less than 125 percent of the water heater nameplate current rating. Figure 680–14

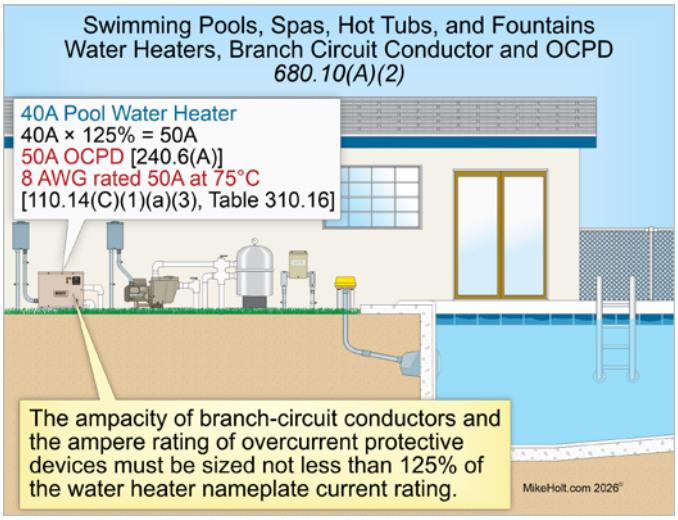


Figure 680–14

(B) Water Heat Pump.

(2) Branch Circuit Conductors and Overcurrent Protective Devices. The ampacity of branch-circuit conductors and the ampere rating of overcurrent protective devices for pool heat pumps must be sized in accordance with the heat pump nameplate current rating. Figure 680–15

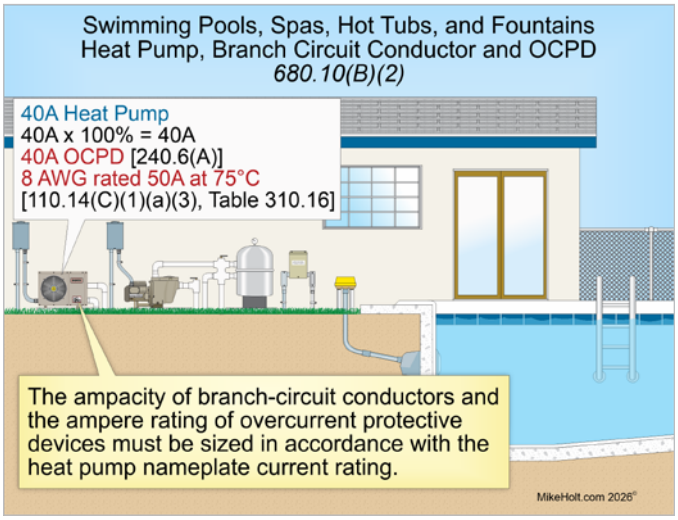


Figure 680–15

680.11 Underground Wiring

(A) Wiring Underground. Wiring methods installed underground within 5 ft horizontally from the inside wall of the pool must be one of the following: Figure 680–16

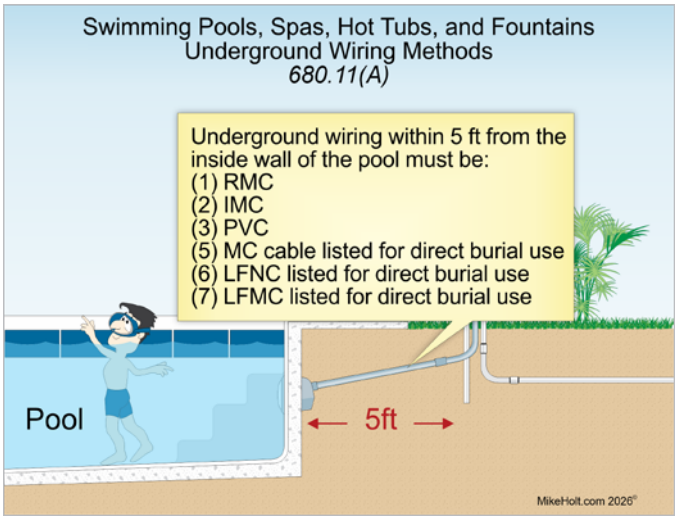


Figure 680–16

(1) Rigid metal conduit

(2) Intermediate metal conduit

(3) Rigid polyvinyl chloride conduit

(5) Jacketed MC cable listed for direct burial use

(6) Liquidtight flexible nonmetallic conduit listed for direct burial use

(7) Liquidtight flexible metal conduit listed for direct burial use

680.12 Equipment Rooms, Vaults, and Pits

(A) Drainage. Equipment for permanently installed pools, spas, hot tubs, and fountains is not permitted to be in a space that does not have drainage. This drainage prevents water accumulation during normal operation or maintenance, unless the equipment is rated for submersion.

(B) Receptacles.

(1) At least one 15A or 20A, 125V GFCI protected receptacle must be installed within the equipment room for permanently installed pools, spas, hot tubs, or fountains Figure 680–17

(2) Other receptacles installed within the equipment room for permanently installed pools, spas, hot tubs, or fountains must be GFCI or SPGFCI protected in accordance with 680.5

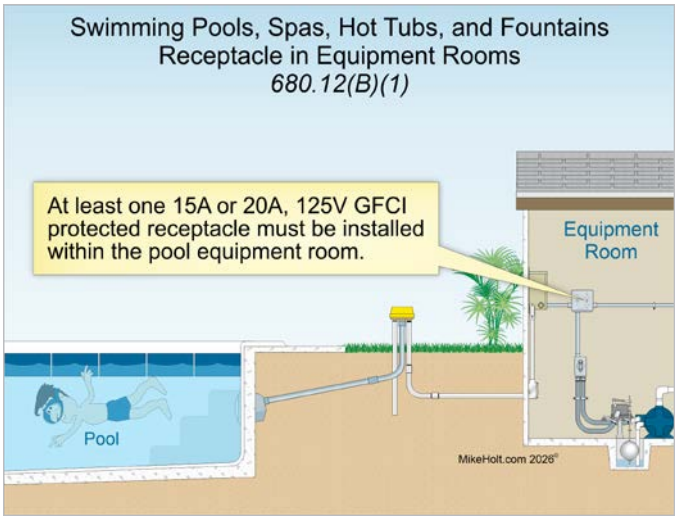


Figure 680–17

680.13 Equipment Disconnecting Means

A disconnect is required for pool, spas, hot tub, or fountain equipment. The disconnect must be readily accessible, be within sight (not more than 50 ft in accordance with 110.29), and not less than 5 ft from the pool, spas, hot tub, or fountain water (unless separated by a permanently installed barrier). This horizontal distance is measured from the water's edge along the shortest path required to reach the disconnect. Figure 680–18

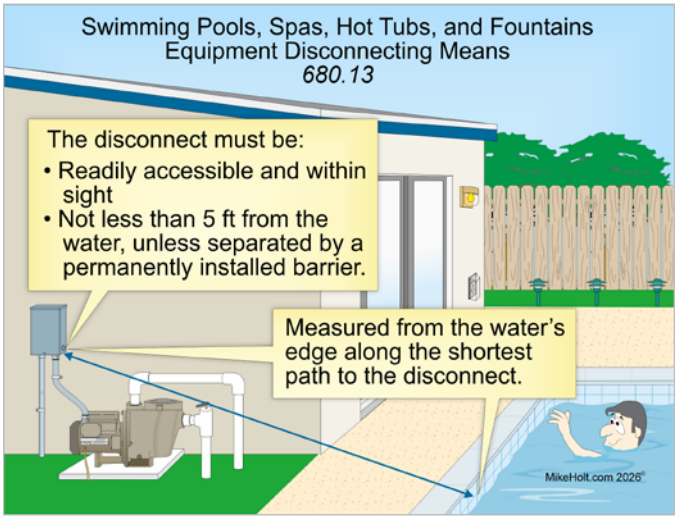


Figure 680–18

680.14 Corrosive Environment

(A) Wiring Methods. RMC, IMC, PVC, RTRC, LFNC, and LFMC are permitted to be installed in a ***corrosive environment***. Figure 680–19

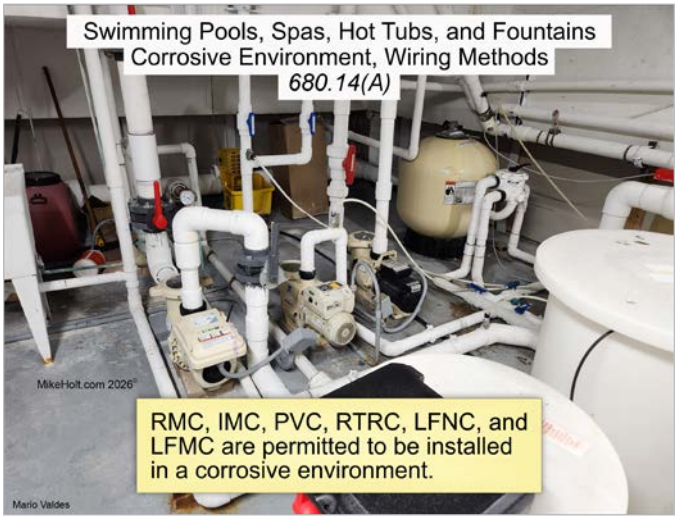


Figure 680–19

Corrosive Environment. Areas or spaces without adequate ventilation where electrical equipment is located, and pool sanitation chemicals are stored, handled, or dispensed. Figure 680–20

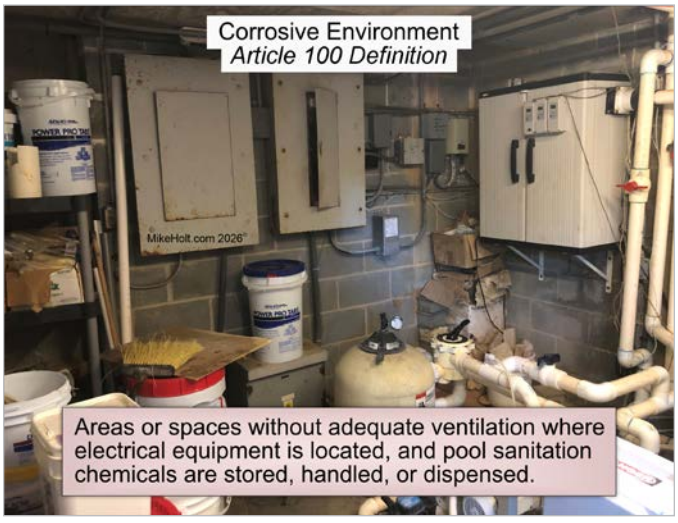


Figure 680–20

(B) Equipment.

Corrosion-Resistant Enclosures. Equipment in a corrosive environment must be identified for use or installed in corrosion-resistant enclosures. Figure 680–21

Figure 680–21

Listed for Pools. Equipment listed for pool and spa use is permitted to be installed in a corrosive environment. Figure 680–22

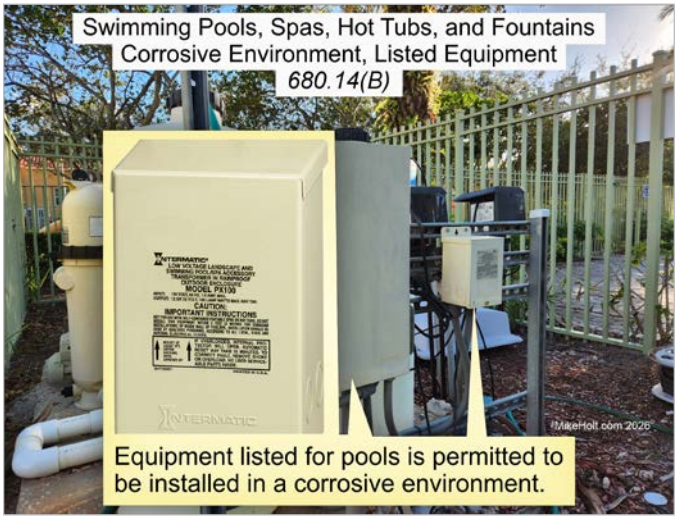


Figure 680–22

Author's Comment:

- Enclosures that are suitable for corrosive environments are identified in Table 110.28.

Part II. Permanently Installed Pools

680.20 General

Electrical installations for ***permanently installed pools*** are only required to comply with Part I and Part II of Article 680.

Pool, Permanently Installed Pool. A pool that is permanently constructed or installed in the ground, partially in the ground, above the ground, inside a building, or on a building. Figure 680–23 and Figure 680–24

Figure 680–23

Figure 680–24

680.21 Pool Motors

(A) Wiring Methods.

