REQUIRED INSPECTIONS AFTER THE PERMIT HAS BEEN ISSUED:

ABOVE GROUND POOLS:

After the pool location has been staked out, you must call 973-882-2730 for an inspection to make sure that the stakeout agrees with the survey.

Underground Electric

Final Inspection

WHEN CALLING 973-882-2730 FOR AN INSPECTION, YOU MUST PROVIDE THE FOLLOWING:

WORK SITE ADDRESS PERMIT NUMBER AND BLOCK & LOT

IN GROUND POOLS:

After the pool location has been staked out, you must call 973-882-2730 for an inspection to make sure that the stakeout agrees with the survey.

Prior to pouring the concrete lock, the top of the pool wall elevation must be verified by a surveyor or engineer. Verification can be in the form of another survey or letter signed and sealed by a surveyor or engineer.

Concrete Lock or Steel (Steel Lined & Fiberglass)

CONTRACTOR: PLEASE REVIEW THE ATTACHED ELECTRICAL CODES BEFORE CALLING FOR AN INSPECTION

Bonding (Grounding of the Pool) (Including Apron)

Underground Electric

Gas Piping (If Necessary)

After Concrete Lock (Same As Back Fill)

Final Inspection INCLUDING AS BUILT SURVEY

1110
APPENDIX G
SWIMMING POOLS, SPAS AND HOT TUBS

SECTION AG101
GENERAL
AG101.1 General. The provisions of this appendix shall control the design and construction of swimming pools, spas and hot tubs installed in or on the lot of a one- or two-family dwelling.

SECTION AG102
DEFINITIONS
AG102.1 General. For the purposes of these requirements, the terms used shall be defined as follows and as set forth in Chapter 2.
ABOVE-GROUND/ON-GROUND POOL. See “Swimming pool.”
BARRIER. A fence, wall, building wall or combination thereof which completely surrounds the swimming pool and obstructs access to the swimming pool.
HOT TUB. See “Swimming pool.”
IN-GROUND POOL. See “Swimming pool.”
RESIDENTIAL. That which is situated on the premises of a detached one- or two-family dwelling or a one-family townhouse not more than three stories in height.
SPA, NONPORTABLE. See “Swimming pool.”
SPA, PORTABLE. A nonpermanent structure intended for recreational bathing, in which all controls, water-heating and water-circulating equipment are an integral part of the product.
SWIMMING POOL. Any structure intended for swimming or recreational bathing that contains water over 24 inches (610 mm) deep. This includes in-ground, above-ground and on-ground swimming pools, hot tubs and spas.
SWIMMING POOL, INDOOR. A swimming pool which is totally contained within a structure and surrounded on all four sides by the walls of the enclosing structure.
SWIMMING POOL, OUTDOOR. Any swimming pool which is not an indoor pool.

SECTION AG103
SWIMMING POOLS
AG103.1 In-ground pools. In-ground pools shall be designed and constructed in conformance with ANSI/NSPI-5 as listed in Section AG108.
AG103.2 Above-ground and on-ground pools. Above-ground and on-ground pools shall be designed and constructed in conformance with ANSI/NSPI-4 as listed in Section AG108.

SECTION AG104
SPAS AND HOT TUBS
AG104.1 Permanently installed spas and hot tubs. Permanently installed spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-3 as listed in Section AG108.
AG104.2 Portable spas and hot tubs. Portable spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-6 as listed in Section AG108.

SECTION AG105
BARRIER REQUIREMENTS
AG105.1 Application. The provisions of this chapter shall control the design of barriers for residential swimming pools, spas and hot tubs subject to this code. These design controls are intended to provide protection against potential drownings and near-drownings by restricting access to swimming pools, spas and hot tubs.
AG105.2 Outdoor swimming pool. An outdoor swimming pool, including an in-ground, above-ground or on-ground pool, hot tub or spa shall be surrounded by a barrier which shall comply with the following:
1. The top of the barrier shall be at least 48 inches (1219 mm) above grade measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches (51 mm) measured on the side of the barrier which faces away from the swimming pool. Where the top of the pool structure is above grade, such as an above-ground pool, the barrier may be at grade level, such as the pool structure, or mounted on top of the pool structure. Where the barrier is mounted on top of the pool structure, the maximum vertical clearance between the top of the pool structure and the bottom of the barrier shall be 4 inches (102 mm).
2. Openings in the barrier shall not allow passage of a 4-inch-diameter (102 mm) sphere.
3. Solid barriers which do not have openings, such as a masonry or stone wall, shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.
4. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the swimming pool side of the fence. Spacing between vertical members shall not exceed 1 ¾ inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 ¾ inches (44 mm) in width.
APPENDIX G

5. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed $\frac{1}{4}$ inches (44 mm) in width.

6. Maximum mesh size for chain link fences shall be a 2\(\frac{3}{8}\) inch (57 mm) square unless the fence has slats fastened at the top or the bottom which reduce the openings to not more than 1\(\frac{3}{4}\) inches (44 mm).

7. Where the barrier is composed of diagonal members, such as a lattice fence, the maximum opening formed by the diagonal members shall not be more than 1\(\frac{1}{4}\) inches (44 mm).

8. Access gates shall comply with the requirements of Section AG105.2, Items 1 through 7, and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the pool and shall be self-closing and have a self-latching device. Gates other than pedestrian access gates shall have a self-latching device. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from the bottom of the gate, the release mechanism and openings shall comply with the following:

8.1. The release mechanism shall be located on the pool side of the gate at least 3 inches (76 mm) below the top of the gate; and

8.2. The gate and barrier shall have no opening larger than $\frac{1}{2}$ inch (13 mm) within 18 inches (457 mm) of the release mechanism.

9. Where an above-ground pool structure is used as a barrier or where the barrier is mounted on top of the pool structure, and the means of access is a ladder or steps:

9.1. The ladder or steps shall be surrounded by a barrier which meets the requirements of Section AG105.2, Items 1 through 8.

AG105.3 Indoor swimming pool. Walls surrounding an indoor swimming pool shall comply with Section AG105.2, Item 9.

AG105.4 Prohibited locations. Barriers shall be located to prohibit permanent structures, equipment or similar objects from being used to climb them.

AG105.5 Barrier exceptions. Spas or hot tubs with a safety cover which complies with ASTM F 1346, as listed in Section AG107, shall be exempt from the provisions of this appendix.

SECTION AG106 ENTRAPMENT PROTECTION FOR SWIMMING POOL AND SPA SUCTION OUTLETS

See N.J.A.C. 5:23-3.15(b) 8vi. of the plumbing subcode.
TOWNSHIP OF FAIRFIELD
ORDINANCE #98-05

AN ORDINANCE AMENDING CHAPTER 26 OF THE CODE OF THE
TOWNSHIP OF FAIRFIELD "SWIMMING POOLS"

WHEREAS, the Mayor and Council of the Township of Fairfield have reviewed Chapter 26-2(a) of the Code of the Township of Fairfield as it pertains to the location of swimming pool decking in relation to the location of easements; and

WHEREAS, the Mayor and Council of the Township of Fairfield have determined that the existing ordinance regarding said subject is overly restrictive.

NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND COUNCIL OF THE TOWNSHIP OF FAIRFIELD, COUNTY OF ESSEX, STATE OF NEW JERSEY, AS FOLLOWS:

1. Chapter 26-2(a) of the Code of the Township of Fairfield be and is hereby amended by the deletion of the sentence "All decking shall be a minimum of five (5) feet from any easement line," and replace with "No part of any pool including filter or pool decking shall be located within any easement."

2. This Ordinance shall take effect immediately upon passage and publication in accordance with law.

ATTEST:

Muriel M. Shore, Mayor

[Signature]

Joseph Catenaro, Municipal Clerk

NOTICE

NOTICE is hereby given that the foregoing Ordinance was introduced and passed upon First Reading at a Meeting of the Mayor and Council of the Township of Fairfield on April 13, 1998 Said Ordinance will have Second Reading and Public Hearing and be considered for final adoption at a Meeting of said Governing Body on April 27, 1998 starting at 7 p.m. in the Township Municipal Bldg., 230 Fairfield Rd., Fairfield, N.J.

Patricia E. Fahy
Deputy Municipal Clerk
**ORDINANCE #98-05**

FIRST READING: APRIL 13, 1998
INTRODUCED BY: COUNCILMAN PALMIERI
SECONDED BY: COUNCILMAN SMALLHEER
PUBLIC HEARING: APRIL 27, 1998
DATE PUBLISHED: APRIL 16, 1998

**ROLL CALL VOTE**

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2ND READING AND PUBLIC HEARING APRIL 27, 1998
INTRODUCED BY: COUNCILMAN PALMIERI
SECONDED BY: COUNCILMAN PURPURA
DATE PUBLISHED: APRIL 30, 1998

**ROLL CALL VOTE**

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AN ORDINANCE AMENDING CHAPTER 64 OF THE MUNICIPAL CODE OF THE TOWNSHIP OF FAIRFIELD, "SWIMMING POOLS"

DEFINITIONS

Persons - Shall mean and include corporations, companies, associations, societies, firms and partnerships, as well as individuals.

Private Swimming Pool - Shall mean any pool, tank or plunge designed or arranged to be filled with water to a depth of twenty-four (24) inches or more, used and maintained for swimming, bathing or wading purposes by an individual for use of his household and guests and located on a lot as an accessory use to a residence, including both artificial and partly artificial pools.

LOCATION

1. A private swimming pool, either permanent or portable, shall not be located within fifteen (15) feet of any side or rear property line, nor shall any such pool be located closer than ten (10) feet from the principal structure or any part thereof, nor six (6) feet from another accessory structure in any yard area except that area designated for accessory use. In the case of a corner lot, a pool shall not be constructed any closer to the side street line than forty-five (45) feet. The measurement shall be made from the property line to the pool water line. All decking shall be a minimum of five (5) feet from any easement line. Hot tubs and spas may be constructed closer than ten (10) feet to a principal structure.

2. A swimming pool shall not be constructed or installed on any premises unless a residence building is also located on the same premises.

