

2020 National Electrical Code Inground pool requirements

680.5 Ground-Fault Circuit Interrupters.

Ground-fault circuit interrupters (GFCIs) shall be self-contained units, circuit-breaker or receptacle types, or other listed types. The GFCI requirements in this article, unless otherwise noted, are in addition to the requirements in 210.8.

680.6 Bonding and Equipment Grounding.

Electrical equipment shall be bonded in accordance with Part V of Article 250 and shall meet the equipment grounding requirements of Parts VI and VII of Article 250. The equipment shall be connected by the wiring methods in Chapter 3, except as modified by this article. Equipment subject to these requirements shall include the following:

1. Through-wall lighting assemblies and underwater luminaires, other than those low-voltage lighting products listed for the application without an equipment grounding conductor.
2. All electrical equipment located within (5 ft) of the inside wall of the specified body of water.
3. All electrical equipment associated with the recirculating system of the specified body of water.
4. Junction boxes
5. Transformer and power supply enclosures
6. Ground-fault circuit interrupters
7. Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the specified body of water.

680.7 Bonding and Equipment Grounding Terminals.

Terminals used for bonding and equipment grounding shall be identified for use in wet and corrosive environments. Field-installed terminals in a damp, wet, or corrosive environment shall be composed of copper, copper alloy, or stainless steel and shall be listed for direct burial use.

680.8 Cord-and-Plug-Connected Equipment.

Fixed or stationary equipment, other than underwater luminaires, for a permanently installed pool shall be permitted to be connected with a flexible cord and plug to facilitate the removal or disconnection for maintenance or repair.

680.8(A) Length.

For other than storable pools, the flexible cord shall not exceed 3 ft in length.

680.8(B) Equipment Grounding.

The flexible cord shall have a copper equipment grounding conductor sized in accordance with 250.122 but not smaller than 12 AWG. The cord shall terminate in a grounding-type attachment plug.

680.8(C) Construction.

The equipment grounding conductors shall be connected to a fixed metal part of the assembly. The removable part shall be mounted on or bonded to the fixed metal part.

680.11 Underground Wiring.

Underground wiring shall comply with 680.11(A) through (C).

680.11(A) Underground Wiring.

Underground wiring within 5 ft horizontally from the inside wall of the pool shall be permitted. The following wiring methods shall be considered suitable for the conditions in these locations:

1. Rigid metal conduit
2. Intermediate metal conduit
3. Rigid polyvinyl chloride conduit
4. Reinforced thermosetting resin conduit.
5. Jacketed Type MC cable that is listed for burial use.
6. Liquidtight flexible nonmetallic conduit listed for direct burial use.
7. Liquidtight flexible metal conduit listed for direct burial use.

680.11(B) Wiring Under Pools.

Underground wiring shall not be permitted under the pool unless this wiring is necessary to supply pool equipment permitted by this article.

680.11(C) Minimum Cover Requirements.

Minimum cover depths shall be as given in Table 300.5.

300.5 Underground Installations.

300.5(A) Minimum Cover Requirements.

Direct-buried cable, conduit, or other raceways shall be installed to meet the minimum cover requirements of [Table 300.5](#).

Table 300.5 Minimum Cover Requirements, 0 to 1000 Volts, Nominal, Burial in Millimeters (Inches)

Location of Wiring Method or Circuit	Type of Wiring Method or Circuit									
	Column 1 Direct Burial Cables or Conductors		Column 2 Rigid Metal Conduit or Intermediate Metal Conduit		Column 3 Nonmetallic Raceways Listed for Direct Burial Without Concrete Encasement or Other Approved Raceways		Column 4 Residential Branch Circuits Rated 120 Volts or Less with GFCI Protection and Maximum Overcurrent Protection of 20 Amperes		Column 5 Circuits for Control of Irrigation and Landscape Lighting Limited to Not More Than 30 Volts and Installed with Type UF or in Other Identified Cable or Raceway	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
All locations not specified below	600	24	150	6	450	18	300	12	150 ^{a, b}	6 ^{a, b}
In trench below 50 mm (2 in.) thick concrete or equivalent	450	18	150	6	300	12	150	6	150	6
Under a building	0	0	0	0	0	0	0	0	0	0
	(in raceway or Type MC or Type MI cable identified for direct burial)						(in raceway or Type MC or Type MI cable identified for direct burial)		(in raceway or Type MC or Type MI cable identified for direct burial)	
Under minimum of 102 mm (4 in.) thick concrete exterior slab with no vehicular traffic and the slab extending not less than 152 mm (6 in.) beyond the underground installation	450	18	100	4	100	4	150	6	150	6
							(direct burial)		(direct burial)	
							100	4	100	4
							(in raceway)		(in raceway)	
Under streets, highways, roads, alleys, driveways, and parking lots	600	24	600	24	600	24	600	24	600	24
One- and two-family dwelling driveways	450	18	450	18	450	18	300	12	450	18