(1) Flexible Connections. Where flexibility is necessary, pool motors can be connected with LFMC, LFNC, or MC cable suitable for use in swimming pool motor circuits. Figure 680–25

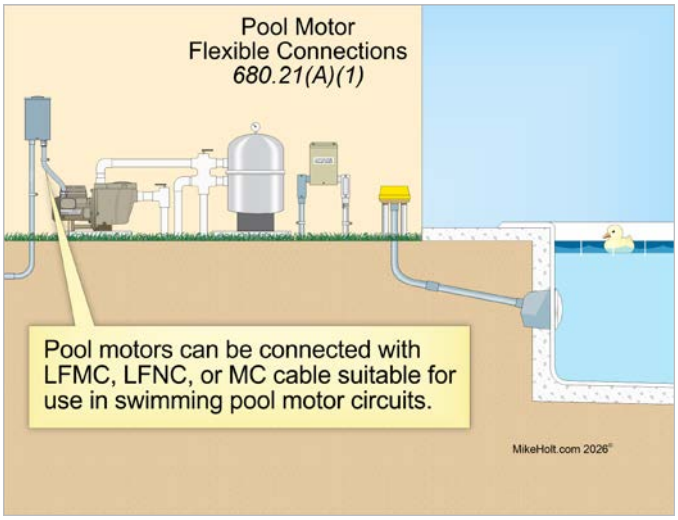


Figure 680–25

Author's Comment:

- In accordance with UL 1569 Metal Clad Cable, MC cable used to connect pool motors must be marked "Suitable for use in swimming pool motor circuits."

(2) Cord-and-Plug Connections. Pool motors can be cord-and-plug-connected with a flexible cord that does not exceed 3 ft in length.

(C) Ground-Fault Protection.

(1) General. Pool motors must have ground-fault protection in accordance with 680.5. Figure 680–26

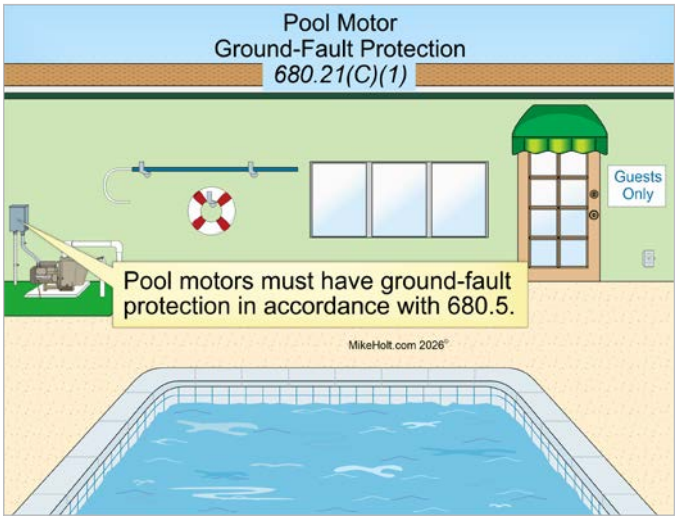


Figure 680–26

(D) Replaced or Repaired. Where a pool motor is replaced or repaired, the outlet serving the pool pump motor must be provided with ground-fault protection in accordance with 680.21(C). Figure 680–27

Figure 680–27

680.22 Receptacles, Luminaires, and Switches

(A) Receptacles.

(1) Required. At least one 15A or 20A, 125V receptacle is required to be located between 6 ft and 20 ft from the inside wall of a pool. This receptacle must not be more than 6½ ft above the floor, platform, or grade level serving the pool. Figure 680–28

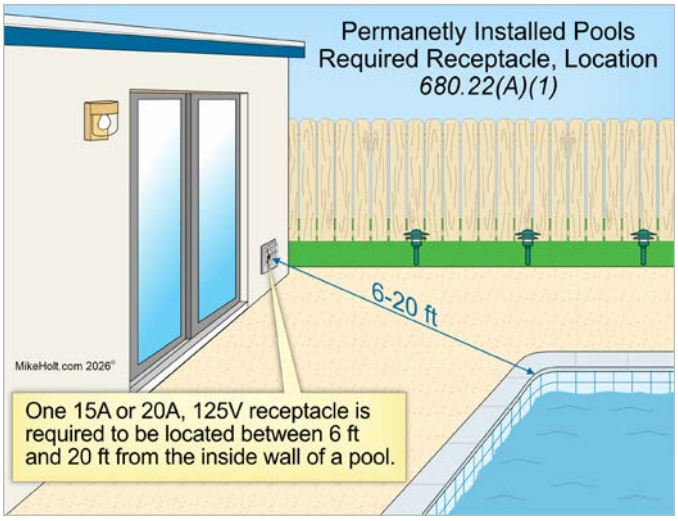


Figure 680–28

(2) Circulation System. Receptacles for pool motors or other loads directly related to the circulation system must be located 6 ft or more from the inside walls of the pool, have GFCI protection, and be a grounding type receptacle. Figure 680–29

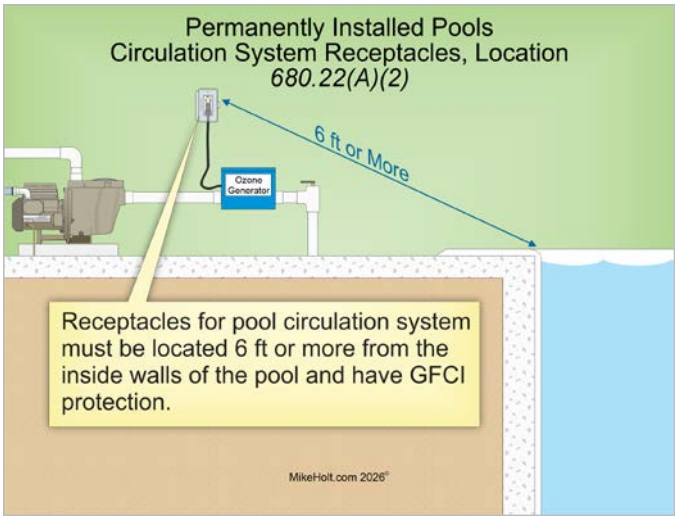


Figure 680–29

(3) Other Receptacles. Receptacles for loads not directly related to the circulation system must be located 6 ft or more from the inside walls of a pool. Figure 680–30

Figure 680–30

(4) Ground-Fault Protection. All receptacles within 20 ft of the inside pool wall must have ground-fault protection in accordance with 680.5.

(5) How to Measure. For the purpose of measuring receptacle distances from the pool water, the measurement is the shortest path a power-supply cord would follow without piercing a floor, wall, ceiling, sliding door, window, or other permanent barrier. Figure 680–31

Figure 680–31

(B) Luminaires, Festoon Lighting, and Ceiling Fans.

(1) Within 5 Ft from Water. Luminaires, lighting outlets, ***festoon lighting***, and ceiling fans within 5 ft (horizontally from the inside pool wall) must be 12 ft or more above the maximum water level. Figure 680–32 and Figure 680–33

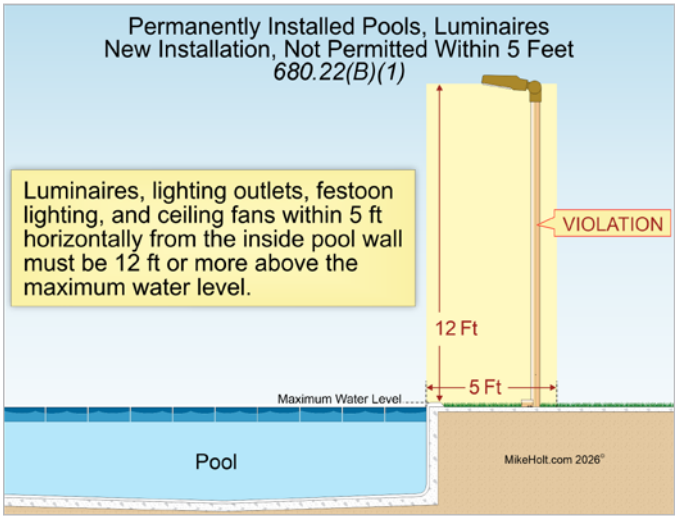


Figure 680–32

(3) Existing Installations. Existing luminaires and lighting outlets can be within 5 ft (horizontally from the inside pool wall) if located no less than 5 ft above the maximum water level, rigidly attached to the structure, and GFCI protected. Figure 680–34

(6) Low-Voltage Luminaires. Low-voltage lighting supplied by a transformer listed and identified for swimming pools can be located within 5 ft from the water. Figure 680–35

Figure 680–33

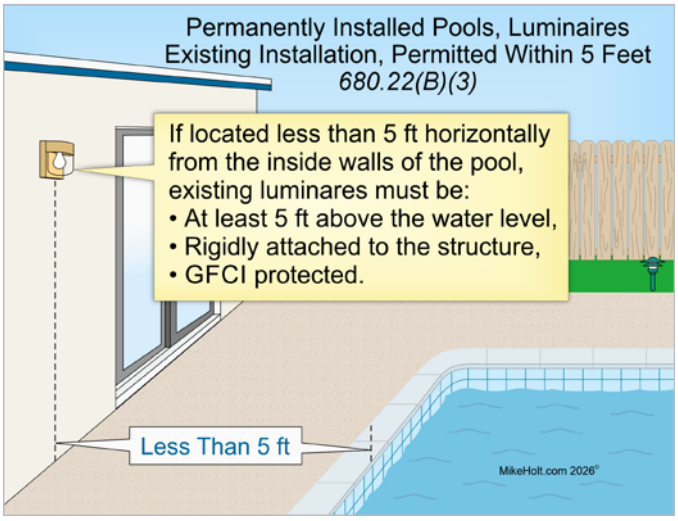


Figure 680–34

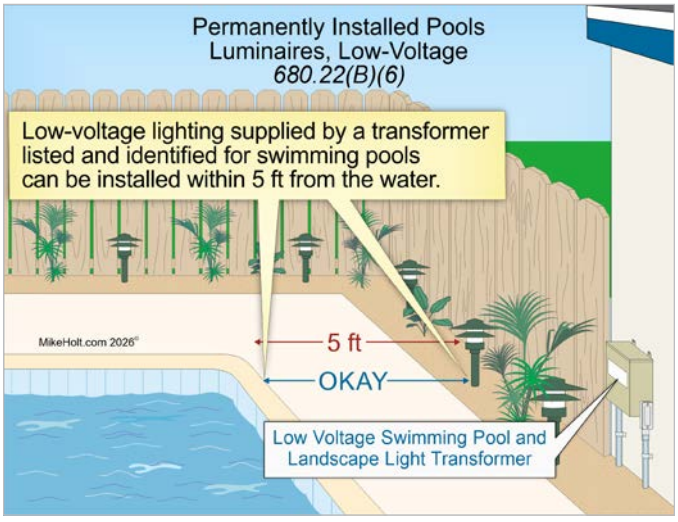


Figure 680–35

Author's Comment:

- A transformer listed, labeled, and identified for swimming pool use has a metal barrier between the primary and secondary windings. Figure 680–36

Figure 680–36

(8) Measurements. When measuring luminaire distances from the pool water, the measurement is the shortest path an imaginary cord connected to the luminaire would follow without piercing a floor, wall, or ceiling, sliding door, window, or other permanent barrier.

(C) Switching Devices. Circuit breakers, time clocks, pool light switches, and other switching devices must be 5 ft or more horizontally from the inside walls of a pool unless separated by a solid fence, wall, or other permanent barrier that provides at least a 5 ft reach distance. Alternatively, a switch that is listed as being acceptable for use within 5 ft is permitted. Figure 680–37

(F) Other Equipment. Electrical equipment must be 5 ft or more horizontally from the inside pool walls, unless separated by a fence, wall, or other permanent barrier. Figure 680–38

680.23 Underwater Pool Luminaires

This section covers all luminaires installed in the pool water.

(A) General.

