

ELECTRIC FOR HOT TUBS & POOLS

All electrical requirement for Swimming Pools, Hot Tubs and Fountains may be found in Article 680 of the National Electrical Code (N.E.C.). If there are any conflicts between this pamphlet and the code, the code will take precedence.

Permanently Installed Swimming Wading Pool

Inground or partially inground pool capable of holding water in a depth greater than 42" or if installed in a structure, regardless if served by electrical circuits of any type.

Self Contained Spa or Hot Tub

Factory fabricated unit consisting of a vessel with all water circulating, heating control equipment integrated and approval by a NRTL.

Filter Pumps

Filter pumps shall be listed and labeled for this intended use.

Storable Swimming Pool

Those that are constructed on or above the ground and only capable of holding water to a maximum depth of 42", or a pool which has non-metallic or molded polymeric walls, or inflatable fabric walls, regardless of dimension.

680-5 Transformers and Ground-Fault Circuit Interrupters

A). Transformers

Transformers used for supplying underwater lighting fixtures together with their transformer enclosure, "box," shall be identified and "listed" for the purpose.

B). Ground-Fault Circuit Interrupters

GFCI shall be self-contained units, circuit-breaker type, receptacle-type, or other approved types.

C). Wiring

Conductors on the load side of a GFCI used to provide protection for underwater lighting fixtures are not permitted to occupy raceway boxes or enclosures containing other conductors, even if the other conductors are for pool-related equipment, such as for a water pump.

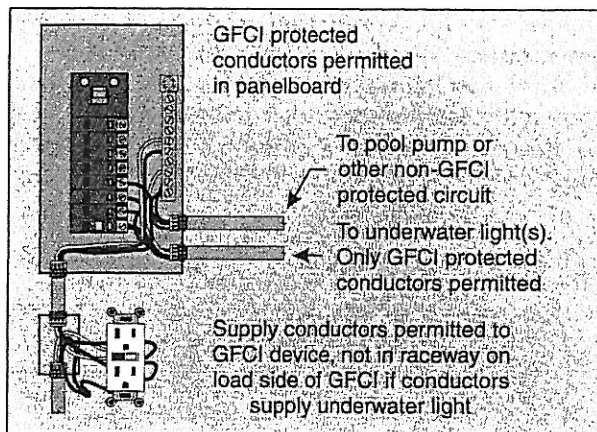


Figure 13-2. Section 680-5(c). GFCI protected conductors to underwater lighting fixtures

Exceptions to the general rule that are permitted:

1. GFCI shall be permitted in a panel board that contains circuits protected by other than GFCI.
2. Supply conductors to a feed-through type GFCI are permitted in the same enclosure.
3. Conductors on the load side of the GFCI are permitted to occupy raceway, boxes, or enclosures containing only conductors protected by GFCI.
4. Grounding conductors are permitted in the same raceway, box, or enclosure.

(See Figure 13-2)

It is clear that conductors that supply pool equipment, such as pool pump motors and heaters that do not have GFCI protection, cannot be installed in the same conduits, junction boxes, and pull boxes with conductors having GFCI protection that supply underwater lighting fixtures.

680-6

A). Receptacles

1. A receptacle that provides power for water pump motors or loads directly related to circulation and sanitation system for permanent pool, as permitted in Section 680-7, shall be permitted between 5' and 10' from the inside wall of the pool, but must be of the single locking, grounded type (twist lock) and be GFCI protected. All other receptacles must be located outside of 10' from the pool.
2. There shall be at least one 125v 15 or 20 amp GFCI general purpose receptacle located 10' away from the pool but within 20' of such pool. This receptacle must not be more than 6'6" above finish grade.

