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2006

Portable Swimming Pools - A Message from the State Building Inspector

STATE OF CONNECTICUT
Department of Public Safety
1111 Country Club Road
Middletown, Connecticut
06457

Contact:
860-685-8230
pio.dps@po.state.ct.us

FOR IMMEDIATE
RELEASE

PORTABLE SWIMMING POOLS AND THE STATE BUILDING CODE

Now that the summer months are upon us, we're all trying to find a way to beat the heat. With the cost of energy these days, a reasonable solution seems to be a portable swimming pool for the kids to splash around in. A variety of retail establishments sell portable pools these days and they seem to be a cheap solution to providing comfort and recreation. Problem is, if the pool is capable of holding more than 24 inches of water, the State Building Code requires a permit and a code-compliant barrier around the pool. Since very few retail establishments advertise this, you may be in for a big surprise when your local building official tells you that the $ 179 blow-up pool you just bought requires a barrier around it that also includes alarms on the doors to your home if the wall of the house is part of the barrier. Since the physical characteristics of a pool barrier differ greatly from the average back-yard fence, don't assume a fenced yard lets you off the hook. Every year a child drowns in a tragic accident involving an unprotected pool. Avoid a needless tragedy, make sure your pool is protected! For answers to your questions, consult your local building department or call the office of the State Building Inspector at (860) 685-8310.

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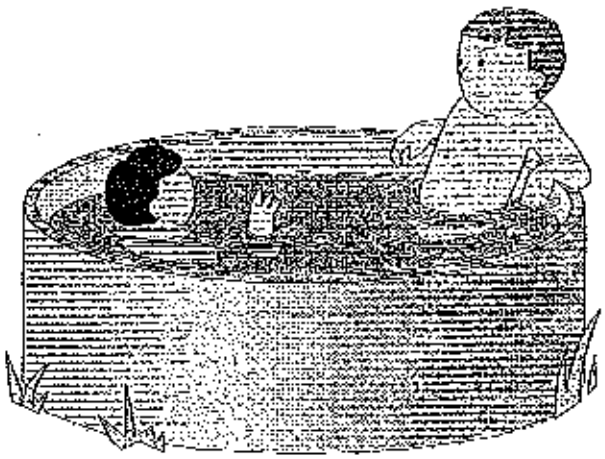
PRIVATE SWIMMING POOL AND SPA/HOT TUB INFORMATION PACKAGE



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- and 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, aboveground and on-ground swimming pools, hot tubs and spas. *In Accordance with Section R105.2 prefabricated swimming pools that are less than 24 inches deep are exempt from permit requirements.*

SWIMMING POOL, INDOOR. A swimming pool which is totally contained within a structure and surrounded on all four sides by walls of said 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. Aboveground 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.

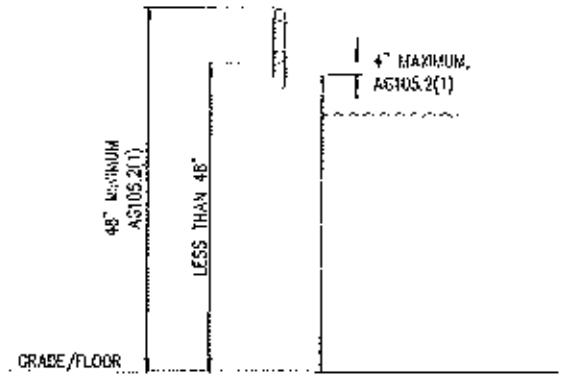
AG104.2 Portable spas and hot tubs. Portable spas and hot tubs shall be designed and constructed in conformance with ANSI/NSPI-6 as listed in Section AG108.

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. 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 in-ground, aboveground or on-ground pool, hot tub or spas shall be provided with a barrier that shall comply with the following:

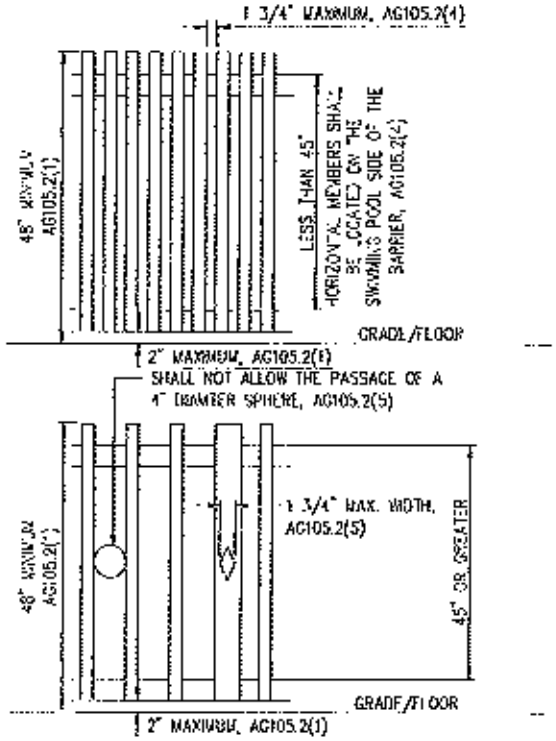
1. The top of the barrier shall be at least 48 inches above grade measured on the side of the barrier that faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches measured on the side of the barrier which faces away from the swimming pool. Where the top of the pool structure is above grade, such as an aboveground pool, the barrier may be at ground level, such as the pool structure, or mounted on top of the pool structure. Where the barrier is mounted on top of the pool structure, the maximum vertical clearance between the top of the pool structure and the bottom of the barrier shall be 4 inches.