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	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
and outdoor parking areas, and used only for dwelling-related purposes										
In or under airport runways, including adjacent areas where trespassing prohibited	450	18	450	18	450	18	450	18	450	18

^aA lesser depth shall be permitted where specified in the installation instructions of a listed low-voltage lighting system.

^bA depth of 6 in. shall be permitted for pool, spa, and fountain lighting, installed in a nonmetallic raceway, limited to not more than 30 volts where part of a listed low-voltage lighting system.

Notes:

1. Cover is defined as the shortest distance in inches measured between a point on the top surface of any direct-buried conductor, cable, conduit, or other raceway and the top surface of finished grade, concrete, or similar cover.
2. Raceways approved for burial only where concrete encased shall require concrete envelope not less than 2 in. thick.
3. Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.
4. Where one of the wiring method types listed in Columns 1 through 3 is used for one of the circuit types in Columns 4 and 5, the shallowest depth of burial shall be permitted.
5. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal raceway, or a nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 2 in. of concrete extending down to rock.

680.13 Maintenance Disconnecting Means.

One or more means to simultaneously disconnect all ungrounded conductors shall be provided for all utilization equipment other than lighting. Each means shall be readily accessible and within sight from its equipment and shall be located at least 5 ft horizontally from the inside walls of a pool, spa, fountain, or hot tub unless separated from the open water by a permanently installed barrier that provides a 5 ft reach path or greater. This horizontal distance shall be measured from the water's edge along the shortest path required to reach the disconnect.

A readily accessible disconnecting means is required to be located within sight of pool, spa, fountain, and hot tub equipment. This provides service personnel with the ability to safely disconnect power for servicing equipment such as motors, heaters, and control panels. The intent of the 5-foot distance from the inside walls of the pool or separation by a permanent barrier is that the disconnecting means not be in reach of someone in the pool.

680.14 Wiring Methods in Corrosive Environment.

Wiring methods in a corrosive environment shall be listed and identified for use in such areas. Rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, and reinforced thermosetting resin conduit shall be considered to be resistant to the corrosive environment.

680.14 Wiring Methods in Corrosive Environment.

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Part II. Permanently Installed Pools

680.20 General.

Electrical installations at permanently installed pools shall comply with the provisions of Part I and Part II of this article.

680.21 Motors.

680.21(A) Wiring Methods.

The wiring to a pool motor shall comply with 680.21(A)(1) unless modified for specific circumstances by (A)(2) or (A)(3).

680.21(A)(1) General.

Wiring methods installed in a corrosive environment shall comply with 680.14 or shall be Type MC cable listed for that location. Wiring methods installed in these locations 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, the wiring methods of branch circuits shall comply with the general requirements in Chapter 3.

680.21(A)(2) Flexible Connections.

Where necessary to employ flexible connections at or adjacent to the motor, Liquidtight flexible metal or Liquidtight flexible nonmetallic conduit with listed fittings shall be permitted.

680.21(A)(3) Cord-and-Plug Connections.

Pool-associated motors shall be permitted to employ cord-and-plug connections. The flexible cord shall not exceed 3 ft in length. The flexible cord shall include a copper equipment grounding conductor sized in accordance with 250.122 but not smaller than 12 AWG. The cord shall terminate in a grounding-type attachment plug.

680.21(B) Double-Insulated Pool Pumps.

A listed cord-and-plug-connected pool pump incorporating an approved system of double insulation that provides a means for grounding only the internal and nonaccessible, non-current-carrying metal parts of the pump shall be connected to any wiring method recognized in Chapter 3 that is suitable for the location. Where the equipment grounding conductor of the motor circuit is connected to the equipotential bonding means in accordance with the second sentence of 680.26(B)(6)(a), the branch-circuit wiring shall comply with 680.21(A).