INSTALLATION

Installation of swimming pools shall be in accordance with the latest edition of the Boca National Building Code sec. 421.0 entitled "Swimming Pools" as well as the following additional requirements:

a. All disturbed areas must be stabilized in accordance with the procedures outlined in the "Standards for Soil Erosion & Sediment Control in New Jersey."

b. A letter from the hauler/contractor must be submitted, prior to construction, indicating the site of the proposed placement of excess excavated material.

c. All excavated material found unsuitable for backfill must be removed from the site and disposed of outside the floodplain of any stream, wetland, or surface water in a manner that it does not interfere with positive drainage of the receiving area.

d. For installations in regulated flood plains no fill (including topsoil and concrete) shall be placed around the swimming pool areas above existing grade.

e. Spot elevations shall be provided to indicate existing and proposed grade at the pool corners and 15' beyond (for in-ground pools only.)

f. All electrical and mechanical controls must be adequately flood proofed to an elevation of one foot above base flood elevation, per N.G.V.D.

g. A four (4) foot high temporary fence shall be maintained about the pool throughout the construction period. This fence must be secured at the end of each work day. This fence must be replaced by a permanent fence in order to receive final approval.

PERMITTED SIZE - No swimming pool, including its accessory buildings, shall cover more than twenty five percent (25%) of the accessory use area as described in this chapter. The maximum height above grade of any pool shall be five (5) feet.
DISCHARGE SYSTEM

1. The effluent from the backwash shall be directed by a pipe into a lawn sprinkling system, an adequate dry well or sand filter pit on the same premises on which the pool is located.

2. If a cartridge-type filter is used, the requirements for the discharge of the backwash effluent will not pertain. The minimum area of a cartridge-type filter for any pool is one hundred (100) square feet. Pool water may not be discharged at the curb or upon the surface of any street. The discharge of pool water shall in no case cause or create a nuisance to abutting property or to the public.

3. Before a pool is emptied, it shall be the owner's responsibility to notify either the Township Engineer or the Township Building Inspector and obtain his approval of the method of disposing of the water.

4. This ordinance shall take effect immediately upon passage and publication in accordance with law.

Attest: 
Joseph Catano, Municipal Clerk
Muriel M. Short, Mayor

NOTICE
NOTICE is hereby given that the foregoing Ordinance was introduced and passed upon First Reading at a Meeting of the Mayor and Council of the Township of Fairfield on June 23, 1997. Said Ordinance was given a Second Reading and Public Hearing and was considered for final adoption at a Meeting of said Governing Body at the Conference/Regular Meeting of July 14, 1997 and there having been no objections was adopted by that Governing Body and will become effective thereafter after final passage in the manner provided by Law.

Patricia E. Fahy
Deputy Municipal Clerk

REQUIRED INSPECTIONS:

Zoning/Engineering -- Site inspection prior to construction.
Building -- Inspection of excavation and form work.
Under-ground & above-ground electric including bonding.
Final inspection.

The undersigned do hereby certify that the rules and regulations listed herein are understood. In addition, the undersigned also acknowledge that any deviation from the approved plan, or regulations listed, without specific consent of the Township will be done at the risk of the property owner.

Address of Pool Location

Block __________ Lot __________

Property Owner - Type or Print

Property Owner - Signature

Contractor - Type or Print

Contractor - Signature

Date 10/91; Rev. 6/95 632 7/97

Attachments
NOTE:
1. All spot elevations to be based upon Township Datum NGVD 29.
2. Bench mark must be identified on survey.

SAMPLE SURVEY

TOWNSHIP OF FAIRFIELD

EXCESS EXCAVATED MATERIAL TO BE TAKEN OFF SITE AND OUT OF FLOOD PLAIN.

CONSTRUCT RETAINING WALL WITH STAINS, AS REQUIRED

OUTER EDGE POOL/SIDEWALK TO BE NO MORE THAN 6" ABOVE EXISTING GROUND

TYPICAL DETAIL NOT TO SCALE

IN - GROUND SWIMMING POOL
INSTALLATIONS IN REGULATED FLOOD PLAINS
The 2005 National Electrical Code (NEC) contains a gap in its requirements that would impact swimming pool safety. That gap has been closed, and the error corrected, by the issuing of a Tentative Interim Amendment (TIA) that revises the code language in Sections 680.26(C) and 680.26(C)(1) of the 2005 NEC. These sections contain the requirements for the Equipotential Bonding Grid for pools.

Because the TIA language was not included in the text of the 2005 NEC, it is not part of the Electrical Subcode in the Uniform Construction Code, N.J.A.C. 5:23-3.16, as adopted May 1, 2006. The language changes are below in bold, underlined type.

(C) Equipotential Bonding Grid. The parts specified in 680.26(B) shall be connected to an equipotential bonding grid with a solid copper conductor, insulated, covered, or bare, not smaller than 8 AWG or rigid metal conduit of brass or other identified corrosion-resistant metal conduit. Connection shall be made by exothermic welding or by listed pressure connectors or clamps that are labeled as being suitable for the purpose and are of stainless steel, brass, copper, or copper alloy. The equipotential bonding grid shall conform to the contours of the pool and shall extend within or under paved walking surfaces for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall be permitted to be any of the following:

Exception: The equipotential bonding grid shall not be required to be installed under the bottom of or vertically along the walls of vinyl lined polymer wall, fiberglass composite, or other pools constructed of nonconductive materials. Any metal parts of the pool, including metal structural supports, shall be bonded in accordance with 680.26(B). For the purposes of this section, poured concrete, pneumatically applied (sprayed) concrete, and concrete block, with painted or plastered coatings, shall be considered conductive material.

(1) Structural Reinforcing Steel. The structural reinforcing steel of a concrete pool or deck where the reinforcing rods are bonded together by the usual steel tie wires or the equivalent. Where deck reinforcing steel is not an integral part of the pool, the deck reinforcing steel shall be bonded to other parts of the bonding grid using a minimum 8 AWG solid copper conductor. Connection shall be per 680.26(D).

The Department of Community Affairs advises that, for new pools that are constructed during the six-month grace period immediately following the adoption of the 2005 NEC (until November 1, 2006), this TIA should be applied. An amendment to the Electrical Subcode implementing this TIA is forthcoming.

If you have any questions on this matter, you may reach me at (609) 984-7609.

Source: Suzanne Borek
Code Assistance Unit
ARTICLE 680
Swimming Pools, Fountains, and Similar Installations

Summary of Changes

680.8: Added new requirement that specified clearances be measured from the maximum water level.

680.12: Revised to require that the maintenance disconnecting means be "readily" accessible.

680.21(A)(1): Revised to require that the branch circuit equipment grounding conductor for swimming pool pump motors be insulated conductor.

680.21(A)(4): Revised to correlate with the change in 680.21(A) requiring insulated equipment grounding conductor for all wiring methods other than cable assemblies installed in the interior of a one-family dwelling.

680.23(B)(6): Added new requirement that luminaires be removable from the water for relamping or normal maintenance and that they be installed so that relamping, maintenance, or inspection can be accomplished from the deck or equivalently dry location.

680.23(E): Revised to clarify the purpose of the nonmetallic hub.

680.23(F)(1): Revised to permit Type MC cable where installed within a building as a branch circuit wiring method for underwater luminaires.

680.24(A)(1)(1) and (B)(1)(1): Revised to delete the text "listed for the purpose" associated with nonmetallic hubs.

680.25(B)(2): Revised to require that swimming pool feeder circuits comply with 250.32(B)(1) where run to a separate building or structure, and prohibits option of connecting the grounded conductor to a grounding electrode system at the second building or structure.

680.26(B)(1): Revised to clarify the conditions under which an alternative means for eliminating voltage gradient is required.

680.26(C): Changed title to "Equipotential" Bonding Grid. Conduit made of brass or other corrosion-resistant metal is permitted as a method for connecting metal parts of equipment to the equipotential bonding grid. The bonding grid is now required to extend at least 3 ft horizontally under paved walking surfaces. Subparagraph (3) revised to permit alternate means of creating equipotential bonding grid.

680.32: Added new text to provide GFCI protection requirement for all 125-volt receptacles located within 20 ft of a storable swimming pool and provides method by which to determine the proximity of receptacle outlets to a storable pool.

680.34: Added new requirement prohibiting all receptacles from within 10 ft of the storable pool, and provides method by which to determine the proximity of receptacle outlets to a storable pool.

680.51(A): Revised to specify types of equipment required to be GFCI protected.

680.57(A): Revised to clarify that section applies only to signs in a fountain or within 10 ft of a fountain edge.


680.74: Revised to delete portion of bonding requirement addressing double-insulated equipment.