(See Figures 13-3 and 13-4)

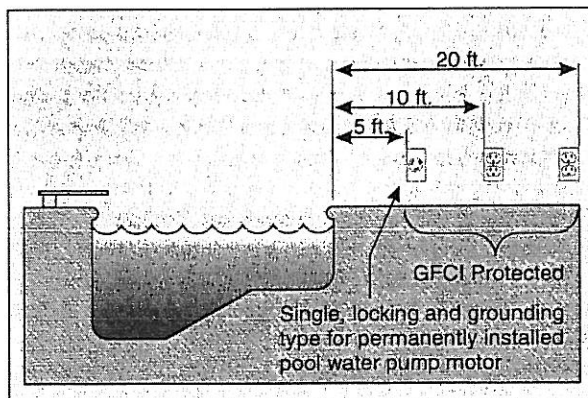
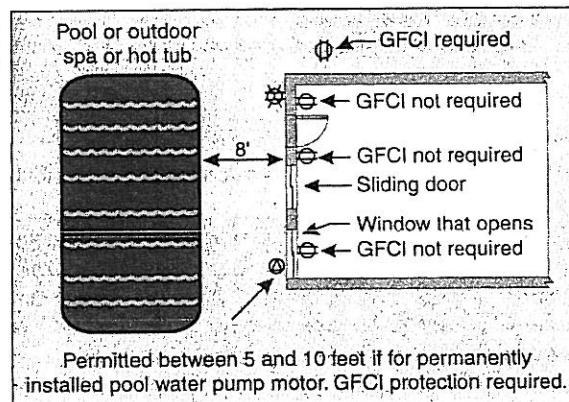


Figure 13-3. Section 680-6(a). Receptacle Outlets Near Pool or Outdoor Spa or Hot Tub.



Figures 13-4. Section 680-6(a)(2). GFCI Protection of Receptacle Outlet. Permitted location of receptacle outlets and GFCI protection requirements

B). Lighting Fixtures, Lighting Outlets, and Ceiling Fans

1. Generally, lighting fixtures, lighting outlets, and fans can not be installed outdoors over a pool, hot tub, or any area extending 5-feet horizontally from the inside walls of the pool, unless located 12-feet or more above the maximum level of the water.
2. Existing lighting fixtures and lighting outlets that are located less than 5-feet horizontally from the inside wall of a pool must be installed so that they are at least 5-feet above the maximum water level and must be rigidly attached to the existing structure and be GFCI.
3. All lighting fixtures must be totally enclosed type (no open bulbs). All lighting fixtures, lighting outlets, and paddle fans over pool indoors must be located above 7-feet 6-inches above the maximum water level and be GFCI protected.

(See Figures 13-5 and 13-6 on next page)

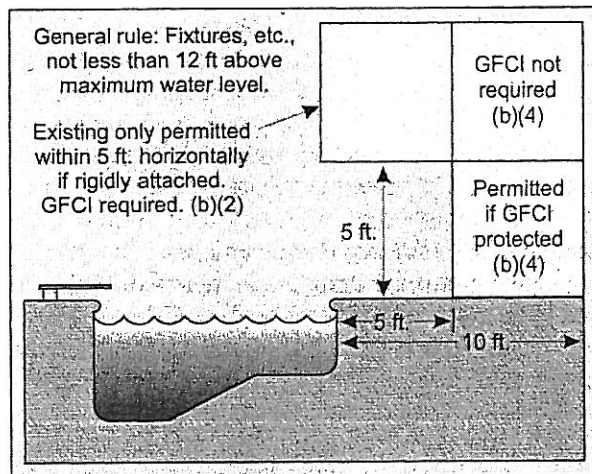


Figure 13-5. Section 680-6(b)(1) and (2). Lighting Fixture Locations for Outdoor Pool, Spa or Hot Tub.