(2) Transformers and Power Supplies. Transformers and power supplies for underwater pool luminaires must be listed, labeled, and identified for swimming pool use. Figure 680–39

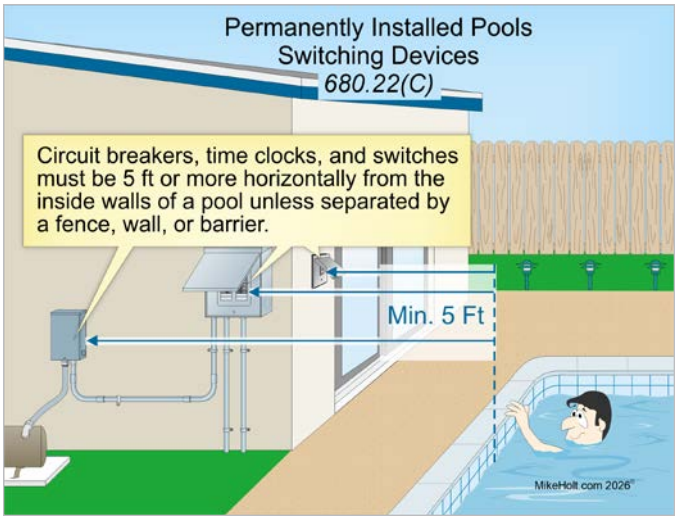


Figure 680–37

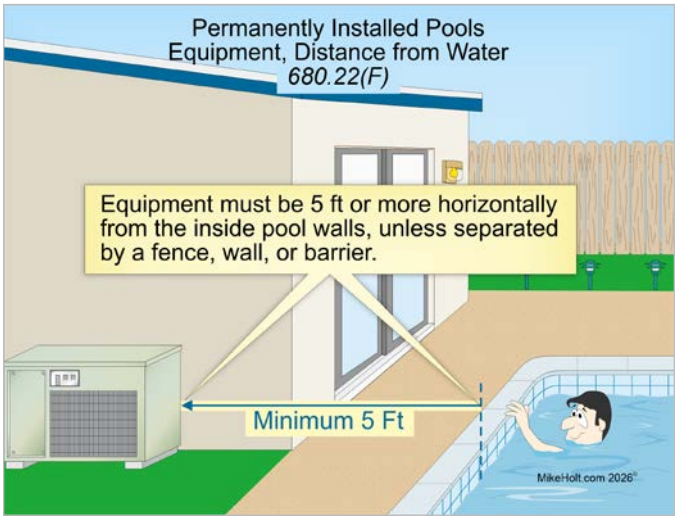


Figure 680–38

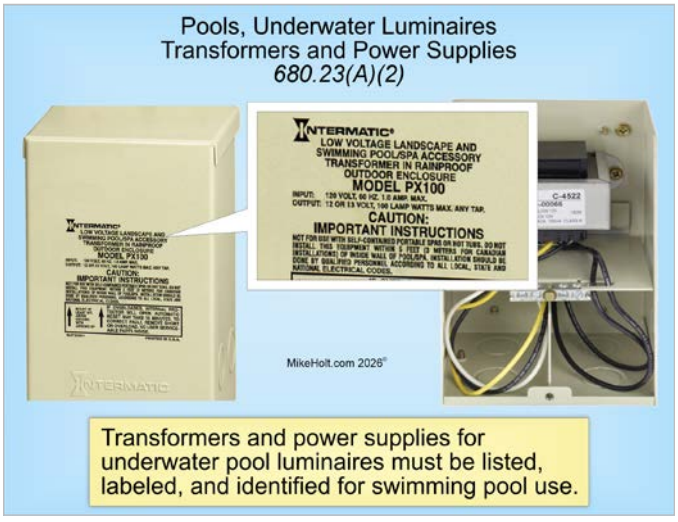


Figure 680–39

(3) GFCI Protection. Branch circuits supplying underwater pool luminaires operating at 120V must be GFCI protected. Figure 680–40

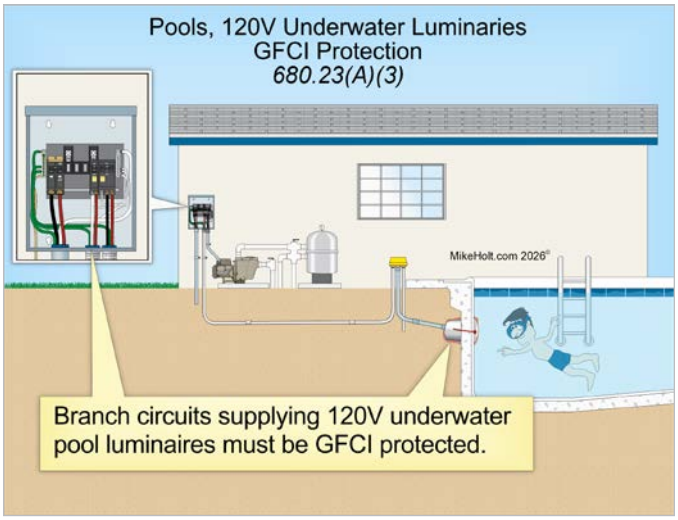


Figure 680–40

(5) Wall-Mounted Luminaires. Underwater luminaires must be located so that the top of the luminaire lens is not less than 18 in. below the normal water level unless the luminaire is listed and identified for use at lesser depths. Figure 680–41

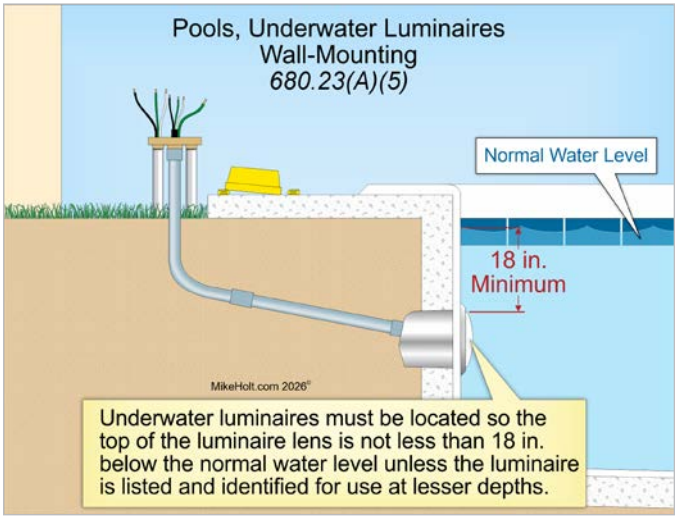


Figure 680–41

(B) Wet-Niche Luminaires.

(2) Wiring to the Wet-Niche Forming Shell.

Forming Shell. A housing designed to support a wet-niche luminaire. Figure 680–42

Figure 680–42

Luminaire, Wet-Niche Luminaire. A luminaire intended to be installed in a forming shell where it will be surrounded by water. Figure 680–43

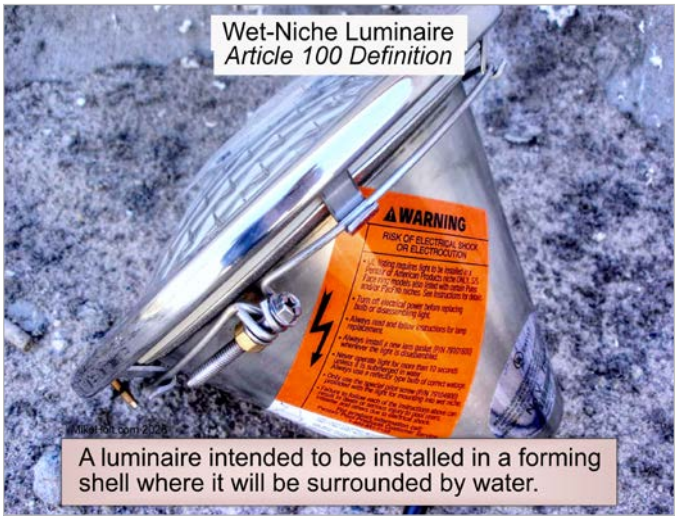


Figure 680–43

(b) PVC. If PVC is used, a bonding jumper must be installed in the PVC as follows:

(1) Not smaller than 8 AWG

(2) Copper

(3) Insulated

(4) Solid or stranded

(5) The bonding jumper must terminate to the forming shell and be covered with a listed potting compound to protect the connection from the deteriorating effects of pool water Figure 680–44

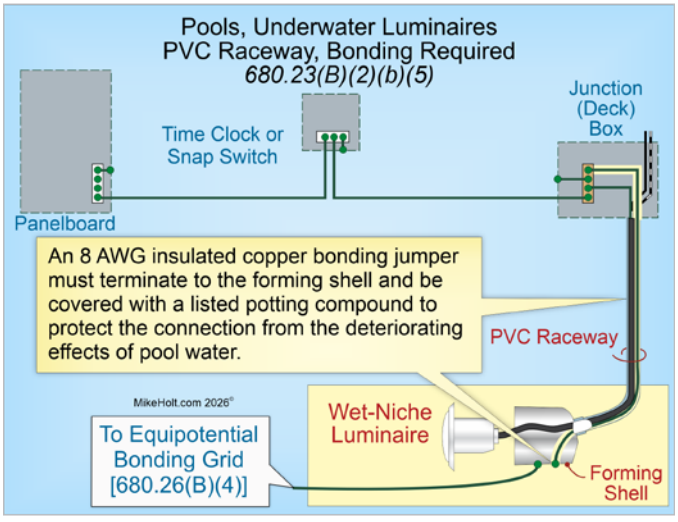


Figure 680–44

Ex: An 8 AWG insulated copper bonding jumper is not required to be run to a low-voltage lighting system that does not require grounding. Figure 680–45

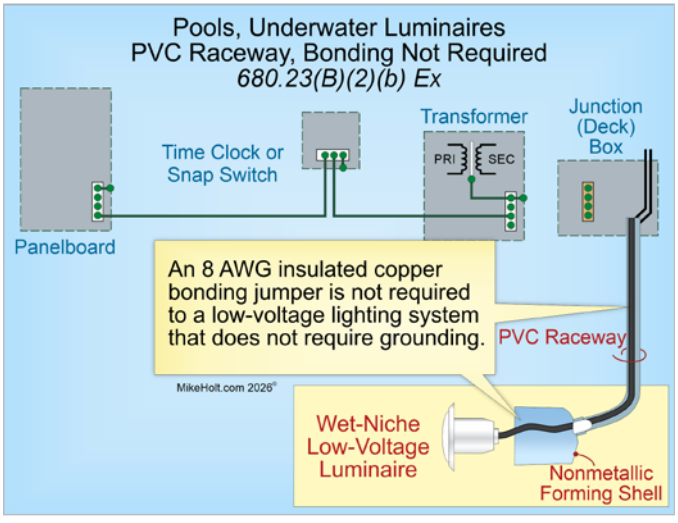


Figure 680–45

(3) Equipment Grounding Provisions for Cords. An insulated equipment grounding conductor is not required in the cord supplying a low-voltage lighting system that does not require grounding. Figure 680–46

(6) Underwater Luminaire Servicing. The location of the forming shell and length of flexible cord for wet-niche luminaires must allow for personnel to place the luminaire on the deck for maintenance.

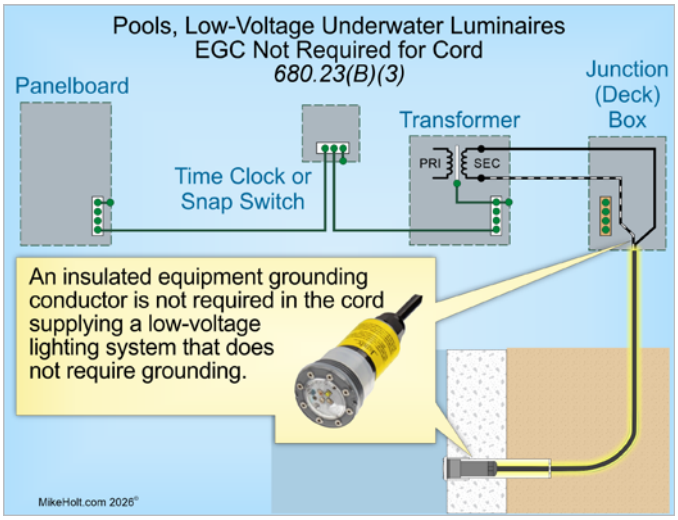


Figure 680–46

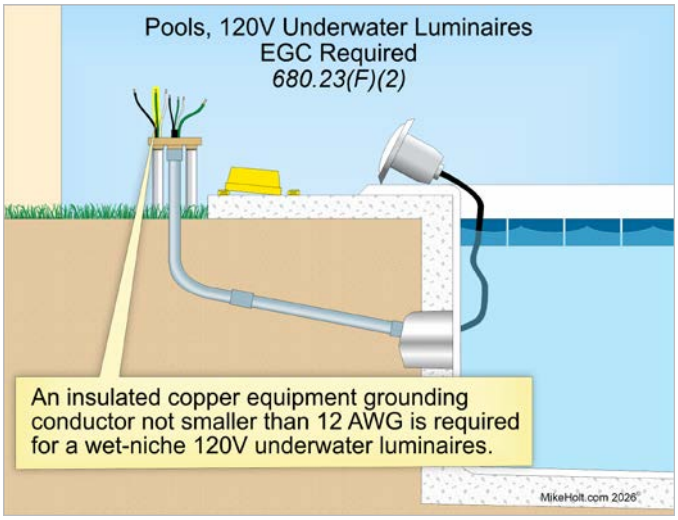


Figure 680–48

(F) Branch-Circuit Wiring to Underwater Luminaires.