Contents

I. General

680.1 Scope

680.2 Definitions

680.3 Other Articles

680.4 Approval of Equipment

680.5 Ground-Fault Circuit Interrupters

680.6 Grounding

680.7 Cord-and Plug-Connected Equipment

(A) Length

(B) Equipment Grounding

(C) Construction

680.8 Overhead Conductor Clearances

(A) Power

(B) Communications Systems

(C) Network-Powered Broadband Communications Systems

680.9 Electric Pool Water Heaters

680.10 Underground Wiring Location

680.11 Equipment Rooms and Pits

680.12 Maintenance Disconnecting Means

II. Permanently Installed Pools

680.20 General
680.21 Motors
(A) Wiring Methods
(B) Double Insulated Pool Pumps
680.22 Area Lighting, Receptacles, and Equipment
(A) Receptacles
(B) Luminaires (Lighting Fixtures), Lighting Outlets, and Ceiling-Suspended (Paddle) Fans
(C) Switching Devices
680.23 Underwater Luminaires (Lighting Fixtures)
(A) General
(B) Wet-Niche Luminaires (Fixtures)
(C) Dry-Niche Luminaires (Fixtures)
(D) No-Niche Luminaires (Fixtures)
(E) Through-Wall Lighting Assembly
(F) Branch-Circuit Wiring
680.24 Junction Boxes and Enclosures for Transformers or Ground-Fault Circuit Interrupters
(A) Junction Boxes
(B) Other Enclosures
(C) Protection
(D) Grounding Terminals
(E) Strain Relief
(F) Grounding
680.25 Feeders
(A) Wiring Methods
(B) Grounding
680.26 Equipotential Bonding
(A) Performance
(B) Bonded Parts
(C) Equipotential Bonding Grid
(D) Connections
(E) Pool Water Heaters
680.27 Specialized Pool Equipment
(A) Underwater Audio Equipment
(B) Electrically Operated Pool Covers
(C) Deck Area Heating
III. Storable Pools
680.30 General
680.31 Pumps
680.32 Ground Fault Circuit Interrupters Required
680.33 Luminaires (Lighting Fixtures)
(A) 15 Volts or Less
(B) Over 15 Volts But Not Over 150 Volts
680.34 Receptacle Locations
IV. Spas and Hot Tubs
680.40 General
680.41 Emergency Switch for Spas and Hot Tubs
680.42 Outdoor Installations
(A) Flexible Connections
(B) Bonding
(C) Interior Wiring to Outdoor Installations
680.43 Indoor Installations
(A) Receptacles
(B) Installation of Luminaires (Lighting Fixtures), Lighting Outlets, and Ceiling-Suspended (Paddle) Fans
(C) Wall Switches
(D) Bonding
(E) Methods of Bonding
(F) Grounding
(G) Underwater Audio Equipment
680.44 Protection
(A) Listed Units
(B) Other Units
(C) Combination Pool and Spa or Hot Tub
V. Fountains
680.50 General
680.51 Luminaires (Lighting Fixtures), Submersible Pumps, and Other Submersible Equipment
(A) Ground-Fault Circuit Interrupter
(B) Operating Voltage
(C) Luminaire (Lighting Fixture) Lenses
(D) Overheating Protection
(E) Wiring
(F) Servicing
(G) Stability
680.52 Junction Boxes and Other Enclosures
(A) General
(B) Underwater Junction Boxes and Other Underwater Enclosures
680.53 Bonding
680.54 Grounding
680.55 Methods of Grounding
(A) Applied Provisions
(B) Supplied by a Flexible Cord
680.56 Cord-and-Plug-Connected Equipment
(A) Ground-Fault Circuit Interrupter
(B) Cord Type
(C) Sealing
(D) Terminations
680.57 Signs
(A) General
(B) Ground-Fault Circuit-Interrupter Protection for Personnel
(C) Location
(D) Disconnect
(E) Bonding and Grounding
680.58 GFCI Protection for Adjacent Receptacle Outlets
VI. Pools and Tubs for Therapeutic Use
680.60 General
680.61 Permanently Installed Therapeutic Pools
680.62 Therapeutic Tubs (Hydrotherapeutic Tanks)
   (A) Protection
   (B) Bonding
   (C) Methods of Bonding
   (D) Grounding
   (E) Receptacles
   (F) Luminaires (Lighting Fixtures)

VII. Hydromassage Bathtubs

680.70 General
680.71 Protection
680.72 Other Electrical Equipment
680.73 Accessibility
680.74 Bonding

I. General

680.1 Scope
The provisions of this article apply to the construction and installation of electrical wiring for and equipment in or adjacent to all swimming, wading, therapeutic, and decorative pools; fountains; hot tubs; spas; and hydromassage bathtubs, whether permanently installed or storable, and to metallic auxiliary equipment, such as pumps, filters, and similar equipment. The term body of water used throughout Part I applies to all bodies of water covered in this scope unless otherwise amended.

Article 680 applies to decorative pools and fountains; swimming, wading, and wave pools; therapeutic tubs and tanks; hot tubs; spas; hydromassage bathtubs; and similar installations. The installations covered by this article can be indoors or outdoors, permanent or storable, and may or may not be directly supplied by electrical circuits of any nature. Requirements for natural and artificially made bodies of water not covered by Article 680 are contained in Article 682, new for the Code.

Studies conducted by Underwriters Laboratories, various manufacturers, and others indicate that a person in a swimming pool can receive a severe electric shock by reaching out and touching the energized casing of a faulty appliance — such as a radio or a hair dryer — as the person’s body, which due to immersion has a lower resistance to electric current, establishes a conductive path through the water to earth. Also, a person not in contact with a faulty appliance or any grounded object can receive an electric shock and be rendered immobile by a potential gradient in the water itself. This level of electrical current necessary to cause immobilization may not be fatal from an electrical shock perspective but is dangerous from an accidental drowning standpoint. Shock hazards in and around a swimming pool can result from faulty electrical equipment directly associated with the pool or from faulty electrical equipment not associated with but in close proximity to the pool.

Accordingly, the requirements of Article 680 covering effective bonding and grounding, installation of receptacles and luminaires, use of GFCIs, modified wiring methods, and so on, apply not only to the installation of the pool but also to installations and equipment adjacent to or associated with the pool.

Enhanced electric shock protection in this wet environment, where it is intended that people are immersed in bodies of water that also contain electrical equipment, is provided through one or more of the following means:

- GFCI protection and low-voltage equipment
- Double-insulated equipment
- Insulation and isolation
- Equipotential bonding
- Physical separation and restricted locations
- Robust physical protection requirements for circuit conductors

680.2 Definitions

Cord-and-Plug-Connected Lighting Assembly. A lighting assembly consisting of a luminaire (lighting fixture) intended for installation in the wall of a spa, hot tub, or storable pool, and a cord-and-plug-connected transformer.

Dry-Niche Luminaire (Lighting Fixture). A luminaire (lighting fixture) intended for installation in the wall of a pool or fountain in a niche that is sealed against the entry of pool water.

Equipment, Fixed. Equipment that is fastened or otherwise secured at a specific location.

Equipment, Portable. Equipment that is actually moved or can easily be moved from one place to another in normal use.

Equipment, Stationary. Equipment that is not easily moved from one place to another in normal use.

Forming Shell. A structure designed to support a wet-niche luminaire (lighting fixture) assembly and intended for mounting in a pool or fountain structure.

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

Hydromassage Bathtub. A permanently installed bathtub equipped with a recirculating piping system, pump, and associated equipment. It is designed so it can accept, circulate, and discharge water upon each use.
See the commentary following 680.71, 680.73, and 680.74.

**Maximum Water Level.** The highest level that water can reach before it spills out.

**No-Niche Luminaire (Lighting Fixture).** A luminaire (lighting fixture) intended for installation above or below the water without a niche.

**Packaged Spa or Hot Tub Equipment Assembly.** A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a spa or hot tub. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth.

The definition of **packaged spa or hot tub equipment assembly** clarifies which assemblies are subject to the requirements of 680.44.

**Packaged Therapeutic Tub or Hydrotherapeutic Tank Equipment Assembly.** A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a therapeutic tub or hydrotherapeutic tank. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth.

**Permanently Installed Decorative Fountains and Reflection Pools.** Those that are constructed in the ground, on the ground, or in a building in such a manner that the fountain cannot be readily disassembled for storage, whether or not served by electrical circuits of any nature. These units are primarily constructed for their aesthetic value and are not intended for swimming or wading.

**Permanently Installed Swimming, Wading, and Therapeutic Pools.** Those that are constructed in the ground or partially in the ground, and all others capable of holding water in a depth greater than 1.0 m (42 in.), and all pools installed inside of a building, regardless of water depth, whether or not served by electrical circuits of any nature.

See the commentary following Part VI, Pools and Tubs for Therapeutic Use.

**Swimming Pools, Fountains, and Similar Installations.**

The requirements for electrically operated pool covers are found in 680.27(B).

**Self-Contained Spa or Hot Tub.** Factory-fabricated unit consisting of a spa or hot tub vessel with all water-circulating, heating, and control equipment integral to the unit. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth.

The definition of **self-contained spa or hot tub** clarifies which assemblies are subject to the requirements of 680.44.

**Self-Contained Therapeutic Tubs or Hydrotherapeutic Tanks.** A factory-fabricated unit consisting of a therapeutic tub or hydrotherapeutic tank with all water-circulating, heating, and control equipment integral to the unit. Equipment may include pumps, air blowers, heaters, light controls, sanitizer generators, and so forth.

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

See the commentary following 680.41, 680.42, 680.43, and 680.44.

**Storable Swimming or Wading Pool.** Those that are constructed on or above the ground and are capable of holding water to a maximum depth of 1.0 m (42 in.), or a pool with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension.

See the commentary following 680.30 and Exhibit 680.16.

Originally, storable pools were not specifically addressed in the NEC. Article 680 was written to provide guidance relative to permanent, in-ground pools and their unique construction requirements because of the unusual earth-water-electricity-human body environment created in the finished product. The conductivity of moist concrete, steel handrails and diving-board stands, as well as 120-volt lights in the pool structure, all called for the strict wiring bonding, and grounding requirements of Article 680.

Storable pools, on the other hand, are intended to be temporary structures, without the need for special wiring.
Part III of Article 680 was created to address the special equipment specifications of storable pools, and Underwriters Laboratories developed testing and labeling criteria for listing the pump/filter units designed especially for these pools. This equipment has the following characteristics:

1. It must have an approved system of double insulation or the equivalent.
2. It is permitted to have a flexible cord equipped with a parallel-blade, grounding-type attachment plug for electrical connection.
3. It must have a grounding conductor included in the flexible cord.
4. The flexible cord is not limited to 3 ft, as required in 680.7, and is specified by UL to be not less than 25 ft long. This length was chosen to discourage the use of extension cords.

The UL labeling requirement for these listed units includes the wording “Do Not Use with Permanently Installed Pools.” In some cases, customers and swimming pool installers, however, have found it desirable to use these pump/filter units on any aboveground or on-ground pool, regardless of the pool’s dimensions or “storability.”

Storable pools are supplied as two distinct types. One type is intended to be disassembled at the end of each swimming season. The second type, by the nature of its construction, can be disassembled, but manufacturers recommend leaving it assembled. The pools in the latter category frequently require special modification to and preparation of the pool site, making them impractical to disassemble. Draining these pools, especially the larger ones, increases the likelihood of costly damage caused by shrinkage of the vinyl liner material.

The main factor differentiating the two types of pools is wall height. Generally, pools, other than the inflatable type, intended to be disassembled at season’s end have wall heights of 42 in. or less, while those not intended for disassembly have wall heights of 48 in. or more. The surface area of the pools is not a factor. Inflatable pools are treated as storable pools regardless of their wall height.

Through-Wall Lighting Assembly. A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall.

Wet-Niche Luminaire (Lighting Fixture). A luminaire (lighting fixture) intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire (fixture) will be completely surrounded by water.

680.3 Other Articles

Except as modified by this article, wiring and equipment in or adjacent to pools and fountains shall comply with other applicable provisions of this Code, including those provisions identified in Table 680.3.