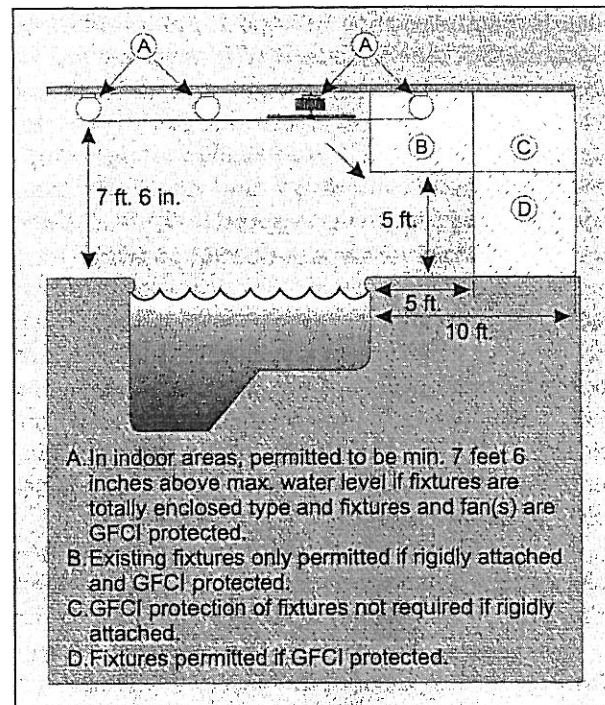


Figure 13-6. Section 680-6(b)(3). Fixtures and fans in indoor pool areas

680-7 Cord & Plug Equipment

- A). Fixed or stationary equipment rated 20 amp or less; not including underwater lighting, for a permanently installed pool, shall be permitted to be connected with a flexible cord to facilitate the removal or disconnection for maintenance or repair. The flexible cord shall not exceed 3' in length and shall have a copper equipment grounding conduct not smaller than No.12 with a locking type grounding attachment plug.

680-8 Overhead Conductor Clearances

- A). (See Figure 13-7.)

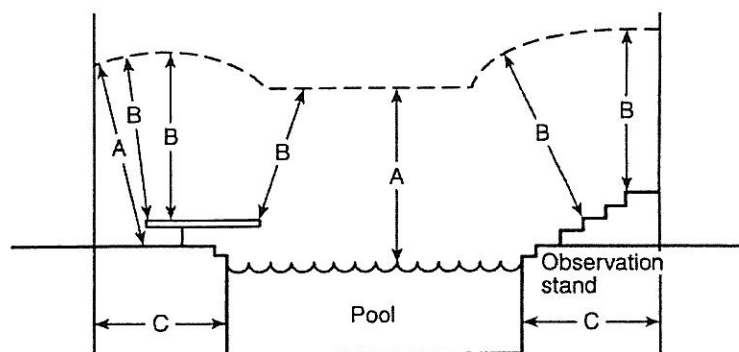


Figure 13-7.

Table 680-8. Clearances

	Insulated Supply or Service Drop Cables, 0-750 Volts to Ground, Supported on and Cabled Together with an Effectively Grounded Bare Messenger or Effectively Grounded Neutral Conductor	All Other Supply or Service Drop Conductors Voltage to Ground	
		0-15 kV	Greater than 15-50 kV
A Clearance in any direction to the water level, edge of water surface, base of diving platform, or permanently anchored raft	22 ft (6.7m)	25 ft (7.62m)	27 ft (8.23m)
B Clearance in any direction to the diving platform or tower	14 ft (4.27m)	17 ft (5.2m)	18 ft (5.49m)
C Horizontal limit of clearance measured from inside wall of the pool	This limit shall extend to the outer edge of the structures listed in (1) and (2) but not less than 10 ft (3.05m)		

680-9

- A). All electric pool heaters must comply with this section.

680-10

- A). Underground wire location shall not be permitted under the pool or within the area extending 5' horizontally from the inside wall of the pool unless wire is necessary to supply pool equipment and written permission from building inspector.

680-12 Disconnecting Means

- A). A disconnecting means shall be provided and be accessible, located within sight and marked accordingly for pools, spas, and hot tub equipment. It must be located at least 5' away from the inside wall of the pool, spa or hot tub.

680-20 Underwater Lighting

680-20(a)(3) Lighting fixtures mounted in walls shall be installed with the top of the fixture lens at least 18" below the normal water level of the pool, unless the lighting fixture is listed and identified for use at a depth of not less than 4" below the normal water level of the pool.

680-20(a)(4) A lighting fixture facing upward shall have the lens adequately guarded to prevent contact by any person.

680-21 Junction Boxes and enclosures for transformers or GFCI shall comply with all subsections of this section, and must be listed and labeled for uses.