(1) Wiring Methods. Branch-circuit wiring for underwater luminaires in corrosive environments must be RMC, IMC, PVC, LFMC, or LFNC in accordance with 680.14. Figure 680–47

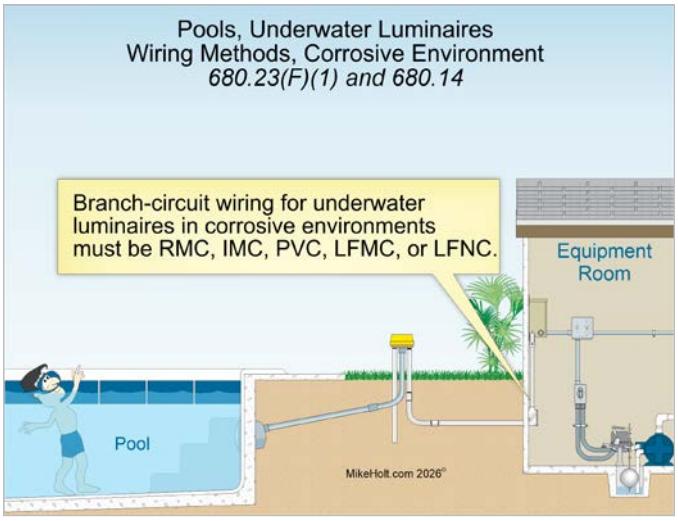


Figure 680–47

(2) Equipment Grounding Conductor.

General. An insulated copper equipment grounding conductor not smaller than 12 AWG is required for a wet-niche 120V underwater luminaires. Figure 680–48

Low-Voltage. An equipment grounding conductor is not required for a low-voltage lighting system that does not require grounding. Figure 680–49

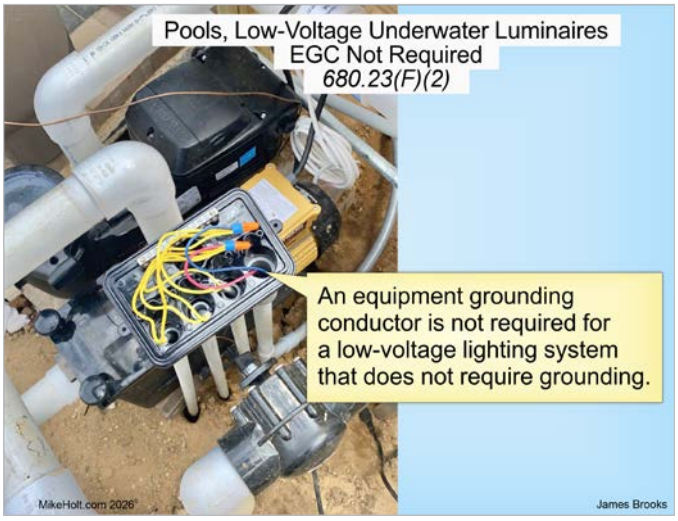


Figure 680–49

The equipment grounding conductor for the underwater luminaire is not permitted to be spliced, except for the following applications:

(a) If more than one underwater luminaire is supplied by the same branch circuit, the equipment grounding conductors can terminate to grounding terminals

(b) The equipment grounding conductor can terminate at the grounding terminal of a time clock, listed pool transformer, or pool light junction box Figure 680–50

(3) Conductors, Load Side of GFCI. The conductors on the load side of a GFCI or transformer for underwater luminaires are not permitted to be with other conductors unless the other conductors are GFCI protected.

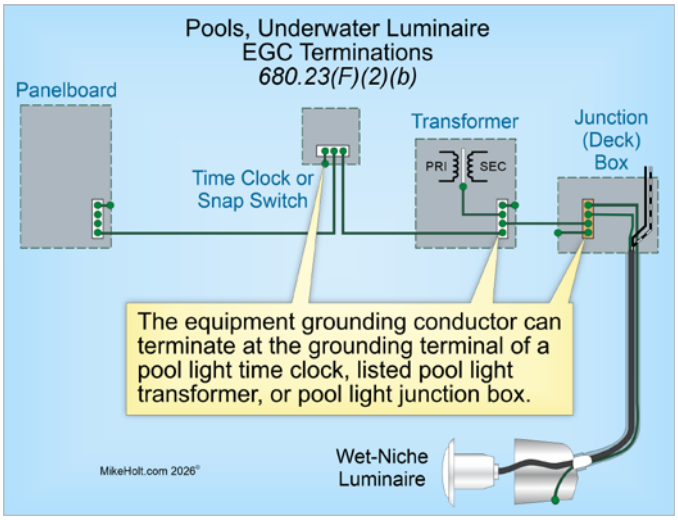


Figure 680–50

680.24 Pool Junction Box

(A) Junction Box. Junction boxes that are connected to a raceway that extends to a forming shell of an underwater luminaire must comply with all of the following:

(1) Construction. The junction box must be listed, labeled, and identified as a swimming pool junction box. Figure 680–51

Figure 680–51

(a) Vertical Spacing. Pool junction boxes for 120V underwater luminaires must not be less than 4 in. above the ground or pool deck or not less than 8 in. above the maximum water level, whichever provides the greater elevation. Figure 680–52

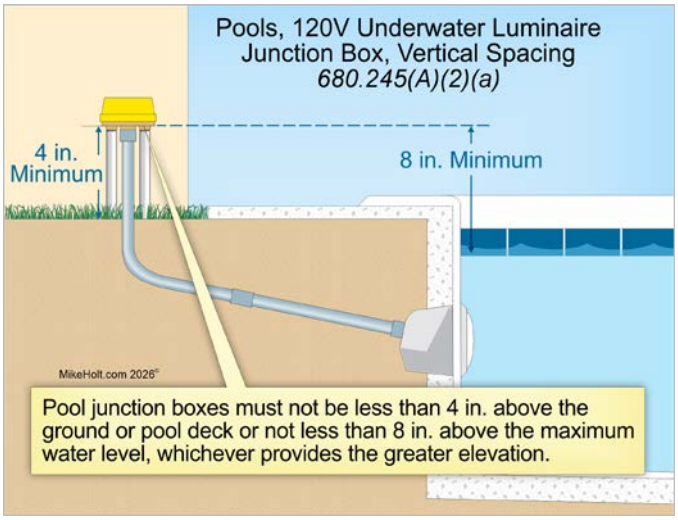


Figure 680–52

(b) Horizontal Spacing. Pool junction boxes for 120V underwater luminaires must be located not less than 4 ft from the inside wall of the pool unless separated by a fence, wall, or barrier. Figure 680–53

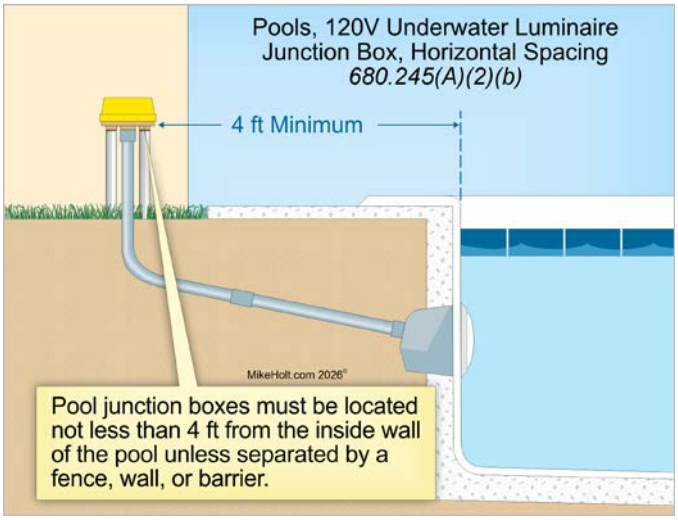


Figure 680–53

Author's Comment:

- If conduits are used to support the junction box, the junction box must be supported by two metal conduits threaded wrenchtight into the enclosure in accordance with 314.23(E).

(c) Flush Deck Box. Flush deck boxes for low-voltage lighting underwater luminaires are permitted if both of the following conditions are met:

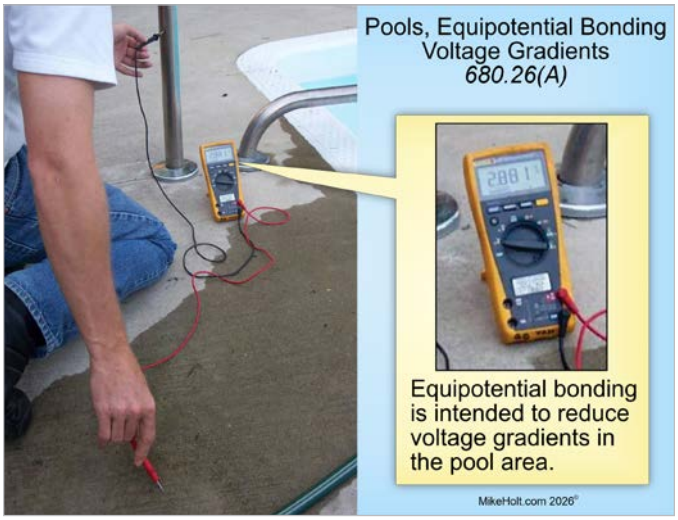
(1) Potting compound is used to fill the box to prevent the entrance of moisture

(2) The flush deck box is located not less than 4 ft from the inside wall of the pool

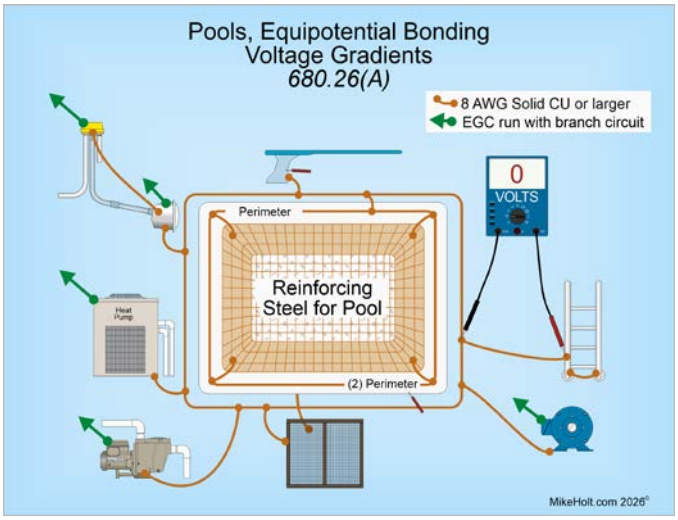
(C) Physical Protection. Junction boxes for underwater luminaires are not permitted to be in a walkway unless afforded protection by being located under diving boards or adjacent to fixed structures.