Table 680.3 Other Articles

<table>
<thead>
<tr>
<th>Topic</th>
<th>Section or Article</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring</td>
<td>Chapters 1-4</td>
</tr>
<tr>
<td>Junction box support</td>
<td>314.23</td>
</tr>
<tr>
<td>Rigid nonmetallic conduit</td>
<td>352.12</td>
</tr>
<tr>
<td>Audio Equipment</td>
<td>Article 640, Parts I and II</td>
</tr>
<tr>
<td>Adjacent to pools and fountains</td>
<td>640.10</td>
</tr>
<tr>
<td>Underwater speakers*</td>
<td>-</td>
</tr>
</tbody>
</table>

*Underwater loudspeakers shall be installed in accordance with 680.27(A).

Note that 314.23 (E) specifies the requirements for the support of threaded boxes that do not contain devices and that 352.12 (B) does not permit luminaires or most other electrical equipment to be supported by rigid nonmetallic conduit. Exhibit 680.1 shows a properly supported junction box for...
Electrical equipment shall be grounded with Article 250. For example, an outdoor receptacle installed to meet the requirements of 680.22(A)(3) is permitted to be wired with Type UF cable containing an insulated or bare conductor for equipment grounding purposes. Circuits for pools may be derived from an existing remote panelboard supplied by an approved cable assembly, as specified in 680.25(A). Exception. The requirements of 680.6 permit Type UF cable to be used for the receptacle required by 680.22(A)(3) and for some pool-related equipment, but circuit conductors for underwater lighting fixtures are required to be run in raceways. Circuit conductors for pool-associated motors other than flexible cord, as permitted by 680.7, are required to be installed in raceways except in the interior of one-family dwelling units, where any raceway or cable assembly permitted by Chapter 3 is acceptable if the equipment grounding conductor is at least 12 AWG copper and is enclosed by the wiring method.

Equipment grounding requirements are contained in 680.6, 680.21(A)(1), 680.23(F)(2), and 680.25(B). These requirements specify that equipment grounding conductor be connected to non-current-carrying metal parts of the specified equipment. These equipment grounding conductors are required to be run with the circuit conductors in rigid metallic conduit, intermediate conduit, listed MC cable (for motors only), or rigid nonmetallic conduit (electrical metallic tubing is permitted in or on buildings, and electrical nonmetallic tubing is permitted inside buildings), and they must be terminated at the grounding terminal bus of the service panelboard, the source of the separately derived system, or the subpanel. This equipment grounding conductor provides a path of low impedance that limits the voltage to ground and facilitates operation of the circuit overcurrent protective device(s). The equipment grounding conductor is required to be an insulated copper conductor not smaller than 12 AWG.

The requirements of 680.6, 680.21(A)(1), 680.23(F)(2), and 680.25(B) are in addition to the bonding requirements in 680.26. The intent of the bonding requirements is to establish an equipotential grid that establishes an equipotential grounding system, and they do not have to be run to the equipment grounding terminals of panelboards or service equipment.

680.7 Cord-and-Plug-Connected Equipment
Fixed or stationary equipment other than an underwater luminaire (lighting fixture) for a permanently installed pool
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.8 shall be permitted to be connected with a flexible cord to facilitate the removal or disconnection for maintenance or repair.

(A) Length: For other than storable pools, the flexible cord shall not exceed 900 mm (3 ft) in length.

(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.

(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.

In some climates, it is preferable to disconnect and remove a permanent pool’s filter pump during cold-weather months. A 3-ft cord is permitted to facilitate the removal of fixed or stationary equipment for maintenance and storage. The 3-ft cord limitation does not apply to cord-and-plug-connected filter pumps used with storable-type pools (covered in Part III of Article 680), since these pumps are neither fixed nor stationary. Listed filter pumps for use with storable pools are considered portable and are permitted to be equipped with cords longer than 3 ft.

680.8 Overhead Conductor Clearances

Overhead conductors shall meet the clearance requirements in this section. Where a minimum clearance from the water level is given, the measurement shall be taken from the maximum water level of the specified body of water.

(A) Power: With respect to service drop conductors and open overhead wiring, swimming pool and similar installations shall comply with the minimum clearances given in Table 680.8 and illustrated in Figure 680.8.

(B) Communications Systems: Communication, radio, and television coaxial cables within the scope of Articles 800 through 820 shall be permitted at a height of not less than 3.0 m (10 ft) above swimming and wading pools, diving structures, and observation stands, towers, or platforms.

(C) Network-Powered Broadband Communications Systems: The minimum clearances for overhead network-
powered broadband communications systems conductors from pools or fountains shall comply with the provisions in Table 680.8 for conductors operating at 0 to 750 volts to ground.

Service drop conductors, conductors of network-powered broadband communications systems, and aerial feeders and branch circuits are permitted to be located above a swimming pool and associated pool structures where provided with the clearances specified in Table 680.8. Overhead conductors of communications systems are required to comply with 680.8(B). These clearances consider such factors as the use of skimmers with aluminum handles and provide sufficient separation between the conductors and the pool. In some instances, locating a swimming pool below electric conductors is unavoidable, for example, on a building lot with limited area or an existing lot where the electric supply lines are already in place. The clearances for conductors from pools and pool structures were increased in the 1999 Code to harmonize the NEC with ANSI C2, National Electrical Safety Code (NESC). The maximum water level of the body of water (pool, spa, hot tub, or other) is used to determine compliance with 680.8. For the definition of maximum water level, see 680.2.

680.9 Electric Pool Water Heaters
All electric pool water heaters shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not over 60 amperes. The ampacity of the branch-circuit conductors and the rating or setting of overcurrent protective devices shall not be less than 125 percent of the total nameplate-rated load.

680.10 Underground Wiring Location
Underground wiring shall not be permitted under the pool or within the area extending 1.5 m (5 ft) horizontally from the inside wall of the pool unless this wiring is necessary to supply pool equipment permitted by this article. Where space limitations prevent wiring from being routed 1.5 m (5 ft) or more from the pool, such wiring shall be permitted where installed in rigid metal conduit, intermediate metal conduit, or nonmetallic raceway system. All metal conduit shall be corrosion resistant and suitable for the location. The minimum burial depth shall be as given in Table 680.10.

This section allows wiring within 5 ft of the inside walls of the swimming pool under two conditions. The first condition permits wiring to pool-associated equipment such as an underwater luminaire. The second condition permits wiring not associated with the pool within this area where spatial constraints such as property lines preclude the 5-ft minimum separation. Under the second condition, underground wiring located within the 5-ft zone is required to be installed in rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit and must be buried to a depth not less than that required by Table 680.10 for those permitted wiring methods. Beyond the 5-ft zone, the minimum cover requirements of Table 300.5 apply to the underground wiring methods used for circuits rated 600 volts and less.

As indicated by the title of this section ("Underground Wiring Location"), the focus of 680.10 is to mitigate shock hazards that may occur as a result of a faulty or damaged underground installation that is in close proximity to the swimming pool. Due to water splashing out of the pool and water dripping off those who have been in the pool, the area within 5 ft of the inside walls is generally the wettest location; as a result, electrical leakage from underground installations presents a greater shock hazard in this continuously wet environment.

680.11 Equipment Rooms and Pits
Electric equipment shall not be installed in rooms or pits that do not have drainage that adequately prevents water accumulation during normal operation or filter maintenance.

680.12 Maintenance Disconnecting Means
One or more means to 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.

A readily accessible disconnecting means is required to be located within sight of pool, spa, and hot tub equipment in order to provide service personnel with the ability to safely disconnect power while servicing equipment such as motors, heaters, and control panels. Underwater luminaires are not subject to this requirement. See Exhibit 680.2.
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.22 Required pool equipment disconnect. The disconnect for pool equipment must be located within sight of the pool equipment and at least 5 ft from the pool.

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
(A) Wiring Methods
(1) General The branch circuits for pool-associated motors shall be installed in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or Type MC cable listed for the location. Other wiring methods and materials shall be permitted in specific locations or applications as covered in this section. Any wiring method employed shall contain an insulated copper equipment grounding conductor sized in accordance with 250.122 but not smaller than 12 AWG.

Type MC cable listed for the application is permitted as a wiring method for swimming pool motor circuits. This listing requirement ensures that the MC cable is suitable for the environmental and installation conditions typically encountered with swimming pool pump motors. Type MC cables listed for installation in direct sunlight or direct burial are marked to indicate suitability for such applications.

Other than cable assemblies installed on the interior of a one-family dwelling per 680.21(A)(4), wiring methods used for the supply circuit to a swimming pool pump motor must include an insulated, copper equipment grounding conductor not less than 12 AWG.

(2) On or Within Buildings Where installed on or within buildings, electrical metallic tubing shall be permitted.

(3) Flexible Connections Where necessary to employ flexible connections at or adjacent to the motor, liquidtight flexible metal or nonmetallic conduit with approved fittings shall be permitted.

(4) One-Family Dwellings In the interior of one-family dwellings, or in the interior of accessory buildings associated with a one-family dwelling, any of the wiring methods recognized in Chapter 3 of this Code that comply with the provisions of this paragraph shall be permitted. Where run in a cable assembly, the equipment grounding conductor shall be permitted to be uninsulated, but it shall be enclosed within the outer sheath of the cable assembly.

(5) Cord-and-Plug Connections Pool-associated motors shall be permitted to employ cord-and-plug connections. The flexible cord shall not exceed 900 mm (3 ft) in length. The flexible cord shall include an equipment grounding conductor sized in accordance with 250.122 and shall terminate in a grounding-type attachment plug.

(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 bonding grid is connected to the equipment grounding conductor of the motor circuit in accordance with the second paragraph of 680.26(B)(4), the branch circuit wiring shall comply with 680.21(A).

Cord-and-plug-connected double-insulated swimming pool filter pumps have been used with permanently installed aboveground pools and some in-ground pools, regardless of the pool’s size, for many years without any known field-related problems. The internal metal parts of a swimming pool filter 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), since the act of bonding compromises the double-insulation system.

680.22 Area Lighting, Receptacles, and Equipment

(A) Receptacles
(1) 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 3.0 m (10 ft) from the inside walls of the pool, or not less than 1.5 m (5 ft) from the inside walls of the pool if they meet all of the following conditions:
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.22

(1) Consist of single receptacles
(2) Employ a locking configuration
(3) Are of the grounding type
(4) Have GFCI protection

(2) Other Receptacles, Location Other receptacles shall be not less than 3.0 m (10 ft) from the inside walls of a pool.