680-22 Bonding

It shall not be the intent of this section to require that the No. 8 or larger solid copper bonding conductor be extended or attached to any remote panel board service equipment, or any electrode, but only that it shall be employed to eliminate voltage gradients in the pool area as prescribed.

A). Bonded Parts

1. All metallic parts of the pool structure, including the reinforcing metal of the pool shell, coping stones and deck.
2. All forming shells and mounting brackets of a no niche fixture, unless listed low-voltage lighting system is used, requires bonding.
3. All metal fitting within or attached to pool structure.
4. All metal parts of electrical equipment associated with the pool water circulating system.
5. Metal sheathed cables, raceways, metal piping, and all fixed metal parts that are within 5' horizontally of the inside wall of the pool and within 12' of the maximum water level of the pool; or any observation stands, towers, or platforms, or from any diving structures and are not separated from the pool by permanent barrier.

B). Common Bonding Grid

1. The parts specified in (A) shall be connected to a common bonding grid with a solid copper conductor not smaller than No. 8. All connections shall be listed and labeled as being suitable for the purpose and are of the following material: stainless steel, brass, copper or copper alloy.

(See Figures 13-8, 13-9*, and 13-10.)

**Figure 13-9 is the same as 13-8, but with two extra bonding points due to being an oval pool.*

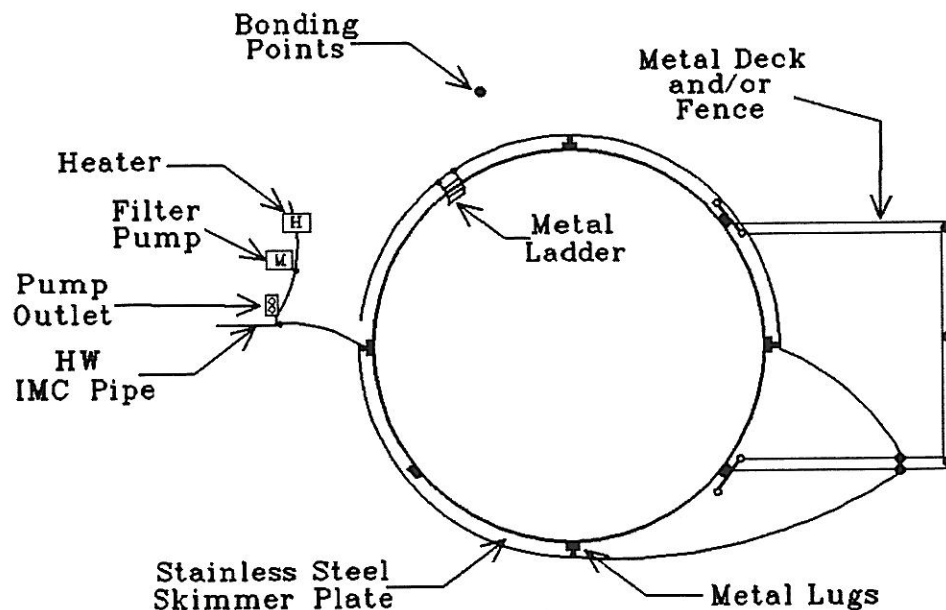


Figure 13-8

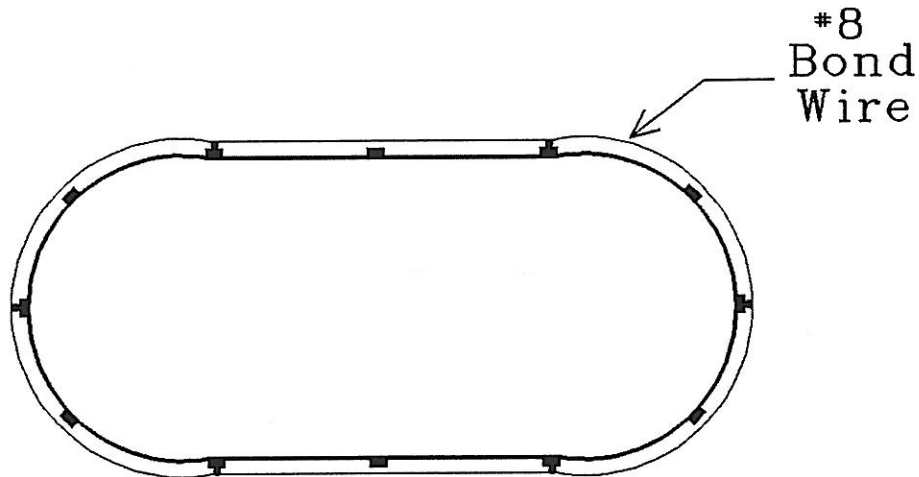


Figure 13-9

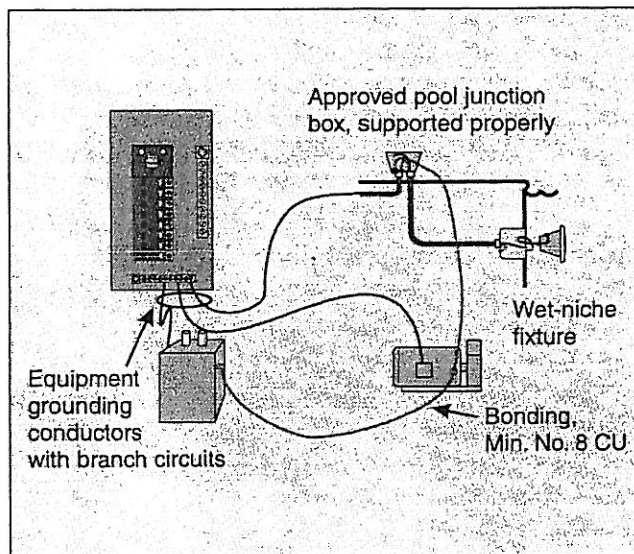


Figure 13-10. Section 680-22(a)(4). Bonding and grounding pool equipment

680-25 A) Methods of Grounding

General – All associated equipment shall be grounded, i.e.: underwater lighting fixtures, junction boxes, metal transformer enclosures, panel boards, motors and other electrical enclosures and equipment. All sizing must comply with 250-122 but not smaller than No. 12 insulated copper conductor.