680.26 Equipotential Bonding

(A) Voltage Gradients. Equipotential bonding is intended to reduce voltage gradients in the area around a permanently-installed pool. ▸Figure 680–54 and ▸Figure 680–55



▸Figure 680–54

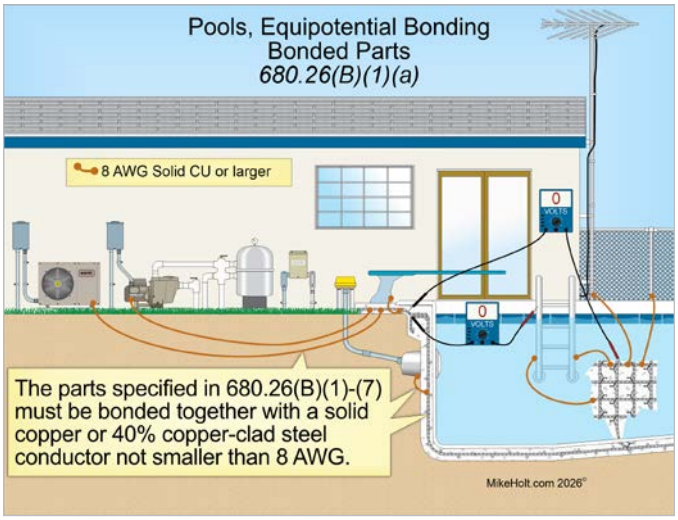


▸Figure 680–55

(B) Suitable Methods for Equipotential Bonding. The parts specified in 680.26(B)(1) through (B)(7) must be bonded together using one or more of the following:

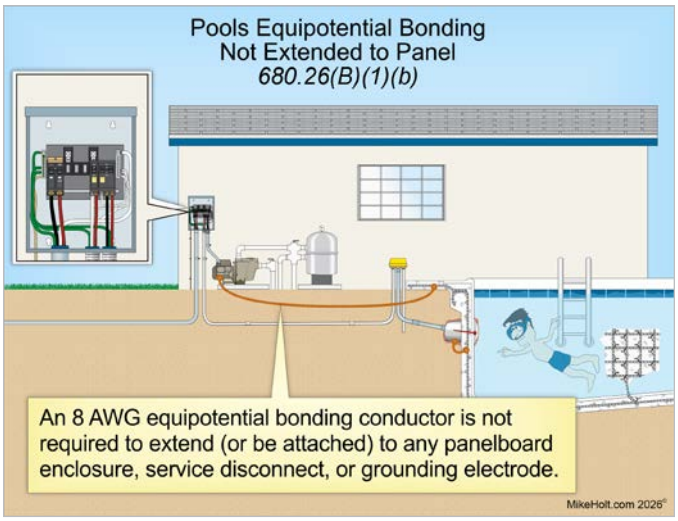
(1) Solid copper or 40 percent copper-clad steel conductor as follows:

(a) Insulated or bare, not smaller than 8 AWG ▸Figure 680–56



▸Figure 680–56

(b) 8 AWG equipotential bonding conductor is not required to extend (or be attached) to any panelboard enclosure, service disconnect, or grounding electrode ▸Figure 680–57



▸Figure 680–57

(3) Structural reinforcing steel

(4) Steel structural welded wire mesh

(1) Conductive Pool Shells. Conductive (concrete) pool shells must be bonded in one of the following methods:

(a) Structural Reinforcing Steel. Unencapsulated structural reinforcing steel rebar in conductive pool shells are required to be bonded together by steel tie wires. ▸Figure 680–58

Figure 680–58

(b) Conductive Grid. Encapsulated structural reinforcing steel rebar in conductive pool shells must have a conductor grid installed as follows:

(1) Must be a minimum of 8 AWG bare solid copper or 40 percent copper-clad steel conductors bonded to each other at all points of crossing in accordance with 250.8 or other approved means

(2) Must conform to the contour of the pool shell

(3) Must be arranged in a 12 in. × 12 in. uniformly spaced grid pattern with a tolerance of 4 in.

(4) Must be secured within or under the pool no more than 6 in. from the outer contour of the pool shell Figure 680–59

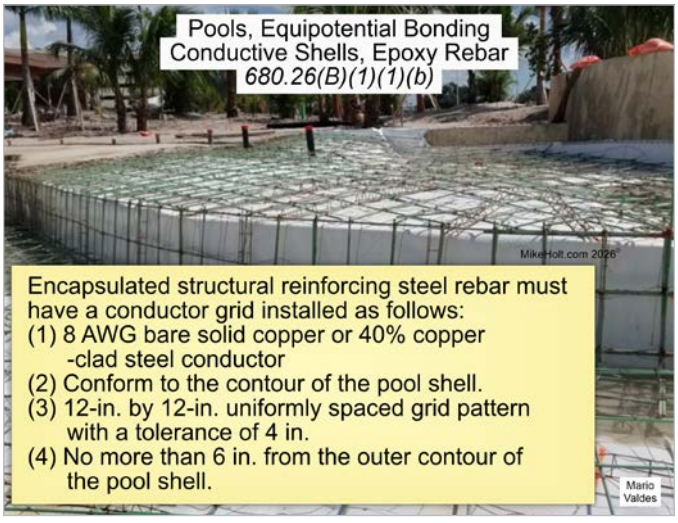


Figure 680–59

Author's Comment:

- Encapsulated structural reinforcing steel is used to prevent rebar corrosion. If used, it will make the pool shell insulated, therefore a conductive copper grid is required to bond the pool shell.
- If split bolts are used to bond the conductor grid, they are only suitable for two wires, unless identified otherwise [110.14(A)].

(2) Perimeter Surfaces. Perimeter surfaces extending 3 ft (horizontally from the inside pool walls) and located between 3 ft above and 3 ft below the maximum water level, must be bonded. Figure 680–60, Figure 680–61, and Figure 680–62

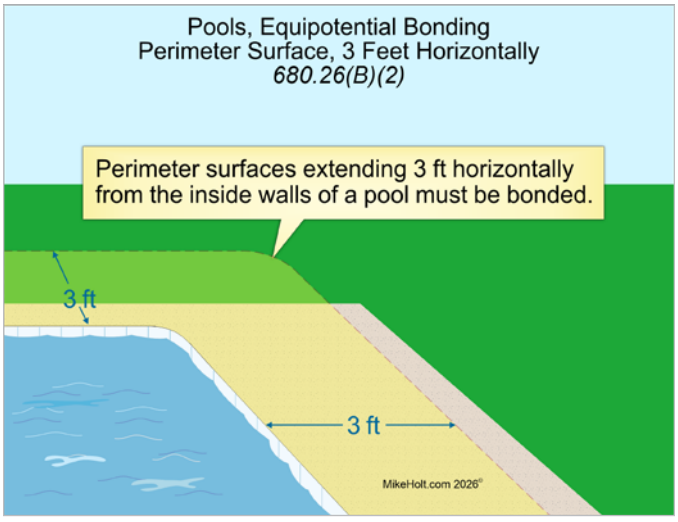


Figure 680–60

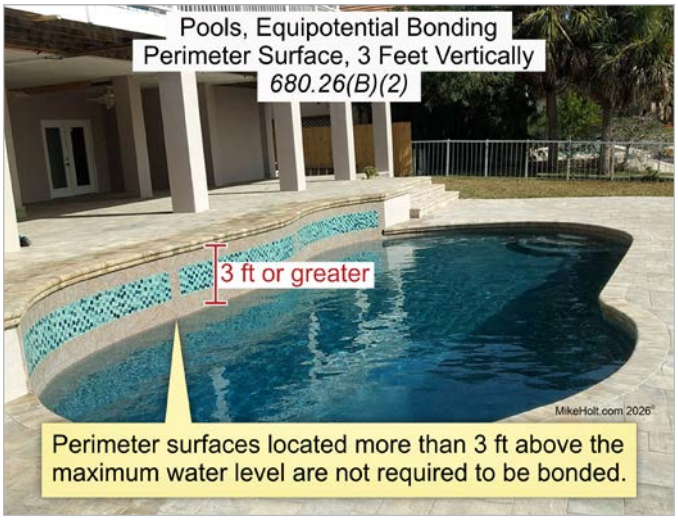


Figure 680–61

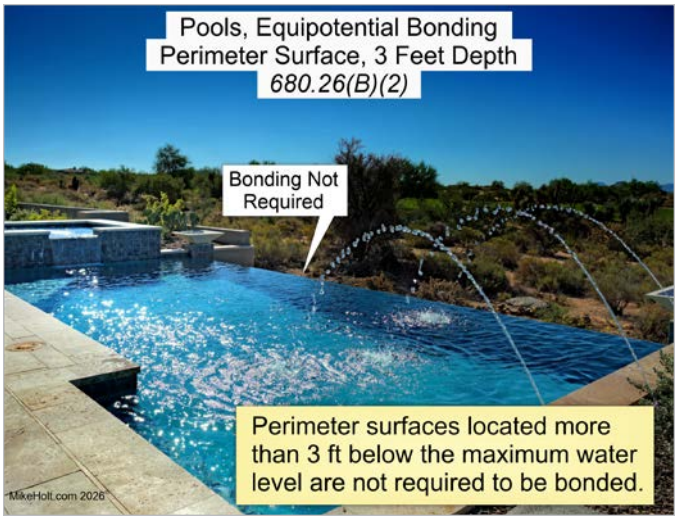


Figure 680–62

Perimeter surfaces separated by a permanent wall or building 5 ft or more only require bonding on the pool side of the wall or building. Figure 680–63

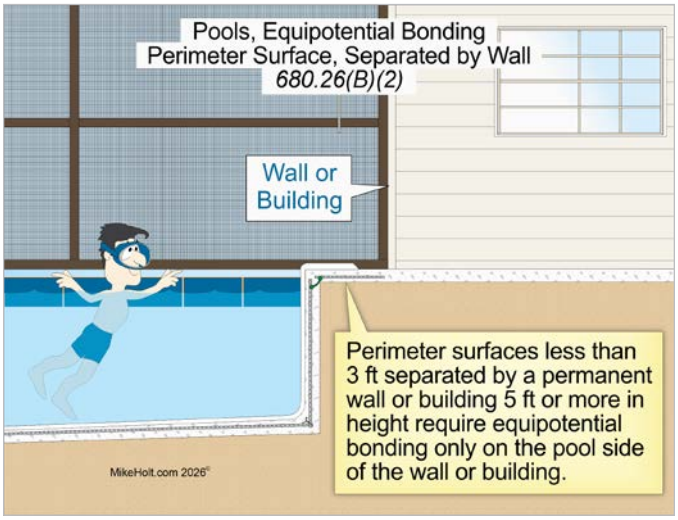


Figure 680–63

Conductive Pool Shells. Perimeter surfaces around conductive pool shells must be bonded to the concrete pool structural reinforcing steel rebar or conductive grid at a minimum of four points (uniformly spaced around the perimeter of the pool). Figure 680–64

Figure 680–64

Nonconductive Pool Shells. Perimeter surfaces around nonconductive pool shells are not required to be bonded to the nonconductive pool shell.

The perimeter surface bond (unpaved surfaces, concrete, masonry pavers, and other types of paving) must consist of one of the following:

(a) Conductive Perimeter Surfaces. The bond for conductive perimeter surfaces must be one or more of the following:

(1) Unencapsulated structural reinforcing steel Figure 680–65

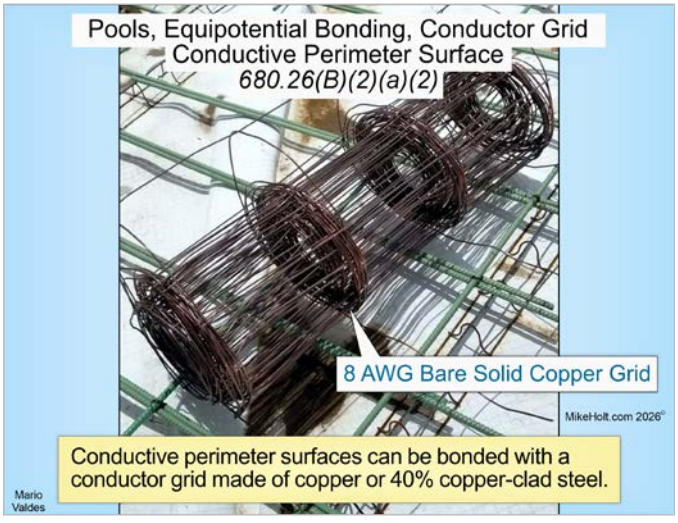
Figure 680–65

Author's Comment:

- The *NEC* does not provide a layout requirement for conductive structural steel (rebar) when used as a perimeter surface equipotential bonding method. Figure 680–66

▸Figure 680–66

(2) Conductor grid made of copper or 40 percent copper-clad steel ▸Figure 680–67



▸Figure 680–67

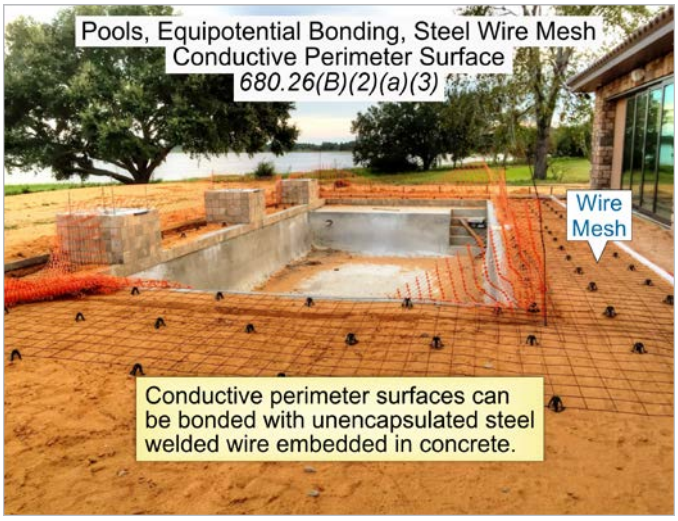
(3) Unencapsulated steel welded wire embedded in concrete ▸Figure 680–68