(3) Dwelling Unit(s) Where a permanently installed pool is installed at a dwelling unit(s), no fewer than one 125-volt 15- or 20-ampere receptacle on a general-purpose branch circuit shall be located not less than 3.0 m (10 ft) from, and not more than 6.0 m (20 ft) from, the inside wall of the pool. This receptacle shall be located not more than 2.0 m (6 ft 6 in.) above the floor, platform, or grade level serving the pool.

(4) Restricted Space Where a pool is within 3.0 m (10 ft) of a dwelling and the dimensions of the lot preclude meeting the required clearances, not more than one receptacle outlet shall be permitted if not less than 1.5 m (5 ft) measured horizontally from the inside wall of the pool.

(5) GFCI Protection All 15- and 20-ampere, single-phase, 125-volt receptacles located within 6.0 m (20 ft) of the inside walls of a pool shall be protected by a ground-fault circuit interrupter. Receptacles that supply pool pump motors and that are rated 15 or 20 amperes, 125 volts through 250 volts, single phase, shall be provided with GFCI protection.

All single-phase, 15- and 20-ampere, 125-volt through 250-volt receptacles that supply swimming pool pump motors are required to have GFCI protection. While this requirement applied only to installations at other than dwellings in the 1999 Code, the 2002 Code was revised to require GFCI protection of these receptacles for all swimming pool installations. It should be noted that 680.22(A)(5) applies to these receptacles regardless of their proximity to the swimming pool and that it applies only to cord-and-plug-connected pump motors.

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

The requirements of 680.22(A) apply to receptacles located near a permanently installed pool or fountain. They do not apply to direct-connected equipment. Permission is given in 680.22(A)(1) to allow a single locking- and grounding-type receptacle to supply a recirculation pump motor where the receptacle is located not less than 5 ft from the inside walls of the pool or fountain and is protected by a GFCI.

As required by 680.22(A)(3), each permanently installed pool in a residential setting is required to have at least one receptacle, which must be located at least 10 ft from the pool and not more than 20 ft from the pool. The intent of this requirement is to permit ordinary appliances to be safely plugged in and used near the pool but to avoid the need for extension cords in the vicinity of the pool. The 10-ft minimum dimension was chosen so that an appliance with a 6 ft cord could not be accidentally knocked into the pool.

The provision of 680.22(A)(5) covers receptacle outlet installation at dwelling units where the spatial constraints prevent locating the required receptacle 10 ft or more from the inside walls of the pool. Where this condition exists, one GFCI-protected receptacle is permitted to be located closer than 10 ft but not less than 5 ft from the inside walls of the pool.

GFCI protection of all 125-volt receptacles located within 20 ft of a pool or fountain is required by 680.22(A)(5). This rule applies to pools located outdoors or indoors, permanently installed or storable, and for residential or commercial-use. Since people within 20 ft of a pool are normally subject to dampness and moisture, the GFCI requirement within the 20-ft space is warranted.

Examples of receptacles meeting the requirements of 680.22(A) are shown in Exhibits 680.3 and 680.4. Exhibit 680.5 illustrates that the determination of the minimum distance for receptacles from a pool does not include receptacles within a structure. The receptacles within the structure are permitted to be less than 10 ft from the pool. Where this installation is at a dwelling unit, it is necessary to provide at least one receptacle between 10 ft and 20 ft from the inside walls of the pool. This location precludes having to run the cord of an appliance used on the pool deck through a doorway.

(B) Luminaires (Lighting Fixtures), Lighting Outlets, and Ceiling-Suspended (Paddle) Fans

(1) New Outdoor Installation Clearances In outdoor pool areas, luminaires (lighting fixtures), lighting outlets, and ceiling-suspended (paddle) fans installed above the pool or the area extending 1.5 m (5 ft) horizontally from the inside walls of the pool shall be installed at a height not less than 3.7 m (12 ft) above the maximum water level of the pool.

(2) Indoor Clearances For installations in indoor pool areas, the clearances shall be the same as for outdoor areas unless modified as provided in this paragraph. If the branch circuit supplying the equipment is protected by a ground-fault circuit interrupter, the following equipment shall be permitted at a height not less than 2.3 m (7 ft 6 in.) above the maximum pool water level:
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.23 Locking- and grounding-type single receptacle Required 125 V, 15 A or 20 A for pools to supply pool pump motor installed at dwellings unless separated from the pool by a solid fence, wall, or other permanent barrier. Alternatively, a switch that is listed as being acceptable for use within 1.5 m (5 ft) shall be permitted.

Panelboards containing circuit breakers, time clocks, pool light switches, and similar switching devices, where located not less than 5 ft horizontally from the inside walls of a pool without a solid fence, wall, or other permanent barrier, must be out of reach of persons who are in the pool, thereby preventing contact and possible shock hazards.

680.23 Underwater Luminaires (Lighting Fixtures)

This section covers all luminaires (lighting fixtures) installed below the normal water level of the pool.

(A) General

(1) Luminaires (Fixture) Design, Normal Operation The design of an underwater luminaire (lighting fixture) supplied from a branch circuit either directly or by way of a transformer meeting the requirements of this section shall be such that, where the luminaire (fixture) is properly installed without a ground-fault circuit interrupter, there is no shock hazard with any likely combination of fault conditions during normal use (not relamping).

Dry-niche, no-niche, or wet-niche underwater luminaires operating at more than 15 volts require GFCI protection. See the commentary following 680.5.

Branch-circuit conductors for dry-niche fixtures are re-
I. Permitted receptacle location less than 10 ft from the inside wall of a permanently installed pool. The minimum distance required by 680.22(A) does not apply to a receptacle located in a structure.

(2) Transformers. Transformers used for the supply of underwater luminaires (fixtures), together with the transformer enclosure, shall be listed as a swimming pool and spa transformer. The transformer shall be an isolated winding type with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings. Unless marked otherwise, UL-listed swimming pool and spa transformers are not suitable for connection to a conduit that extends directly to an underwater pool light housing. Swimming pool and spa transformers are not permitted to be used outdoors unless marked "For Outdoor Use" or in an equivalent manner that signifies that they have been found acceptable for both outdoor and indoor use. See 110.3(B).

(3) GFCI Protection, Relamping. A ground-fault circuit interrupter shall be installed in the branch circuit supplying luminaires (fixtures) operating at more than 15 volts such that there is no shock hazard during relamping. The installation of the ground-fault circuit interrupter shall be such that there is no shock hazard with any likely fault-condition combination that involves a person in a conductive pad of the branch circuit or the luminaires (fixture) to ground.

(4) Voltage Limitation. No luminaires (lighting fixtures) shall be installed for operation on supply circuits over 150 volts between conductors.

(5) Location, Wall-Mounted Luminaires (Fixtures). Luminaires (lighting fixtures) mounted in walls shall be
Article 680 — Swimming Pools, Fountains, and Similar Installations

Exhibit 680.6 Limitations that apply to the placement of luminaires, lighting outlets, and ceiling-suspended fans in the area surrounding outdoor and indoor pools.

Outdoor Pools

- Luminaires, lighting outlets, and ceiling-suspended (paddle) fans permitted above 12 ft.
- Luminaires, lighting outlets, and ceiling-suspended (paddle) fans not permitted below 12 ft.
- Existing luminaires and lighting outlets permitted if protected by a GFCI.
- Luminaires and lighting outlets permitted if rigidly attached.

Indoor Pools

- Luminaires, lighting outlets, and ceiling-suspended (paddle) fans permitted above 12 ft.
- Totally enclosed luminaires protected by a GFCI and ceiling-suspended (paddle) fans protected by a GFCI permitted above 7 1/2 ft.
- Luminaires, lighting outlets, and ceiling-suspended (paddle) fans not permitted below 5 ft.
- Existing luminaires and lighting outlets permitted if rigidly attached to existing structure (GFCI required).
- Luminaires and lighting outlets permitted if protected by a GFCI.
- Luminaires and lighting outlets permitted if rigidly attached.

Installed with the top of the luminaire (fixture) less not less than 450 mm (18 in.) below the normal water level of the pool, unless the luminaire (lighting fixture) is listed and identified for use at lesser depths. No luminaire (fixture) shall be installed less than 100 mm (4 in.) below the normal water level of the pool.

The reason for the 18-in. minimum submergence requirement is to reduce the likelihood that a person in the water and hanging onto the side of the pool directly over the fixture will have his or her chest in line with the fixture. This section covers fixtures that have been investigated and found acceptable for use where a person's chest may be directly in front of the fixture. The highest level of leakage current in the pool coming from a wet-niche fixture with a broken lens and bulb is found directly in front of the fixture.

(6) Bottom-Mounted Luminaires (Fixtures) A luminaire (lighting fixture) facing upward shall have the lens adequately guarded to prevent contact by any person.

(7) Dependence on Submersion Luminaires (fixtures) that depend on submersion for safe operation shall be inherently protected against the hazards of overheating when not submerged.

Fixtures that depend on submersion for safe operation are required to be inherently protected against the hazards of overheating when not submerged, for example, during a relamping process. Protection against overheating is required to be built into a fixture or to be a part of it. A remotely located low-water cutoff switch does not provide the intended protection.

(8) Compliance Compliance with these requirements shall be obtained by the use of a listed underwater luminaire (lighting fixture) and by installation of a listed ground-fault circuit interrupter in the branch circuit or a listed transformer for luminaires (fixtures) operating at not more than 15 volts.

(B) Wet-Niche Luminaires (Fixtures)

(1) Forming Shells Forming shells shall be installed for the mounting of all wet-niche underwater luminaires (fixtures) and shall be equipped with provisions for conduit entries. Metal parts of the luminaire (fixture) and forming
680.23 Article 680—Swimming Pools, Fountains, and Similar Installations

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.

(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.

(a) Metal Conduit. Metal conduit shall be approved and shall be of brass or other approved corrosion-resistant metal.

(b) 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.

Where rigid nonmetallic conduit or liquidtight flexible nonmetallic conduit is used between a forming shell for a wet-niche fixture and a junction box or other enclosure, 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. The conduit must be sized large enough to enclose both the 8 AWG insulated copper bonding jumper and the approved flexible cord that supplies the wet-niche fixture, to facilitate easy withdrawal and insertion of the bonding conductor and the cord. Low-voltage lighting systems are exempt from this equipment grounding conductor requirement.