The internal metal parts of a swimming pool pump incorporating a system of double insulation are grounded; however, they are not required to be incorporated into the bonding system required by 680.26(B), because bonding defeats the double insulation system.

680.21(C) GFCI Protection.

Outlets supplying all pool motors on branch circuits rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase, shall be provided with Class A ground-fault circuit-interrupter protection.

Exception: Listed low-voltage motors not requiring grounding, 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 installed without GFCI protection.

An outlet is a point on the wiring system where a receptacle is installed to supply a cord-and-plug-connected pool pump motor. It can also be a point on the wiring system where the branch circuit is directly connected to the pool pump motor, which is often referred to as a "hard-wired" installation.

680.21(D) Pool Pump Motor Replacement.

Where a pool pump motor in [680.21\(C\)](#) is replaced for maintenance or repair, the replacement pump motor shall be provided with ground-fault circuit-interrupter protection.

Although the original installation might not have provided GFCI protection for the swimming pool pump motor, a new or rebuilt pump motor installed to replace a failed motor is required to be protected by a GFCI. This applies to all direct-connected (hard-wired) and cord-and-plug-connected swimming pool pump motors required to be provided with GFCI protection by [680.21\(C\)](#).

680.22 Lighting, Receptacles, and Equipment.

680.22(A) Receptacles.

680.22(A)(1) Required Receptacle, Location.

Where a permanently installed pool is installed, no fewer than one 125-volt, 15- or 20-ampere receptacle on a general-purpose branch circuit shall be located not less than 6 ft from, and not more than 20 ft from, the inside wall of the pool. This receptacle shall be located not more than 6 ft 6 in. above the floor, platform, or grade level serving the pool.

680.22(A)(2) Circulation and Sanitation System, Location.

Receptacles that provide power for water-pump motors or for other loads directly related to the circulation and sanitation system shall be located at least 6 ft from the inside walls of the pool. These receptacles shall have GFCI protection and be of the grounding type.

680.22(A)(3) Other Receptacles, Location.

Other receptacles shall be not less than 6 ft from the inside walls of a pool.

680.22(A)(4) GFCI Protection.

All 15- and 20-ampere, single-phase, 125-volt receptacles located within 20 ft of the inside walls of a pool shall be protected by a Class A ground-fault circuit interrupter. Also see [680.22\(A\)\(5\)](#).

680.22(A)(5) Pool Equipment Room.

At least one GFCI-protected 125-volt, 15- or 20- ampere receptacle on a general-purpose circuit shall be located within a pool equipment room, and all other receptacles supplied by branch circuits rated 150 volts or less to ground within a pool equipment room shall be GFCI protected.

680.23(B)(1) Forming Shells.

Forming shells shall be installed for the mounting of all wet-niche underwater luminaires and shall be equipped with provisions for conduit entries. Metal parts of the luminaire and forming shell in contact with the pool water shall be of brass or other approved corrosion-resistant metal. All forming shells used with nonmetallic conduit systems, other than those that are part of a listed low-voltage lighting system not requiring grounding, shall include provisions for terminating an 8 AWG copper conductor.

680.23(B)(2) Wiring Extending Directly to the Forming Shell.

Conduit shall be installed from the forming shell to a junction box or other enclosure conforming to the requirements in [680.24](#). Conduit shall be rigid metal, intermediate metal, Liquidtight flexible nonmetallic, or rigid nonmetallic.

1. Metal Conduit. Metal conduit shall be listed and identified as red brass or stainless steel.
2. Nonmetallic Conduit. Where a nonmetallic conduit is used, an 8 AWG insulated solid or stranded copper bonding jumper shall be installed in this conduit unless a listed low-voltage lighting system not requiring grounding is used. The bonding jumper shall be terminated in the forming shell, junction box or transformer enclosure, or ground-fault circuit-interrupter enclosure. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a listed potting compound to protect the connection from the possible deteriorating effect of pool water.

An 8 AWG insulated copper bonding jumper is required to be installed in the conduit to provide electrical continuity between the forming shell and the junction box or other enclosure. This bonding conductor is in addition to the EGC required by [680.23\(F\)\(2\)](#).

The function of this conductor is twofold: (1) It permanently bonds all non-current-carrying metal surfaces of the forming shell to any non-current-carrying parts of the deck box and to the EGC of the circuit that supplies the wet-niche luminaire, and (2) it serves as the path for ground-fault current in the event of a ground fault when the wet-niche luminaire is removed from the forming shell, which is typically done during relamping. Damage to the wet-niche luminaire supply cord could result in such a ground-fault scenario.