Author's Comment:

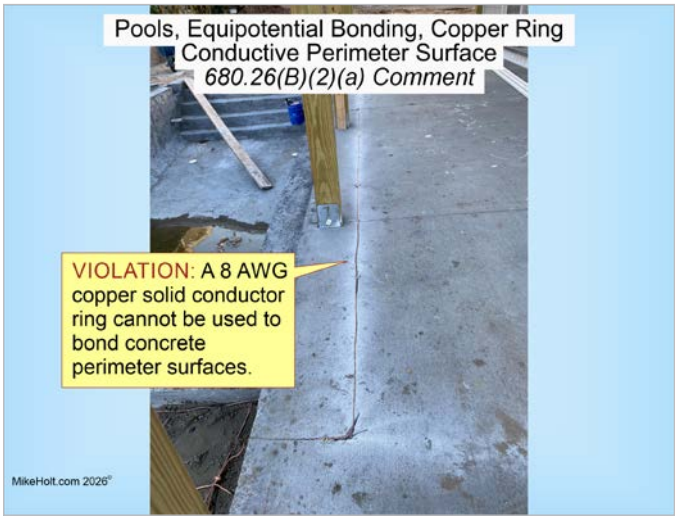
- An 8 AWG copper conductor ring cannot be used to bond paved concrete perimeter surfaces. ▸Figure 680–69

(c) Unpaved Perimeter Surfaces. The bond for unpaved portions of perimeter surfaces must consist of one of the following:

(1) Conductor Ring. A copper or 40 percent copper-clad steel conductor ring meeting the following requirements is permitted:



▸Figure 680–68



▸Figure 680–69

(a) Minimum 8 AWG bare solid copper or 40 percent copper-clad steel

(b) Must follow the contour of the perimeter surface

(c) Placed between 18 in. and 24 in. from the inside pool walls

(d) Located within 4 in. and 6 in. below the finished grade (dirt)

(e) Installed only in perimeter surfaces not intended to have direct access to swimmers in the pool ▸Figure 680–70

(2) Conductor Grid. A copper or 40 percent copper-clad steel grid or unencapsulated steel structural welded wire meeting the following requirements is permitted:

(a) Installed in accordance with 680.26(B)(2)(a)

(b) Located between 4 in. to 6 in. below finished grade

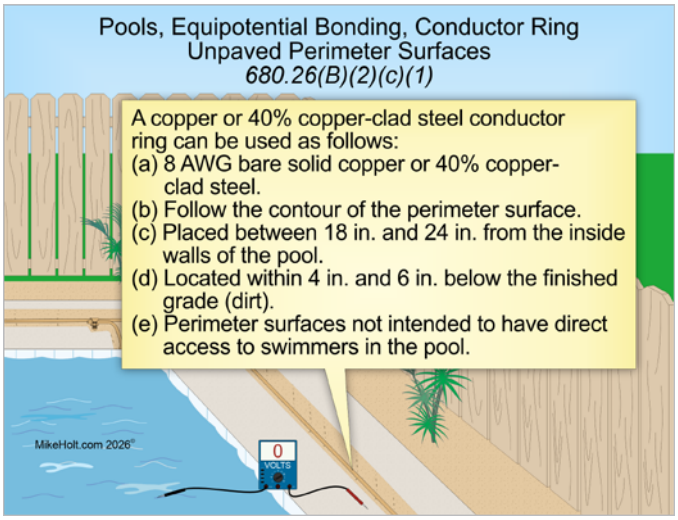


Figure 680–70

(d) Nonconductive Perimeter Surfaces. Equipotential bonding is not required for nonconductive perimeter surfaces. Figure 680–71

Figure 680–71

Note: Nonconductive materials include, but are not limited to, wood, plastic, wood-plastic composites, fiberglass, and fiberglass composites.

(3) Metal Parts of Pool Structure. Metal parts of the pool structure not part of the pool shell [680.26(B)(1)(a)] must be bonded. Figure 680–72

(4) Metal Forming Shells. All metal forming shells for underwater luminaires must be bonded. Figure 680–73

Ex: Listed low-voltage lighting with nonmetallic forming shells is not required to be bonded.

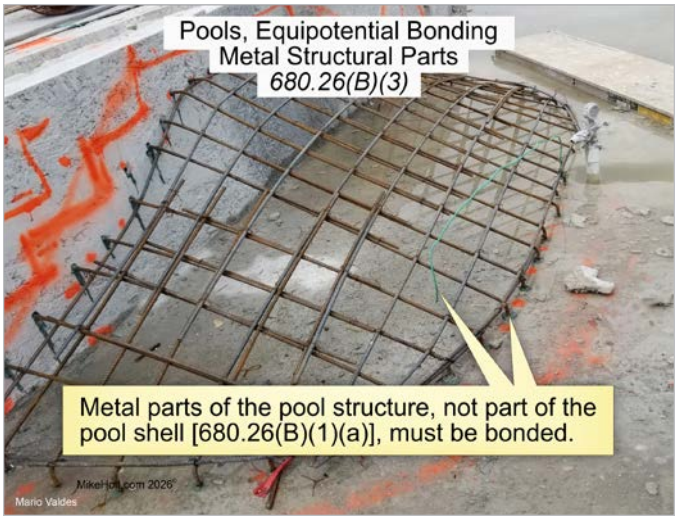


Figure 680–72

Figure 680–73

(5) Metal Pool Fittings and Metal Structures. Metal fittings and metal structures attached to the pool perimeter surface [680.26(B)(2)] such as ladders and handrails must be bonded. Figure 680–74

Ex: The following are not required to be bonded:

(1) Isolated parts not over 4 in. in any dimension, and not penetrating the pool structure more than 1 in.

(2) Metallic pool cover anchors in a concrete or masonry deck, 1 in. or less in any dimension, and 2 in. or less in length

(3) Metallic pool cover anchors in a wood or composite deck, 2 in. or less in any dimension, and 2 in. or less in length

(6) Electrical Pool Equipment. Metal parts of the following electrical equipment must be bonded.

(1) Electrically-powered pool covers Figure 680–75

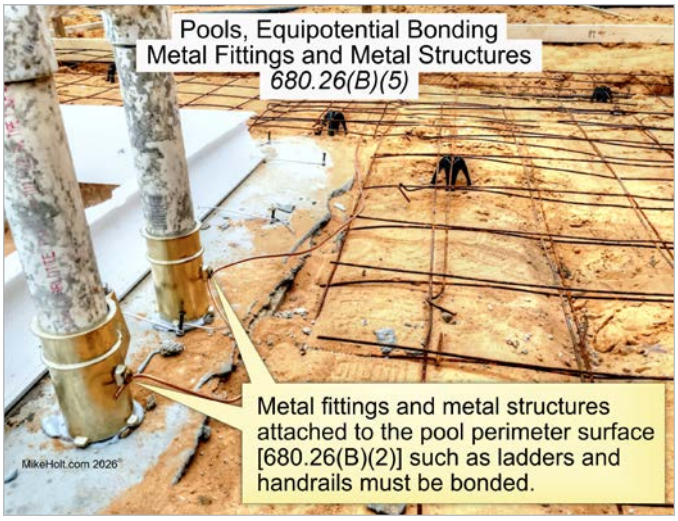


Figure 680–74

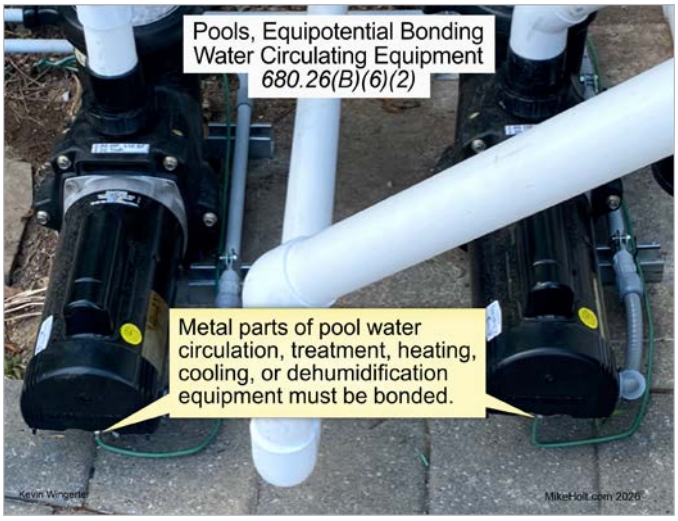


Figure 680–76

Figure 680–75

Figure 680–77

(2) Pool water circulation, treatment, heating, cooling, or dehumidification equipment Figure 680–76

(3) Other electrical equipment within 5 ft horizontally and 12 ft vertically from the inside pool walls, unless separated from the pool by a permanent barrier

(7) Fixed Metal Parts. Fixed metal parts of awnings, metal fences, metal doors, and window frames within 5 ft horizontally and 12 ft vertically from the inside pool walls must be bonded. Figure 680–77 and Figure 680–78

Ex: Fixed metal parts separated from the pool by a permanent barrier that prevents contact by a person are not required to be bonded.

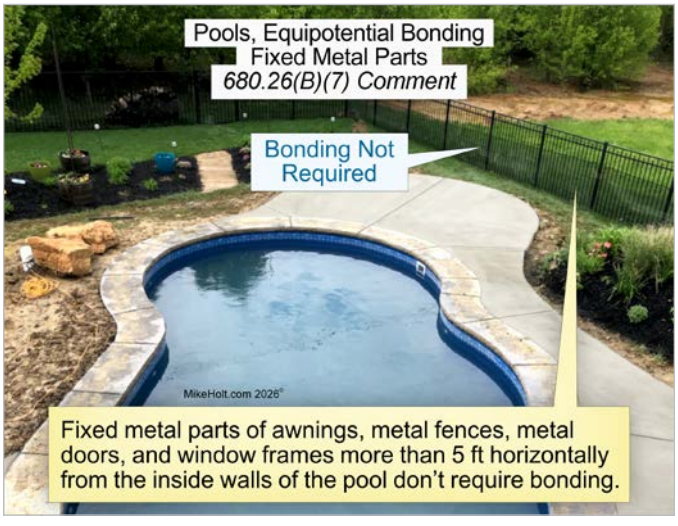
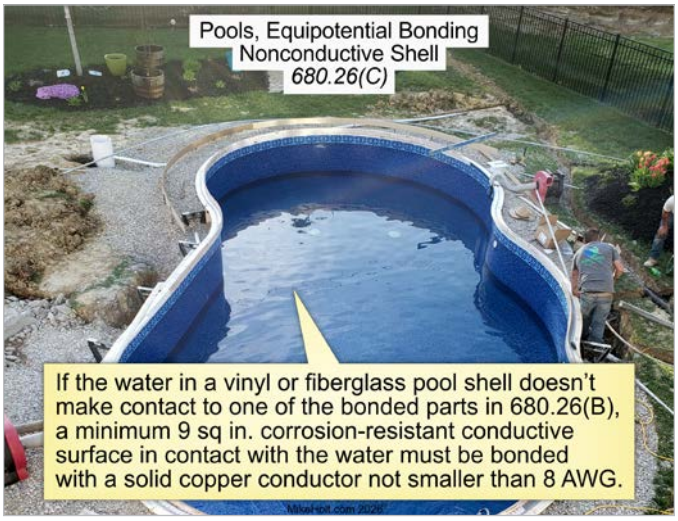
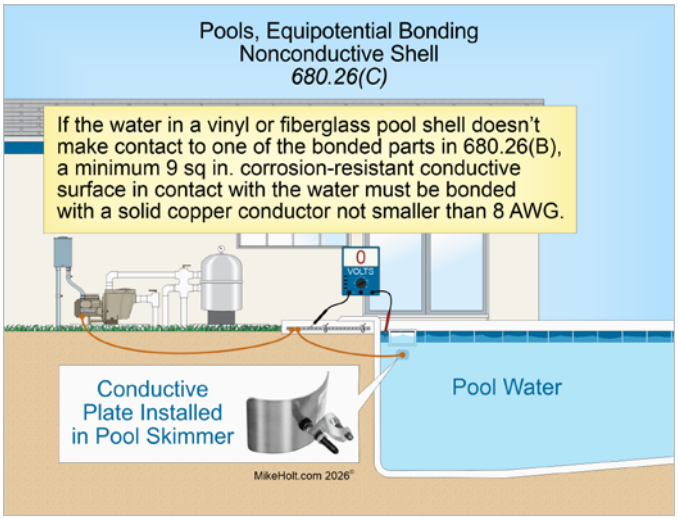