(3) Equipment Grounding Provisions for Cords Wet-niche luminaires (lighting fixtures) that are supplied by a flexible cord or cable shall have all exposed non-current-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a ground-fault circuit-interrupter enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG.

(4) Luminaires (Fixtures) Grounding Terminations The end of the flexible-cord jacket and the flexible-cord conductor terminations within a luminaire (fixture) shall be covered with, or encapsulated in, a suitable potting compound to prevent the entry of water into the luminaire (fixture) through the cord or its conductors. In addition, the grounding connection within a luminaire (fixture) shall be similarly treated to protect such connection from the deteriorating effect of pool water in the event of water entry into the luminaire (fixture).

Custom swimming pool installations where the pool is incorporated as an architectural feature of a building or structure can present access problems for those who have to change the lamps of an underwater luminaire. In some cases, the length of the flexible cord connected to a wet-niche luminaire does not permit the luminaire to be removed from the pool for relamping or servicing. To address the concern over a person having to be in the pool in order to change lamps, this new requirement specifies that the underwater luminaire installation has to be made so that changing of the lamp can occur on the deck or equivalently dry location.

(C) Dry-Niche Luminaires (Fixtures)

(1) Construction A dry-niche luminaire (lighting fixture) shall be provided with a provision for drainage of water and a means for accommodating one equipment grounding conductor for each conduit entry.

(2) Junction Box A junction box shall not be required but, if used, shall not be required to be elevated or located as specified in 680.24(A)(2) if the luminaire (fixture) is specifically identified for the purpose.

(D) No-Niche Luminaires (Fixtures) A no-niche luminaire (fixture) shall meet the construction requirements of 680.23(B)(3) and be installed in accordance with the requirements of 680.23(B). Where connection to a forming shell is specified, the connection shall be to the mounting bracket.

(E) Through-Wall Lighting Assembly A through-wall lighting assembly shall be equipped with a threaded entry or hub, or a nonmetallic hub, for the purpose of accommodating the termination of the supply conduit. A through-wall lighting assembly shall meet the construction requirements.
of 680.23(B)(3) and shall be installed in accordance with the requirements of 680.23. Where connection to a forming shell is specified, the connection shall be to the conduit termination point.

(f) Branch-Circuit Wiring

(1) Wiring Methods Branch-circuit wiring on the supply side of enclosures and junction boxes connected to conduits run to wet-niche and no-niche luminaires (fixtures), and the field wiring compartments of dry-niche luminaires (fixtures), shall be installed using rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or rigid nonmetallic conduit. Where installed on buildings, electrical metallic tubing shall be permitted, and where installed within buildings, electrical nonmetallic tubing, Type MC cable, or electrical metallic tubing shall be permitted.

Exception: Where connecting to transformers for pool lights, liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit shall be permitted. The length shall not exceed 1.8 m (6 ft) for any one length or exceed 3.0 m (10 ft) in total length used. Liquidtight flexible nonmetallic conduit, Type B (LFNC-B), shall be permitted in lengths longer than 1.8 m (6 ft).

(2) Equipment Grounding Through-wall lighting assemblies, wet-niche, dry-niche, or no-niche luminaires (lighting fixtures) shall be connected to an insulated copper equipment grounding conductor installed with the circuit conductors. The equipment grounding conductor shall be installed without joint or splice except as permitted in (F)(2)(a) and (F)(2)(b). The equipment grounding conductor shall be sized in accordance with Table 250.122 but shall not be smaller than 12 AWG.

Exception: An equipment grounding conductor between the wiring chamber of the secondary winding of a transformer and a junction box shall be sized in accordance with the overcurrent device in this circuit.

(a) If more than one underwater luminaire (lighting fixture) is supplied by the same branch circuit, the equipment grounding conductor, installed between the junction boxes, transformer enclosures, or other enclosures in the supply circuit to wet-niche luminaires (fixtures), or between the field-wiring compartments of dry-niche luminaires (fixtures), shall be permitted to be terminated on grounding terminals.

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

See the commentary following 680.23(A)(2).

(3) Conductors Conductors on the load side of a ground-fault circuit interrupter or of a transformer, used to comply with the provisions of 680.23(A)(8), shall not occupy raceways, boxes, or enclosures containing other conductors unless one of the following conditions applies:

(1) The other conductors are protected by ground-fault circuit interrupters.
(2) The other conductors are grounding conductors.
(3) The other conductors are supply conductors to a feed-through type ground-fault circuit interrupter.
(4) Ground-fault circuit interrupters shall be permitted in a panelboard that contains circuits protected by other than ground-fault circuit interrupters.

680.24 Junction Boxes and Enclosures for Transformers or Ground-Fault Circuit Interrupters

(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 (fixture) shall meet the requirements of this section.

(1) Construction The junction box shall be listed as a swimming pool junction box and shall comply with the following conditions:

(a) Be equipped with threaded entries or hubs or a nonmetallic hub
(b) 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

(2) Installation Where the luminaire (fixture) operates over 15 volts, the junction box location shall comply with (A)(2)(a) and (A)(2)(c). Where the luminaire (fixture) operates at less than 15 volts, the junction box location shall be permitted to comply with (A)(2)(c).

(a) Vertical Spacing. The junction box shall be located not less than 100 mm (4 in.), measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 200 mm (8 in.) above the maximum pool water level, whichever provides the greater elevation.
(b) Horizontal Spacing. The junction box shall be located not less than 1.2 m (4 ft) from the inside wall of the pool, unless separated from the pool by a solid fence, wall, or other permanent barrier.
(c) **Flush Deck Box.** If used on a lighting system operating at 15 volts or less, a flush deck box shall be permitted if both of the following apply:

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 1.2 m (4 ft) from the inside wall of the pool.

(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 (fixture) shall meet the requirements of this section.

1. **Construction** The enclosure shall be listed and labeled for the purpose and meet the following requirements:
   - Equipped with threaded entries or hubs or a nonmetallic hub
   - Comprised of copper, brass, suitable plastic, or other approved corrosion-resistant material
   - Provided with an approved seal, such as duct seal at the conduit connection, that prevents circulation of air between the conduit and the enclosures
   - Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass, or other approved corrosion-resistant metal that is integral with the box

2. **Installation**
   - **(a) Vertical Spacing.** The enclosure shall be located not less than 100 mm (4 in.), measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 200 mm (8 in.) above the maximum pool water level, whichever provides the greater elevation.
   - **(b) Horizontal Spacing.** The enclosure shall be located not less than 1.2 m (4 ft) from the inside wall of the pool, unless separated from the pool by a solid fence, wall, or other permanent barrier.

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

(D) **Grounding Terminals** Junction boxes, transformer 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 (fixture) shall be provided with a number of grounding terminals that shall be no fewer than one more than the number of conduit entries.

(E) **Strain Relief** The termination of a flexible cord of an underwater luminaire (lighting fixture) within a junction box, transformer enclosure, ground-fault circuit interrupter, or other enclosure shall be provided with a strain relief.

(F) **Grounding** The junction box, transformer enclosure, or other enclosure in the supply circuit to a wet-niche or no-niche luminaire (lighting fixture) and the field-wiring chamber of a dry-niche luminaire (lighting fixture) shall be grounded to the equipment grounding terminal of the panelboard. This terminal shall be directly connected to the panelboard enclosure.

The requirements in 680.24(A) through 680.24(F) cover the construction and installation of boxes and enclosures associated with underwater luminaires. Boxes and enclosures used for the supply wiring to wet-niche and no-niche underwater luminaires must be listed for the purpose by a recognized testing laboratory. The provisions of 680.24(D) ensure the availability of integral grounding terminals necessary for the grounding and bonding of underwater luminaires. A box that is listed but not specifically for use with swimming pools does 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.

In an installation where nonmetallic conduit is the wiring method between the wet-niche forming shell and the deck (junction) box, a bonding jumper and an equipment grounding conductor in that conduit must be terminated in the junction box. The bonding jumper is covered in 680.23(B)(2)(b). The use of nonmetallic conduit requires the installation of an insulated, copper bonding jumper in that section of conduit between the deck box and the wet-niche forming shell. This conductor can be solid or stranded and must not be smaller than 8 AWG. The function of this conductor is twofold. 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 equipment grounding conductor of the circuit that supplies the wet-niche luminaire. Additionally, this conductor 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, as is typically done during relamping. Damage to the wet-niche luminaire supply cord could result in this ground-fault scenario.

The equipment grounding conductor is the one contained in the flexible cord supplying the wet-niche luminaire. In accordance with 680.23(B)(3), this conductor is required to be insulated, copper, and sized no smaller than the circuit conductors within the cord, but not smaller than 16 AWG.

In addition to the bonding jumper and equipment grounding conductor of the cord contained in the section of nonmetallic conduit between the forming shell and the deck box, the wiring method from the deck box to the power source is also required to contain a separate equipment grounding conductor. This equipment grounding conductor is required by 680.23(F)(2) and must be insulated, copper.
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.24(A)(2) Equipotential Bonding

680.25 Feeders

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

(A) Wiring Methods Feeders shall be installed in rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or rigid nonmetallic conduit. Electrical metallic tubing shall be permitted where installed on or within a building, and electrical nonmetallic tubing shall be permitted where installed within a building.

Exception: An existing feeder between an existing remote panelboard and service equipment shall be permitted to run in flexible metal conduit or an approved cable assembly that includes an equipment grounding conductor within its outer sheath. The equipment grounding conductor shall comply with 250.24(A)(5).

(B) Grounding An equipment grounding conductor shall be installed with the feeder conductors between the grounding terminal of the pool equipment panelboard and the grounding terminal of the applicable service equipment or source of a separately derived system. For other than (1) existing feeders covered in 680.25(A), Exception, or (2) feeders to separate buildings that do not utilize an insulated equipment grounding conductor in accordance with 680.25(B)(2), this equipment grounding conductor shall be insulated.

(1) Size This conductor shall be sized in accordance with 250.122 but not smaller than 12 AWG. On separately derived systems, this conductor shall be sized in accordance with Table 250.66 but not smaller than 8 AWG.

(2) Separate Buildings A feeder to a separate building or structure shall be permitted to supply swimming pool equipment branch circuits, or feeders supplying swimming pool equipment branch circuits, if the grounding arrangements in the separate building meet the requirements in 250.32(B)(1). Where installed in other than existing feeders covered in 680.25(A), Exception, a separate equipment grounding conductor shall be an insulated conductor.