Low-voltage lighting systems that are listed for installation without an EGC or a bonding conductor are exempt from this requirement.

680.23(B)(3) Equipment Grounding Provisions for Cords.

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

680.23(B)(4) Luminaire Grounding Terminations.

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

680.23(B)(5) Luminaire Bonding.

The luminaire shall be bonded to, and secured to, the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to remove the luminaire from the forming shell. Bonding shall not be required for luminaires that are listed for the application and have no non-current-carrying metal parts.

680.23(B)(6) Servicing.

Wet-niche luminaires shall be removable from the water for inspection, relamping, or other maintenance. The forming shell location and length of cord in the forming shell shall permit personnel to place the removed luminaire on the deck or other dry location for such maintenance. The luminaire maintenance location shall be accessible without entering or going in the pool water.

In spa locations where wet-niche luminaires are installed low in the foot well of the spa, the luminaire shall only be required to reach the bench location, where the spa can be drained to make the bench location dry.

680.24(A) Junction Boxes.

A junction box connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall meet the requirements of this section.

680.24(A)(1) Construction.

The junction box shall be listed, labeled, and identified as a swimming pool junction box and shall comply with the following conditions:

1. Be equipped with threaded entries or hubs or a nonmetallic hub.
2. Be comprised of copper, brass, suitable plastic, or other approved corrosion-resistant material.
3. Be 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.

680.24(A)(2) Installation.

Where the luminaire operates over the low voltage contact limit, the junction box location shall comply with 680.24(A)(2)(a) and (A)(2)(b). Where the luminaire operates at the low voltage contact limit or less, the junction box location shall be permitted to comply with 680.24(A)(2)(c).

1. Vertical Spacing. The junction box shall be located not less than 4 in., measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 8 in. above the maximum pool water level, whichever provides the greater elevation.
2. Horizontal Spacing. The junction box shall be located not less than 4 ft from the inside wall of the pool, unless separated from the pool by a solid fence, wall, or other permanent barrier.
3. Flush Deck Box. If used on a lighting system operating at the low voltage contact limit or less, a flush deck box shall be permitted if both of the following conditions are met:
 1. An approved 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.

680.24(B) Other Enclosures.

An enclosure for a transformer, ground-fault circuit interrupter, or a similar device connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall meet the requirements of this section.

680.24(B)(1) Construction.

The enclosure shall be listed and labeled for the purpose and meet the following requirements:

1. Equipped with threaded entries or hubs or a nonmetallic hub.

2. Comprised of copper, brass, suitable plastic, or other approved corrosion-resistant material
3. Provided with an approved seal, such as duct seal at the conduit connection, that prevents circulation of air between the conduit and the enclosures.
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.

680.24(B)(2) Installation.

1. Vertical Spacing. The enclosure shall be located not less than 4 in., measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 8 in. above the maximum pool water level, whichever provides the greater elevation.
2. Horizontal Spacing. The enclosure shall be located not less than 4 ft from the inside wall of the pool, unless separated from the pool by a solid fence, wall, or other permanent barrier.

680.24(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.

680.24(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.

This requirement ensures the availability of integral grounding terminals necessary for the grounding and bonding of underwater luminaires. A box that is not specifically listed for use with swimming pools might not provide the correct number of integral grounding and bonding terminals. The number of grounding terminals in a box or enclosure is required to be one more than the number of conduit entries for which the box is designed.

680.24(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.

680.24(F) Grounding.

The grounding 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.

680.26 Equipotential Bonding.

680.26(A) Performance.

The equipotential bonding required by this section shall be installed to reduce voltage gradients in the pool area.

The function of equipotential bonding differs from the primary function of bonding to meet the requirements of [Article 250](#). Providing a path for ground-fault current is not the function of the equipotential bonding grid and associated bonding conductors. The only function of the 8 AWG conductor required by [680.26\(B\)](#) is equipotential bonding to eliminate the voltage gradient in the pool area. The bonding conductor is not required to extend or connect to any parts or equipment other than those covered in [680.26\(B\)\(1\)](#) through [\(B\)\(7\)](#) and to a pool water bonding element covered in [680.26\(C\)](#).