Figure 680–78

(C) Pool Water. If the water in a vinyl or fiberglass pool shell does not make contact with one of the bonded parts in 680.26(B), a minimum 9 sq in. corrosion-resistant conductive surface in contact with the water must be bonded with a solid copper conductor not smaller than 8 AWG. ▸Figure 680–79 and ▸Figure 680–80



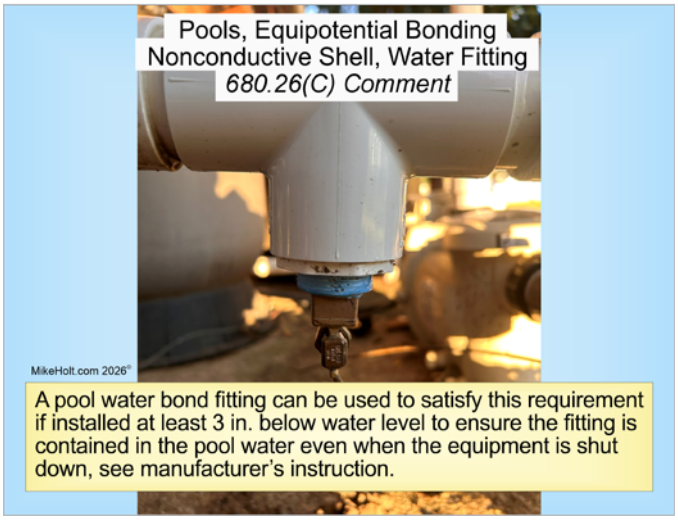
▸Figure 680–79



▸Figure 680–80

Author's Comment:

- Where bonded items such as a conductive pool shell, metal ladders, metal rails, or underwater luminaires are in direct contact with the pool water and provide the required surface area, it is not necessary to install a corrosion-resistant conductive device.
- A pool water bond fitting can be used to satisfy this requirement if installed below the water level to ensure the fitting is contained in the pool water even when the equipment is shut down, see manufacturer's instruction. ▸Figure 680–81



▸Figure 680–81

680.27 Specialized Equipment

(B) Electrically Operated Pool Covers.

(1) Motors and Wiring. Motors and wiring for an electrically operated pool cover must be located not less than 5 ft from the inside wall of a permanently installed pool unless separated by a permanent barrier.

(2) GFCI Protection. The branch circuit serving the electric pool cover motor must be GFCI protected.

Part III. Storable Pools

Pool, Storable Pool. A pool of any water depth installed on or above the ground that is intended to be stored when not in use or designed for ease of relocation. ▸Figure 680–82

680.30 General

(A) General. *Storable pools* are only required to comply with Part I and Part III of Article 680.

Figure 680–82

Author's Comment:

- The requirements contained in Part I of Article 680 include definitions, cord-and-plug-connected equipment, overhead conductor clearances, and the location of maintenance disconnects.
- The equipotential bonding requirements in 680 Part II (680.26) do not apply to storable pools. Figure 680–83

Figure 680–83

Author's Comment:

- The requirements contained in Part I of Article 680 include definitions, cord-and-plug-connected equipment, overhead conductor clearances, and the location of maintenance disconnects.

680.32 Ground-Fault Protection

All receptacles located within 20 ft from the inside walls of a storable pool must have ground-fault protection in accordance with 680.5. Figure 680–84

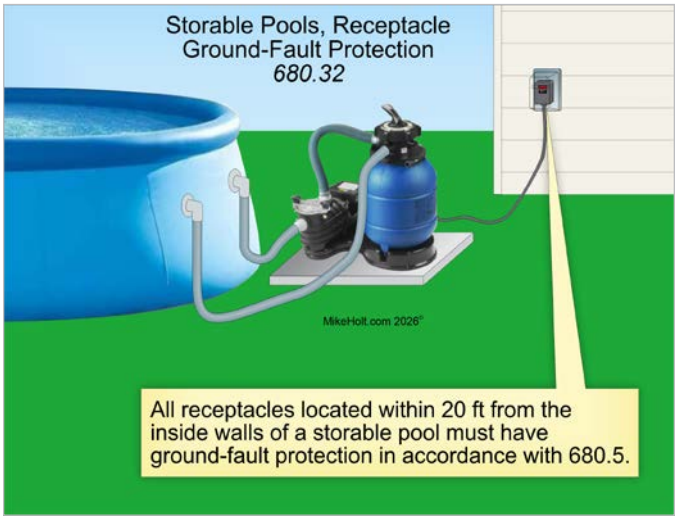


Figure 680–84

680.34 Receptacle Locations

Receptacles are not permitted to be less than 6 ft from the inside walls of a storable pool. Figure 680–85

Figure 680–85

The receptacle distance is measured as the shortest path a flexible cord will follow without passing through a wall, doorway, or window.

680.35 Storable Pools

Storable pools must comply with the additional requirements specified in 680.35(A) through (G) of the *Code*.

(A) Cord-Connected Storable Pool Equipment. Storable pool equipment rated 20A, single-phase, 120V or less are permitted to be cord connected if they are GFCI protected.

(B) Pumps. A storable pool pump must be listed, labeled, and identified for swimming pool use.

Part IV. Permanently Installed and Self-Contained Spas and Hot Tubs

Spa or Hot Tub. A tub having a filter, heater, and motor-driven blower for recreational/therapeutic use, and typically not drained after each use. ▸Figure 680–86

▸Figure 680–86

680.40 General

Electrical installations for permanently installed and self-contained ***spa or hot tubs*** are required to comply with Part I and Part IV of Article 680.

680.41 Emergency Shutoff Switch

(A) Emergency Shutoff Switch for Spas and Hot Tubs. For other than a one-family dwelling, for permanently installed and self-contained ***spa or hot tubs*** a clearly labeled emergency water recirculation shutoff required, that is readily accessible, not less than 5 ft away, adjacent to, and within sight of the spa or hot tub. ▸Figure 680–87

▸Figure 680–87

Author's Comment:

- Either the equipment disconnect [680.13] or a pushbutton that controls a relay can be used to meet the emergency shutoff requirement. ▸Figure 680–88

▸Figure 680–88

- The purpose of the emergency shutoff is to protect users from becoming entrapped by the water recirculating system intake. Deaths and injuries have occurred in less than 3 ft of water because individuals became stuck to the water intake opening. This requirement applies to spas and hot tubs installed indoors as well as outdoors.

680.42 Outdoor Installations

Permanently installed outdoor and self-contained spa or hot tubs must comply with Parts I and II of Article 680, except the perimeter bonding requirements for self-contained spas and hot tubs must comply with 680.42(B).

Author's Comment:

- Permanently installed outdoor spa or hot tubs must comply with the bonding requirements of 680.26. ▸Figure 680–89

▸Figure 680–89

(B) Equipotential Bonding Not Required. Equipotential bonding for listed self-contained unit spas and hot tubs is not required if all the following conditions apply:

(1) Spa or hot tub is listed as a self-contained unit for aboveground use

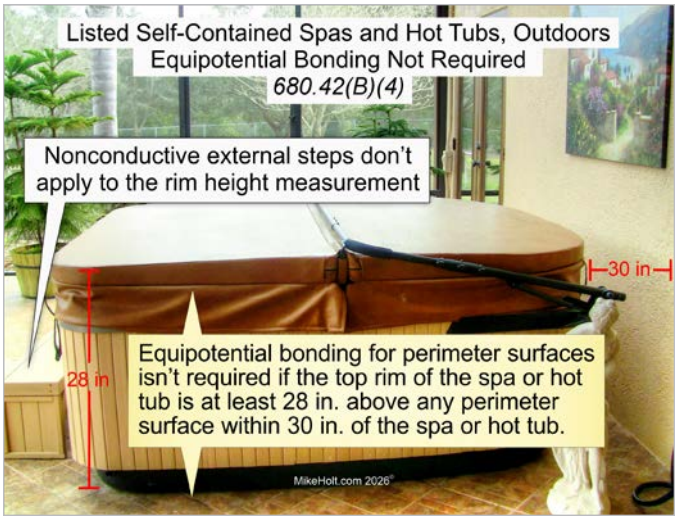
(2) Spa or hot tub is not identified as only for indoor use`

(3) Spa or hot tub is on or above grade

(4) Top rim of the spa or hot tub is at least 28 in. above any perimeter surface within 30 in. of the spa or hot tub ▸Figure 680–90

680.43 Indoor Installations

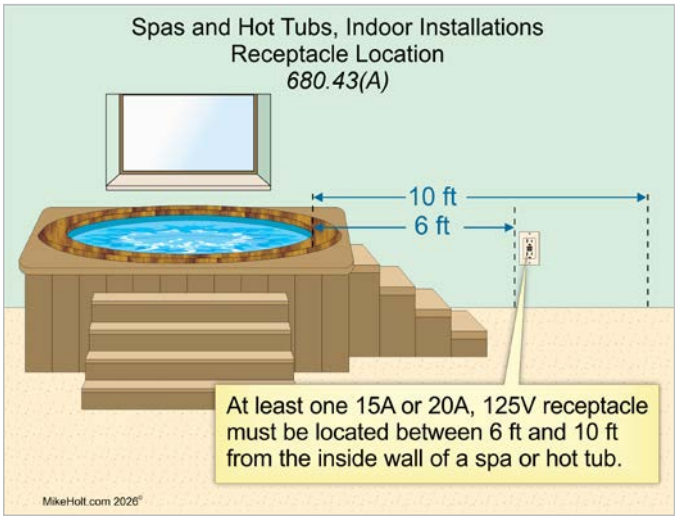
Permanently installed and self-contained indoor spa or hot tubs must comply with Parts I and II of Article 680, except as modified by this section.



▸Figure 680–90

Ex 2: The equipotential bonding requirements for perimeter surfaces contained in 680.26(B)(2) do not apply to a listed self-contained spa or hot tub installed.

(A) Receptacles. At least one 15A or 20A, 125V receptacle must be located between 6 ft and 10 ft from the inside wall, of a spa or hot tub. ▸Figure 680–91



▸Figure 680–91

(1) Location. Receptacles must be not less than 6 ft away measured horizontally from the inside walls of the spa or hot tub.

(2) Ground-Fault Protection. All receptacles within 10 ft of the inside walls of a spa or hot tub must have ground-fault protection in accordance with 680.5. ▸Figure 680–92

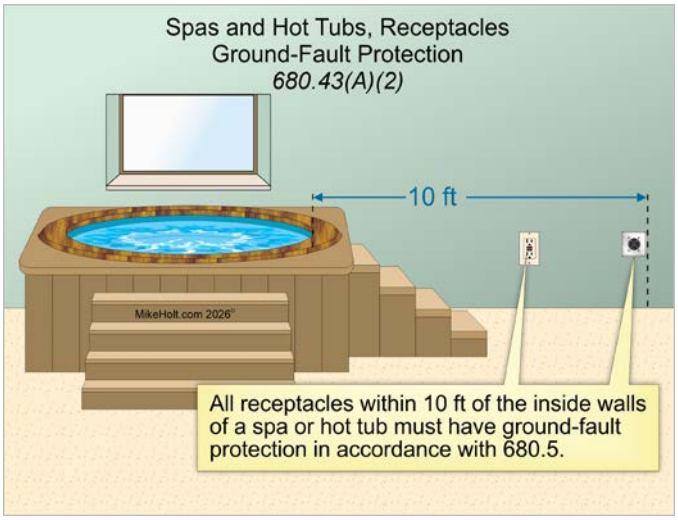


Figure 680–92

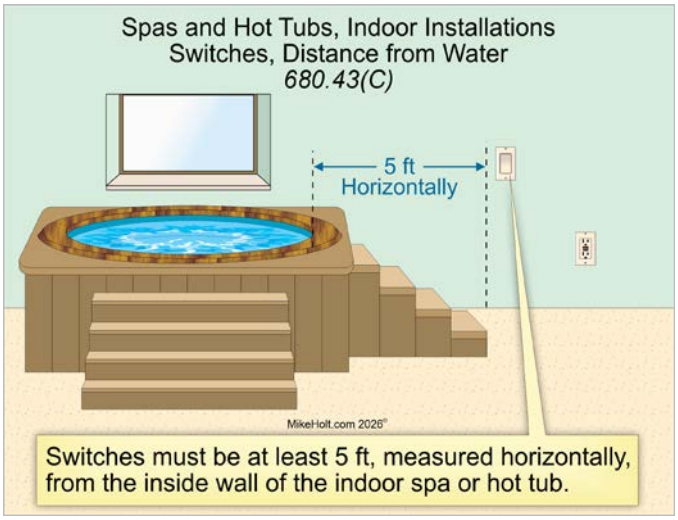


Figure 680–93

(3) Spa or Hot Tub Supply Receptacle. Receptacles that provide power for spa or hot tub equipment cannot exceed 150 volts to ground and must be GFCI protected.