The insulated equipment grounding conductor can be aluminum or copper and is required to be installed in a raceway. It should be understood that for an existing remote panelboard, the 680.25(A) Exception permits an approved cable assembly with an insulated or covered aluminum or copper equipment grounding conductor. See Exhibit 680.8.

Swimming pool equipment supplied by a separately derived system is covered in 680.25(B). Where a remote panelboard supplying a pool is supplied by a separately derived system, the rules covering the grounding conductor apply only to the feeder between the separately derived system and the panelboard, not all the way back to the service, which might be high voltage.

The general rule in 680.25(B) requires an equipment grounding conductor to be installed between a panelboard serving swimming pool equipment and the service or the source of a separately derived system. Added in the 1999 Code. 680.25(B)(2) allows pool equipment to be supplied from a remote panelboard in a separate building where an insulated equipment grounding conductor is installed with the feeder circuit conductors run from the service (or derived system) to the panelboard and the installation complies with 250.32(B)(1). See Exhibit 680.9.

680.26 Equipotential Bonding

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

FPN: The 8 AWG or larger solid copper bonding conductor shall not be required to be extended or attached to any remote panelboard, service equipment, or any electrode.
Article 680 — Swimming Pools, Fountains, and Similar Installations

Exhibit 680.8 An existing remote panelboard supplying new pool equipment. A race-way is not required for this application if the existing feeder wiring method contains an insulated or covered equipment grounding conductor.

Exhibit 680.9 Grounding requirements per 680.25(B)(2) for remote panelboard and swimming pool equipment located in a structure remote from the service equipment.

It is important to understand the difference between the terms bonding and grounding as they apply to Article 680. As defined in Article 100, bonding is "the permanent joining of metallic parts to form an electrically conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed." As described in 680.26(A), the function of equipotential bonding differs from the function of bonding to meet the requirements of Article 250 in that providing a path for ground fault current is not the function of the equipotential bonding grid and associated bonding conductors.

Creating an electrically safe environment in and around permanently installed swimming pools requires the installation of a bonding system with the sole function of establishing equal electrical potential (voltage) in the vicinity of the swimming pool. A person who is immersed in a pool who is dripping wet, has a large amount of exposed skin and is lying or walking on a concrete deck is extremely susceptible to any differences in electrical potential that may be present in the pool area.

The primary purpose of bonding in and around swimming pools is to ensure that voltage gradients in the pool area are not present. The fine print note explains that the AWG conductor's only function is equipotential bonding to eliminate the voltage gradient in the pool area.

The reason for connecting metal parts (ladders, handrails, water-circulating equipment, forming shells, diving boards, etc.) to a common bonding grid (pool reinforcing steel, pool metal wall, or an alternative bonding grid as described in 680.26(C)(3)) is to ensure that all such metal parts are at the same electrical potential. The grid reduces possible injurious or disabling shock hazards created by stray currents in the ground or piping connected to the swimming pool. Stray currents can also exist in nonmetallic piping because of the low resistivity of chlorinated water. See Exhibit 680.10.
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.26

Exhibit 680.10 Bonding in a swimming pool.

(8) Bonded Parts The parts specified in 680.26(B)(1) through (B)(5) shall be bonded together.

The metal parts required to be bonded per 680.26(B) 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, which include conduit and piping, metal door frames, and metal window frames, within 5 ft of the inside walls of the pool and not separated by a permanent barrier. The bonding of these parts does not mean they are required to be connected to each other; rather, it means they are required to be connected to a common bonding grid by using an insulated, covered, or bare solid copper conductor not smaller than 8 AWG or by listed pressure connectors, clamps, or other listed means, in accordance with 250.8.

Metallic Structural Components All metallic parts of the pool structure, including the reinforcing metal of the pool shell, coping stones, and deck, shall be bonded. The usual steel tie wires shall be considered suitable for bonding the reinforcing steel together, and welding or special clamping shall not be required. These tie wires shall be made tight. If reinforcing steel is effectively insulated by an encapsulating nonconductive compound at the time of manufacture and installation, it shall not be required to be bonded. Where reinforcing steel of the pool shell or the reinforcing steel of coping stones and deck is encapsulated with a non-conductive compound or another conductive material is not available, provisions shall be made for an alternative means to eliminate voltage gradients that would otherwise be provided by unencapsulated, bonded reinforcing steel.

Encapsulated reinforcing steel might not provide the conductivity necessary to establish the required common bonding grid. A common bonding grid will not be formed if the steel is effectively encapsulated by a listed compound during installation and manufacturing. Therefore, a bonding connection to the encapsulated reinforcing steel is not required for this type of application. See Exhibit 680.12.

In Exhibit 680.13, the structural reinforcing steel serves as the common bonding grid to which all metal apparatuses associated with the pool are connected. Safety-rope hooks are not required to be bonded, as specified in 680.26(B)(3). The flush deck box meets the provisions of 680.24(A).

(2) Underwater Lighting All metal forming shells and mounting brackets of no-niche luminaires (fixtures) shall be bonded unless a listed low-voltage lighting system with nonmetallic forming shells not requiring bonding is used.

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

(4) 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. Accessible metal parts of listed equipment incorporating an approved system of double insulation and providing a means for grounding internal nonaccessible, non-current-carrying metal parts shall not be bonded by a direct connection to the equipment bonding grid. The means for grounding internal nonaccessible, non-current carrying metal parts shall be an equipment grounding conductor run with the power-supply conductors in the case of motors supplied with a flexible cord, or a grounding terminal in the case of motors intended for permanent connection.

Where a double-insulated water-pump motor is installed under the provisions of this rule, a solid 8 AWG copper conductor that is of sufficient length to make a bonding connection to a replacement motor shall be extended from the bonding grid to an accessible point in the motor vicinity. Where there is no connection between the swimming pool bonding grid and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit.
Exhibit 680.12 Epoxy-coated rebar, which does not require bonding.

(5) Metal Wiring Methods and Equipment Metal-sheathed cables and raceways, metal piping, and all fixed metal parts that are within the following distances of the pool, except those separated from the pool by a permanent barrier, shall be bonded.

Examples of fixed metal parts bound by this requirement include metal fences, metal awnings, metal door frames, and metal window frames.

(1) Within 1.5 m (5 ft) horizontally of the inside walls of the pool

(2) Within 3.7 m (12 ft) measured vertically above the maximum water level of the pool, or any observation stands, towers, or platforms, or any diving structures.

(C) Equipotential Bonding Grid The parts specified in 680.26(B) shall be connected to an equipotential bonding grid with a solid copper conductor, insulated, covered, or bare, not smaller than 8 AWG or rigid metal conduit of brass or other identified corrosion-resistant metal conduit. Connection shall be made by exothermic welding or by listed pressure connectors or clamps that are labeled as being suitable for the purpose and arc of stainless steel, brass, copper, or copper alloy. The equipotential common bonding grid shall extend under paved walking surfaces for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall be permitted to be any of the following:

The requirements for creating the equipotential bonding grid are substantially revised in the 2005 Code. First, the use of an 8 AWG, solid copper conductor or brass rigid metal conduit as the equipotential bonding grid is no longer recognized. This change precludes, for example, the use of an 8 AWG solid copper conductor encircling the pool perimeter as an equipotential bonding grid. The 8 AWG conductor and/or the metal conduit can be used as the method for connecting electrical and nonelectrical equipment to the bonding grid. Exhibit 680.14 illustrates the use of brass rigid metal conduit or other corrosion-resistant metal conduit as.
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.26

Exhibit 680.13 A poured-concrete pool with structural reinforcing steel that serves as the common bonding grid.

(a) means to connect electrical equipment, such as the forming shell of a wet niche luminaire, to a common bonding grid comprised of the pool reinforcing steel.

The second change regarding the types of permitted equipotential bonding grids is the recognition of a field-fabricated bonding structure that can be employed in the absence of structural reinforcing steel (which could be a result of nonconductive encapsulation) or bolted or welded metal pool walls. This "alternate means" as described in 680.26(C)(3) is required to "cover the contour" of the pool. What that means is that the field-fabricated bonding grid has to cover the entire outside outline of the pool structure, as would be the case with reinforcing steel or with bolted or welded metal walls. In addition to covering the pool contour, the bonding grid is required to extend horizontally into the deck area for not less than 3 ft. This 3-ft horizontal extension for the pool deck is required for all pool installations, including those with exposed reinforcing steel and those with bolted or metal walls (see Exhibit 680.14).

(1) Structural Reinforcing Steel. The structural reinforcing steel of a concrete pool where the reinforcing rods are bonded together by the usual steel tie wires or the equivalent

(2) Bolted or Welded Metal Pools. The wall of a bolted or welded metal pool

(3) Alternate Means. This system shall be permitted to be constructed as specified in (a) through (c):

a. Materials and Connections. The grid shall be constructed of minimum 8 AWG bare solid copper conductors. Conductors shall be bonded to each other at all points of crossing. Connections shall be made as required by 680.26(D).

b. Grid Structure. The equipotential bonding grid shall cover the contour of the pool and the pool deck extending 1 m (3 ft) horizontally from the inside walls of the pool. The equipotential bonding grid shall be arranged in a 300 mm (12 in.) by 300 mm (12 in.) network of conductors in a uniformly spaced

Exhibit 680.14 Brass rigid metal conduit used as a means to connect electrical equipment to the common bonding grid.
perpendicular grid pattern with tolerance of 100 mm (4 in.).

c. Securing. The below-grade grid shall be secured within or under the pool and deck media.

(D) Connections Where structural reinforcing steel or the walls of bolted or welded metal pool structures are used as an equipotential bonding grid for nonelectrical parts, the connections shall be made in accordance with 250.8.

As specified in 250.8 for the grounding and bonding connections required by Article 250, exothermic welding, pressure connectors and clamps specifically listed for the purpose, and other listed means are permitted as the method of connecting swimming pool bonding conductors to a common bonding grid. Connections in pool areas must be suitable for wet conditions and high levels of chlorine. High concentrations of chlorine in swimming pool water make the wet locations in the vicinity of swimming pool areas (including many pool pump rooms) a corrosive environment. The integrity of the bonding connections should be periodically inspected, particularly those bonding connections between the 8 AWG copper conductor and, for instance, an aluminum (or other dissimilar metal) ladder.