680-40 Outdoor Installation of Spas and Hot Tubs

A spa or hot tub installed outdoors, shall comply with the provisions provided in previous pages, except listed packaged units are permitted to be connected with 6-feet of liquid-tight flexible conduit.

680-41 Indoor Installation of Spas and Hot Tubs

A spa or hot tub installed indoors, shall comply with the provisions provided in previous pages. Listed spa and hot tubs rated 20 amps or less may be cord and plug.

A) Exception: At least one 125 volt 15 or 20 amp receptacle on a general purpose branch circuit shall be located a minimum of 5-feet from and not more than 10-feet from the inside wall of the spa or hot tub and be GFCI protected.

- 1) All receptacles within 10-feet of spa or hot tub must be GFCI protected.
- 2) Wall switches shall be located at least 5-feet, measured horizontally, from the inside walls of the spa or hot tub.
- 3) All metal surfaces that are within 5-feet of the spa or hot tub are to be bonded.
- 4) Lighting fixtures, lighting outlets, and ceiling suspended fans located over spa or hot tubs, or within 5-feet shall be a minimum of 7-feet 6-inches above the maximum water level and shall be GFCI protected. If lighting fixture can not meet this requirement, fixtures must than be:
 - a). Recessed fixture (can light) with a glass or plastic lens and non-metallic or electrically isolated trim, suitable for use in a damp location and be GFCI protected.
 - b). Surface-mounted fixtures with a glass or plastic globe and a non-metallic body or a metallic body isolated from contact and be suitable for use in damp location.

ALL INFORMATION IN THIS PAMPHLET CAME FROM THE NATIONAL ELECTRICAL CODE, 1999 EDITION, ARTICLE 680; OR FROM THE 1 & 2 FAMILY DWELLING ELECTRICAL SYSTEMS, 4TH EDITION BY J. PHILIP SIMMONS, CHAPTER 13.