Creating an electrically safe environment in and around permanently installed swimming pools requires the installation of a bonding system to establish equal electrical potential (voltage) in the vicinity of the swimming pool. A person who is immersed in a pool or who is lying on or walking on a conductive perimeter surface is susceptible to differences in electrical potential that may be present in the pool area. Bonding reduces possible injurious or disabling shock hazards created by stray currents in the ground or piping connected to the swimming pool. See [Exhibit 680.7](#).

680.26(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.

680.26(B)(1) Conductive Pool Shells.

Bonding to conductive pool shells shall be provided as specified in [680.26\(B\)\(1\)\(a\)](#) or [\(B\)\(1\)\(b\)](#). Cast-in-place 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. Reconstructed pool shells shall also meet the requirements of this section.

1. Structural Reinforcing Steel. Unencapsulated structural reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where structural reinforcing steel is encapsulated in a nonconductive compound, a copper conductor grid shall be installed in accordance with 680.26(B)(1)(b).
2. Copper Conductor Grid. A copper conductor grid shall be provided and shall comply with the following:
 1. Be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing in accordance with 250.8 or other approved means
 2. Conform to the contour of the pool
 3. Be arranged in a 12 in. by 12 in. network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 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

Encapsulated reinforcing steel does not provide the conductivity necessary to establish the required common bonding grid around the contour of a conductive pool shell. Therefore, a bonding connection to the encapsulated reinforcing steel, such as epoxy-coated rebar, is not required. However, a copper bonding grid around the contour of a conductive pool shell must be provided and constructed as prescribed in 680.26(B)(1)(b).

In Exhibits 680.7 and 680.8, structural reinforcing steel serves as a common point to which all non-current-carrying metal parts in the pool area are connected. This connection method is one way of satisfying the requirement to bond all metal parts together. Individual pieces of hardware such as the hooks used to attach safety or lane ropes that are less than 4 inches in any dimension and do not penetrate into the pool structure more than 1 inch are not required to be bonded per 680.26(B)(5).

680.26(B)(2) Perimeter Surfaces.

The perimeter surface to be bonded shall be considered to extend for 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), (B)(2)(b), or (B)(2)(c) and shall be attached to the pool reinforcing steel or copper conductor grid at a minimum of four points uniformly spaced around the perimeter of the pool. For nonconductive pool shells, bonding at four points shall not be required.

1. Structural Reinforcing Steel. Structural reinforcing steel shall be bonded in accordance with 680.26(B)(1)(a).
2. Copper Ring. 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 splicing devices or exothermic welding shall be permitted.
 4. The required conductor shall be 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 to 4 in. to 6 in. below the subgrade.
3. Copper Grid. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, copper grid shall be utilized where the following requirements are met:
 1. The copper grid shall be constructed of 8 AWG solid bare copper and be arranged in accordance with 680.26(B)(1)(b)(3).
 2. The copper grid shall follow the contour of the perimeter surface extending 3 ft, horizontally beyond the inside walls of the pool.
 3. Only listed splicing devices or exothermic welding shall be permitted.
 4. The copper grid shall be secured within or under the deck or unpaved surfaces between 4 in. to 6 in. below the subgrade.

The requirement for bonding perimeter surfaces applies to paved and unpaved surfaces, such as a lawn surrounding a permanently installed aboveground swimming pool. Where the paved portion of the perimeter surface extends less than 3 feet horizontally from the inside walls of the pool, the perimeter bonding grid must be continued under the adjacent unpaved perimeter surface. If walls or other physical barriers prevent the perimeter from extending 3 feet beyond the inside walls of the pool, the bonding grid is required only to extend under the available perimeter area.

The perimeter bonding grid can comprise structural reinforcing metal (rebar or welded wire mesh) that is conductive to the perimeter surface and installed in or under the perimeter surface. Where structural reinforcing steel is not available, a single, bare, solid 8 AWG or larger copper conductor can be installed around the pool's perimeter in an area measuring between 18 inches and 24 inches from the inside pool walls. The 8 AWG bonding conductor can be installed in the paving material (i.e., in the concrete), or it can be buried in the material (*subgrade*) below the paving material. Where buried, the bonding conductor must not be less than 4 inches and not more than 6 inches below the surface level of the subgrade material.