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

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

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

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

(c) Below 7 ft 6 in. Luminaires meeting the requirements of item (1) or (2) and protected by a ground-fault circuit interrupter is permitted to be installed less than 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

(C) Switches. Switches must be at least 5 ft horizontally from the inside wall of the indoor spa or hot tub. Figure 680–93

(D) Bonding. The following parts must 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 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 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

Ex: 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, are not required to be bonded.

(5) Non-current-carrying metal parts of electrical devices and controls that are not associated with the spas or hot tubs and that are located within 5 ft of such units

680.44 Ground-Fault Protection

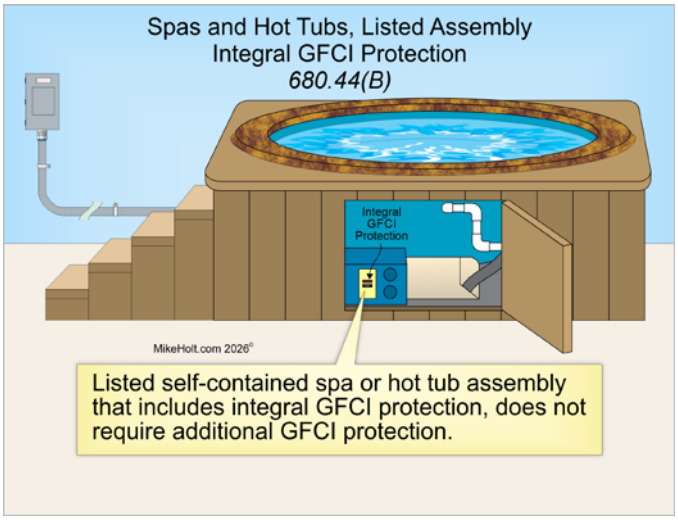
(A) General. The outlet that supplies spa or hot tub assemblies must have ground-fault protection in accordance with 680.5. ▸Figure 680–94

▸Figure 680–94

Author's Comment:

- A two-pole GFCI can protect a 240V spa or hot tub that does not require a neutral. However, the GFCI requires a neutral to operate, so be sure to run a neutral to the hot tub disconnect.

(B) Listed Units. If so marked, a listed self-contained spa or hot tub or packaged equipment assembly that includes integral GFCI protection for all electrical parts, does not require additional GFCI protection. ▸Figure 680–95



▸Figure 680–95

Part V. Fountains

Fountain. An ornamental structure water feature from which one or more jets or streams of water are discharged into the air for splash pads, ornamental pools, display pools, and reflection pools. ▸Figure 680–96

▸Figure 680–96

680.50 General

Fountains are only required to comply with Part I and Part V of Article 680.

(A) Equipotential Bonding Requirements.

(1) Water Common to a Pool. Fountains that have water common to a pool must comply with the equipotential bonding requirements contained in Part II of Article 680. ▸Figure 680–97

▸Figure 680–97

(2) Intended for Recreational Use. *Splash pads* must have equipotential bonding in accordance with 680.26. ▸Figure 680–98

▸Figure 680–98

(B) Equipment Exceeding the Low-Voltage Contact Limit. Fountain equipment with ratings exceeding the low-voltage contact limit must be located at least 5 ft horizontally from the inside walls of a fountain, unless separated from the fountain by a fence, wall, or barrier.

680.51 Luminaires and Submersible Equipment

(A) GFCI Protection. GFCI protection is required for luminaires and submersible equipment unless supplied by a listed swimming pool transformer in accordance with 680.23(A)(2). ▸Figure 680–99

▸Figure 680–99

(C) Luminaire Lenses. Luminaires must be installed so that the top of the luminaire lens is below the normal water level unless listed for above-water use. ▸Figure 680–100

▸Figure 680–100

(E) Cords. The maximum length of an exposed flexible cord is 10 ft. Power-supply cords that extend beyond the fountain perimeter must be installed in an approved wiring method enclosure.

(F) Servicing. Equipment must be capable of being removed from the water for relamping or for normal maintenance.

(G) Stability. Equipment must be inherently stable or be securely fastened in place.

680.54 Connection to an Equipment Grounding Conductor

(A) Equipment Grounding Conductor. The following must be connected to the circuit equipment grounding conductor:

(1) Electrical equipment within the fountain or within 5 ft of the inside wall of the fountain

(2) Electrical equipment associated with the circulating system of the fountain

(3) Panelboard enclosures associated with the fountain

(B) Bonding. Where a conductor is used for bonding it must be a minimum 8 AWG solid copper conductor. The following parts must be bonded together and connected to an equipment grounding conductor for a branch circuit supplying fountain equipment:

(1) Metal piping systems associated with the fountain

(2) Metal fittings within or attached to the fountain

(3) Metal parts of electrical equipment associated with the circulating system of the fountain

(4) Metal raceways within 5 ft of the inside wall or the fountain perimeter and not separated from it by a permanent barrier

(5) Metal surfaces within 5 ft of the inside wall or the fountain perimeter and not separated from it by a permanent barrier

(6) Electrical equipment within 5 ft from the fountain's inside wall or perimeter

(C) Equipotential Bonding of Splash Pad. The shell of a splash pad and its collection basin area is considered to be the inside wall for the purpose of perimeter equipotential bonding. ▸Figure 680–101

▸Figure 680–101

Author's Comment:

- Splash pads must have equipotential bonding in accordance with 680.26, See 680.50(A)(2).

680.56 Flexible Cord-Connected Equipment

(A) GFCI Protection. Cord-connected fountain equipment must be GFCI protected.

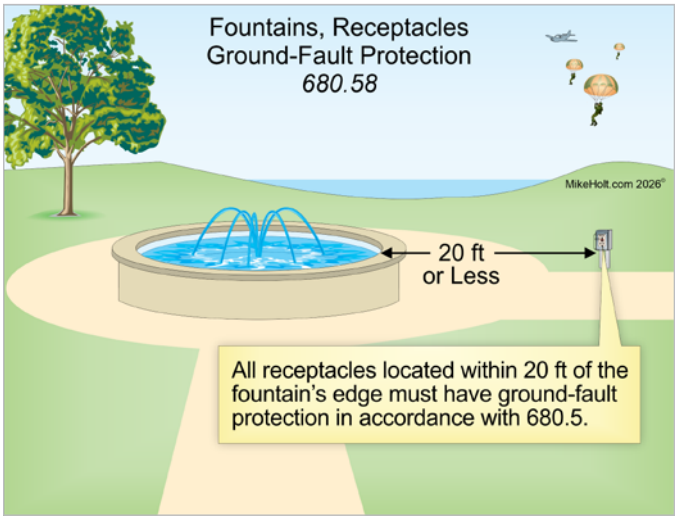
680.57 Electric Signs In or Adjacent to Fountains

(B) GFCI Protection. Circuits that supply an electric sign in a fountain or within 10 ft of the fountain edge must be GFCI protected. ▸Figure 680–102

▸Figure 680–102

680.58 Ground-Fault Protection

All receptacles located within 20 ft of the fountain's edge must have ground-fault protection in accordance with 680.5. ▸Figure 680–103



▸Figure 680–103

680.59 Ground-Fault Protection for Permanently Installed Nonsubmersible Pumps

Outlets supplying permanently installed nonsubmersible pump motors must have ground-fault protection in accordance with 680.5.

Part VII. Hydromassage Bathtubs

Hydromassage Bathtub. A permanently installed bathtub with a recirculating piping system designed to accept, circulate, and discharge water after each use. ▸Figure 680–104

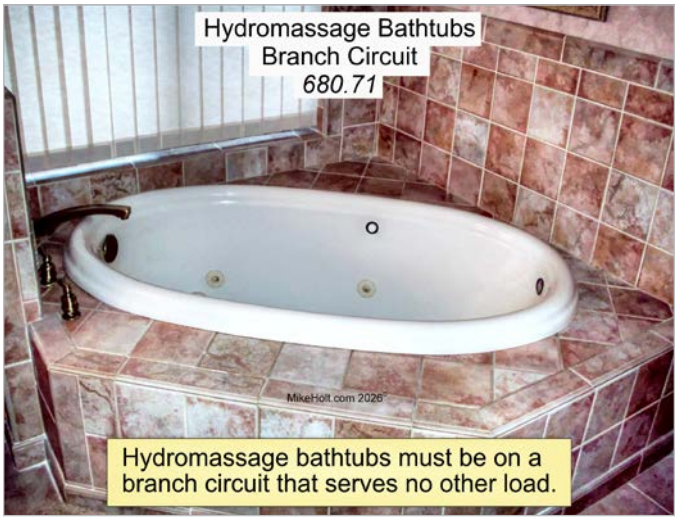
▸Figure 680–104

680.70 General

Electrical installations for a ***hydromassage bathtub*** are only required to comply with Part VII of Article 680.

680.71 Branch Circuit

Hydromassage bathtubs must be on a branch circuit that serves no other load. ▸Figure 680–105



▸Figure 680–105

680.73 Accessibility

Where the hydromassage bathtub is cord-and-plug-connected with the supply receptacle accessible only through a service access opening, the receptacle must be installed so that its face is within direct view and not more than 1 ft of the opening. ▸Figure 680–106

▸Figure 680–106

680.74 Bonding

(A) General. The following parts must be bonded together:

(1) Metal fittings within, or attached to, the hydromassage bathtub structure that are in contact with the circulating water

(2) Metal parts of electrical equipment associated with the hydromassage bathtub water circulating system, including pump and blower motors

(3) Metal-sheathed cables, metal raceways, and metal piping within 5 ft of the inside walls of the hydromassage bathtub and not separated from its area by a permanent barrier

(4) Exposed metal surfaces within 5 ft of the inside walls of the hydromassage bathtub and not separated from it by a permanent barrier

(5) Metal parts of electrical devices not associated with the hydromassage bathtub within 5 ft from the hydromassage bathtub

Ex 1: Small conductive surfaces not likely to become energized such as air and water jets, supply valve assemblies, drain fittings not connected to metallic piping not connected to metal framing are not required to be bonded. ▸Figure 680–107

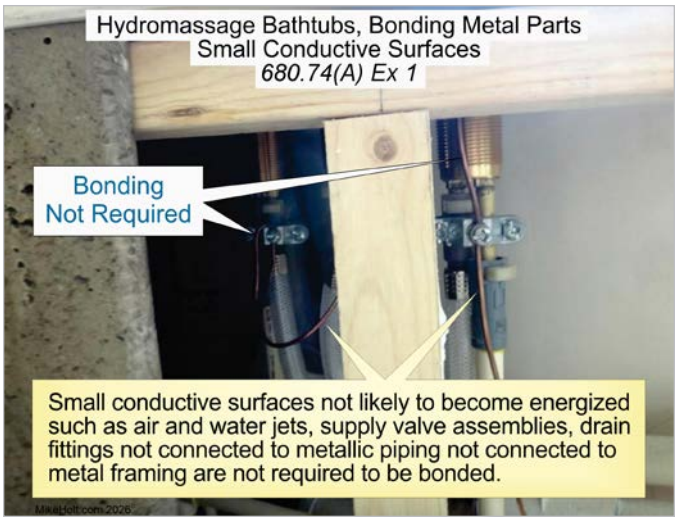


Figure 680–107

Ex 2: Double-insulated motors and blowers are not required to be bonded.

(B) Bonding Conductor. The bonding conductor must be a solid copper conductor not smaller than 8 AWG.

Bonding jumpers are not required to be extended or attached to any remote panelboard, service disconnect, or any electrode.

680.75 GFCI Protection

Hydromassage bathtubs must have GFCI protection located at readily accessible location.