See Exhibit 680.15 for an illustration of two acceptable methods of making swimming pool bonding connections.

(E) 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.

680.27 Specialized Pool Equipment

(A) Underwater Audio Equipment All underwater audio equipment shall be identified for the purpose.

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

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

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

(B) Electrically Operated Pool Covers

(1) Motors and Controllers The electric motors, controllers, and wiring shall be located not less than 1.5 m (5 ft) from the inside wall of the pool unless separated from the pool by a wall, cover, or other permanent barrier. Electric motors installed below grade level shall be of the totally enclosed type. The device that controls the operation of the motor for an electrically operated pool cover shall be located such that the operator has full view of the pool.

FPN No. 1: For cabinets installed in damp and wet locations, see 312.2(A).
FPN No. 2: For switches or circuit breakers installed in wet locations, see 404.4.
FPN No. 3: For protection against liquids, see 430.11.

(2) Protection The electric motor and controller shall be connected to a circuit protected by a ground-fault circuit interrupter.
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.33

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

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

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

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

Only unit heaters and permanently connected radiant heaters are permitted in the area that extends 5 ft to 20 ft horizontally from the inside walls of a pool. Radiant heat cables embedded in the deck are not permitted.

III. Storable Pools

680.30 General

Electrical installations at storable pools shall comply with the provisions of Part I and Part III of this article.

Storable pools can be readily disassembled and are limited (other than inflatable type) to a maximum water depth of 42 in. Pools of any dimension with inflatable walls are considered storable. See the definition of storable swimming or wading pool in 680.2. This type of pool and its associated equipment do not require bonding conductors. However, the filter pump must be double insulated, and the provision of grounding means consisting of an equipment grounding conductor that is an integral part of the flexible cord also is required. There are portable filter pumps for use with storable pools listed by Underwriters Laboratories. All electrical equipment used with a storable pool is required to have GFCI protection for personnel. Exhibit 680.16 illustrates the requirements for a storable-type pool.

680.31 Pumps

A cord-connected pool filter pump shall incorporate an approved system of double insulation or its equivalent and shall be provided with means for grounding only the internal and nonaccessible non-current-carrying metal parts of the appliance. The means for grounding shall be an equipment grounding conductor run with the power-supply conductors in the flexible cord that is properly terminated in a grounding-type attachment plug having a fixed grounding contact member.

680.32 Ground-Fault Circuit Interrupters Required

All electrical equipment, including power-supply cords, used with storable pools shall be protected by ground-fault circuit interrupters.

All 125-volt receptacles located within 6.0 m (20 ft) of the inside walls of a storable pool shall be protected by a ground-fault circuit interrupter. In determining these dimensions, the distance to be measured shall be the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

FPN: For flexible cord usage, see 400.4.

680.33 Luminaires (Lighting Fixtures)

An underwater luminaire (lighting fixture), if installed, shall be installed in or on the wall of the storable pool. It shall comply with either 680.33(A) or 680.33(B).

(A) 15 Volts or Less A luminaire (lighting fixture) shall be part of a cord-and-plug-connected lighting assembly. This
680.34 Receptacle Locations

Receptacles shall not be less than 3.0 m (10 ft) from the inside walls of a pool. In determining these dimensions, the distance to be measured shall be the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, door or sliding door, window opening, or other effective permanent barrier.

IV. Spas and Hot Tubs

680.40 General

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

680.41 Emergency Switch for Spas and Hot Tubs

A clearly labeled emergency shutoff or control switch for the purpose of stopping the motor(s) that provide power to the recirculation system and jet system shall be installed at a point readily accessible to the users and not less than 1.5 m (5 ft) away, adjacent to, and within sight of the spa or hot tub. This requirement shall not apply to single-family dwellings.

The provisions of 680.41 require a local disconnecting device for spas and hot tubs that is capable of being used in an emergency. This requirement was added to address entrapment hazards associated with spas and hot tubs. The definitive publication on this issue, Guideline for Entrapment Hazards: Making Pools and Spas Safer (Pub. No. 363), is available from the U.S. Consumer Product Safety Commission, Washington, DC 20207, or on-line at www.cpsc.gov.

The emergency shutoff switch must be installed within sight of and at least 5 ft from the spa or hot tub and must be clearly labeled “Emergency Shutoff.” See Exhibit 680.17 for an illustration of the switch location. The shutoff switch may be either a line-operated device or a remote-control circuit that causes the pump circuit to open. This requirement does not apply to single-family dwellings.

680.42 Outdoor Installations

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

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

(1) Flexible Conduit Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit shall be permitted in lengths of not more than 1.8 m (6 ft).

The use of liquidtight flexible metal or nonmetallic conduit is permitted by 680.41(A)(1). This modifies the requirements for wiring methods in 680.25(A).

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

(B) Bonding Bonding by metal-to-metal mounting on a common frame or base shall be permitted. The metal bands or hoops used to secure wooden staves shall not be required to be bonded as required in 680.26.

(C) Interior Wiring to Outdoor Installations In the interior of a one-family dwelling or in the interior of another building or structure associated with a one-family dwelling.
Article 680 — Swimming Pools, Fountains, and Similar Installations

680.17 Location of the emergency shutoff device required by 680.41.

Switch labeled as emergency shutoff

680.43 Indoor Installations

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

Exception: Listed spa and hot tub packaged units rated 20 amperes or less shall be permitted to be cord-and-plug connected to facilitate the removal or disconnection of the unit for maintenance and repair.

(A) Receptacles At least one 125-volt, 15- or 20-ampere receptacle on a general-purpose branch circuit shall be located not less than 1.5 m (5 ft) from, and not exceeding 3.0 m (10 ft) from, the inside wall of the spa or hot tub.

(1) Location Receptacles shall be located at least 1.5 m (5 ft) measured horizontally from the inside walls of the spa or hot tub.

(2) Protection, General Receptacles rated 125 volts and 20 amperes or less and located within 3.0 m (10 ft) from the inside walls of a spa or hot tub shall be protected by a ground-fault circuit interrupter.

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

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

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

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

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

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

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

(1) Recessed luminaires (fixtures) with a glass or plastic lens, nonmetallic or electrically isolated metal trim, and suitable for use in damp locations

(2) Surface-mounted luminaires (fixtures) with a glass or plastic globe, a nonmetallic body, or a metallic body insulated from contact, and suitable for use in damp locations
680.44 Protection

Except as otherwise provided in this section, the outlet(s) that supplies a self-contained spa or hot tub, a packaged spa or hot tub equipment assembly, or a field-assembled spa or hot tub shall be protected by a ground-fault circuit interrupter. The requirements of 680.44 specify that field-assembled spas and hot tubs with heater loads of 50 amperes or less are to be GFCI protected. Spas and hot tubs utilizing voltages over 250 volts or 3-phase power are not required to have GFCI protection because GFCI devices are not available in all voltage, amperage, and phasing arrangements. Combination spa-pool or hot-tub-pool installations are not required to have GFCI protection if they share a common bonding grid.

(A) Listed Units If so marked, a listed self-contained unit or listed packaged equipment assembly that includes integral ground-fault circuit-interrupter protection for all electrical parts within the unit or assembly (pumps, air blowers, heaters, lights, controls, sanitizer generators, wiring, and so forth) shall be permitted without additional GFCI protection.

(B) Other Units A field-assembled spa or hot tub rated 3 phase or rated over 250 volts or with a heater load of more than 50 amperes is required to have GFCI protection.
than 50 amperes shall not require the supply to be protected by a ground-fault circuit interrupter.

(C) Combination Pool and Spa or Hot Tub A combination pool/hot tub or spa assembly commonly bonded need not be protected by a ground-fault circuit interrupter.

FPN: See 680.2 for definitions of self-contained spa or hot tub and for packaged spa or hot tub equipment assembly.
EXAMPLE OF SKETCH FOR PROPOSED ELECTRICAL FOR ABOVE GROUND POOL

20 Amp. breaker
12-2 Romex

weather tight junction box on rear outside of house.
PVC conduit

18" below grade top of pipe

12 gauge THHN in conduit 18" below ground

200 AMP svc. (in basement) mark the circuit breaker

10'-20' from pool. GFI Conv. outlet need good support. 4x4 volminized post, angle iron, rocket post, etc.

5'-10' from pool, 20AMP twist lock recept. GFI with in use cover.

BONDING LUG MUST BE SUITABLE FOR DIRECT BURIAL OR "DB" STAMPED ON LUG.

No splice allowed underground.

Need a piece of #8 solid copper wire from metal of pool to bonding lug on pool motor.
PERMIT APPLICATION

DATE OF APPLICATION: ___________  BLOCK: ___________  LOT: ___________

APPLICATION #: ___________________  PROPERTY OWNER: ___________________

DATE OF PERMIT: ___________________  ADDRESS: ___________________

WORK SITE LOCATION: ___________________  TELEPHONE #: ___________________

ZONING DISTRICT: ___________________  TENANT: ___________________

TENANT TELEPHONE #: ___________________

( ) FENCE: Type ___________________  Height ___________________  Yard Location ___________________
   *Require copy of survey with fence location

( ) SHED (up to 100 s.f.) Length ___________  Width ___________  Height: ___________
   *Require copy of survey with shed location

( ) POOL INGROUND – (SEE BLDG. DEPT FOR OTHER PERMIT REQUIREMENTS)

( ) POOL (above ground) Diameter ___________  Height ___________  Fence: Y/N ___________
   *Require copy of survey with pool location

( ) SIGN: PERMANENT ___________  TEMPORARY ___________  TEMPORARY BANNER ___________
   WALL SIGN: Length ___________  X Width ___________  Total s.f. face of Bldg ___________
   FREE STANDING: Length ___________  Height ___________  Height from ground to top ___________
   Width of front of property ___________  Sign fronts on what street ___________

   Sign Message: ___________________

   Name, Address & Phone No. of Realtor or Sign Co. ___________________

   *Require drawings showing signs and location

Real estate signs shall not exceed 32 s.f. in surface area if single faced or 64 s.f. if double faced.
Overall height not to exceed 6 feet. All signs must be 15 ft. off property line.

( ) FEE: ___________  CHECK #: ___________  CASH ___________  DEPOSIT #: ___________

Revised: 08/14/03
C:/W/zonpermappl