If structural reinforcing steel is not available, another choice for bonding the perimeter surfaces is through the use of a grid comprising bare 8 AWG solid copper conductors installed to follow the contour of the perimeter surface. The copper conductor grid pattern is arranged using the same space and tolerances as required for bonding grids installed for conductive pool shells in accordance with 680.26(B)(1)(b). This requirement does not apply to decks constructed of non-conductive materials such as wood, plastic, or fiberglass. However, the perimeter surface under an elevated deck around a pool installed on or partially in the ground requires bonding.

The required perimeter surface bond must be connected at four evenly spaced points around the pool perimeter to the conductive pool shell. Connection between the perimeter surface bond and nonconductive pool shells is not required.

680.26(B)(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.

680.26(B)(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.

680.26(B)(5) Metal Fittings.

All metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 4 in. in any dimension and do not penetrate into the pool structure more than 1 in. shall not require bonding. Metallic pool cover anchors intended for insertion in a concrete or masonry deck surface, 1 in. or less in any dimension and 2 in. or less in length, and metallic pool cover anchors intended for insertion in a wood or composite deck surface, 2 in. or less in any flange dimension and 2 in. or less in length, shall not require bonding.

680.26(B)(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.

1. 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 swimming pool equipotential bonding means to an accessible point in the vicinity of the pool pump motor. Where there is no connection between the swimming pool equipotential bonding means and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit.
2. Pool Water Heaters. For pool water heaters rated at more than 50 amperes and having specific instructions regarding bonding and grounding, only those parts designated to be bonded shall be bonded and only those parts designated to be grounded shall be grounded.

680.26(B)(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 5 ft horizontally from the inside walls of the pool shall not be required to be bonded.

Exception No. 3: Those greater than 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.

The metal parts required to be bonded include all metal parts of electrical equipment associated with the water-circulating system of the pool, all metal parts of the pool structure, and all fixed metal parts within 5 feet of the inside walls of the pool and not separated by a permanent barrier. The bonding of these parts can be accomplished by one or more of the following methods using a solid 8 AWG or larger copper conductor that is insulated, covered, or bare.

1. Connecting the parts directly to each other in series or parallel configurations
2. Connecting the parts to the unencapsulated structural metal forming the shell of a conductive pool or connecting the parts to a copper conductor grid system used around the contour of a conductive pool shell
3. Connecting the parts using the pool shell constructed of bolted or welded steel as a common connection point
4. Connecting the parts to the perimeter bonding grid consisting of either structural reinforcing steel (rebar or welded wire mesh) or a solid 8 AWG bare copper conductor encircling the pool's perimeter

Brass or other corrosion-resistant rigid metal conduit (RMC) can also be used as a bonding conductor for connecting metal parts together. See Exhibit 680.7 for an example of using brass RMC as the method of bonding two electrical enclosures and as a point to connect bonding jumpers run to the pool reinforcing steel and stainless steel ladder.

As specified in 250.8(A), exothermic welding, listed pressure connectors and clamps, and other listed means are permitted as the method of connecting bonding conductors to swimming pool equipment. Connections in pool areas must be suitable for wet conditions and exposure to pool chemicals. Pool chemicals in swimming pool water can make the vicinity of the swimming pool area a corrosive environment. The integrity of the bonding connections should be periodically inspected, particularly those bonding connections between

the 8 AWG copper conductor and an aluminum (or other dissimilar metal) ladder. See Exhibit 680.9 for an illustration of two acceptable methods of making swimming pool bonding connections.

680.26(C) Pool Water.

Where none of the bonded parts are in direct connection with the pool water, the pool water shall be in direct contact with an approved corrosion-resistant conductive surface that exposes not less than 9 in. 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).

Where bonded items such as ladders, rails, or underwater luminaires are in direct contact with the pool water and provide the required surface area, it is not necessary to provide another conductive element. A conductive pool shell in contact with the water also satisfies this requirement. However, where the pool does not include any of those items, it is necessary to install a conductive element. Devices have been specifically listed as a means to provide this contact with the pool water.

680.27(B) Electrically Operated Pool Covers.

680.27(B)(1) Motors and Controllers.

The electric motors, controllers, and wiring shall be located not less than 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 device 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 5 ft from the inside walls of the pool.

680.27(B)(2) Protection.

The electric motor and controller shall be connected to a branch circuit protected with ground-fault circuit-interrupter protection.

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).

This is just a small portion of the electrical code requirements of the for all aspects of an inground pool. If there are any questions as to electrical code requirements, please contact the Building Department.