2. Openings in the barrier shall not allow passage of a 4-inch-diameter sphere.

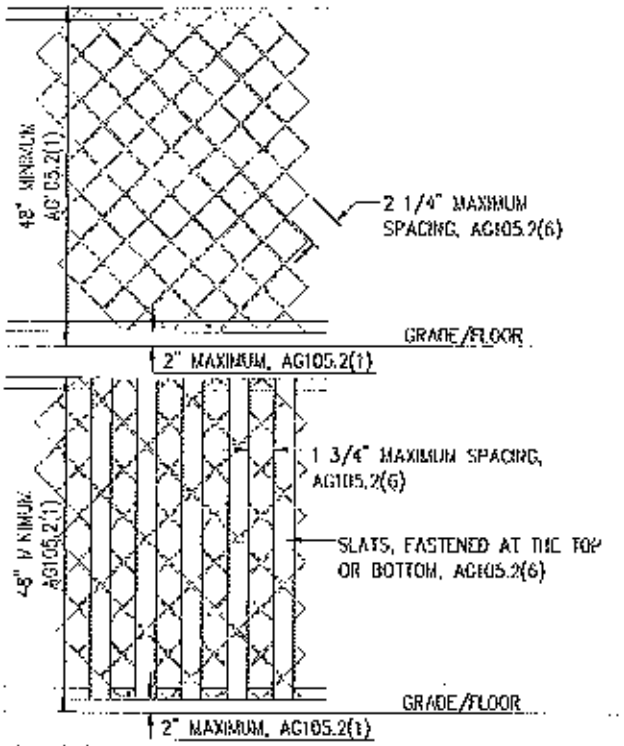
3. Solid barriers that do not have openings, such as masonry or stone walls, shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.

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, the horizontal members shall be located on the swimming pool side of the barrier. Spacing between vertical members shall not exceed 1 3/4 inches in width. Where there are decorative cutouts within vertical or horizontal members, spacing within the cutouts shall not exceed 1 3/4 inches in width.

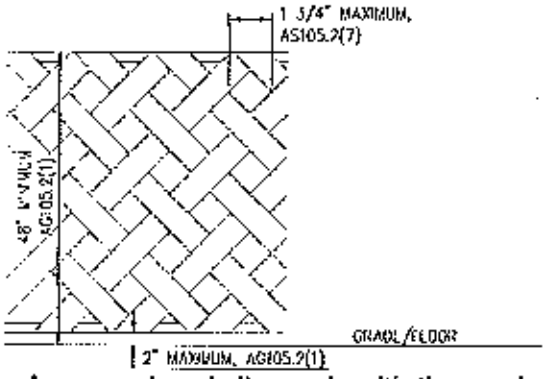


5. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches or more, spacing between vertical members shall not allow passage of a 4 inch diameter sphere. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 3/4 inches in width.

6. Maximum mesh size for chain link fences shall be a 2 ¼ inch square unless the fence is provided with slats fastened at the top or the bottom which reduce the openings to not more than 1 ¾ inches.

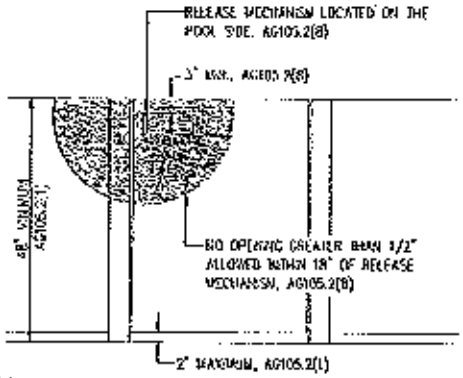


7. Where the barrier is composed of diagonal members, such as a lattice fence, the maximum opening formed by the diagonal members shall not be more than 1 3/4 inches.



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 from the bottom of the gate, the release mechanism and

surrounding openings shall comply with the following: The release mechanism shall be located on the pool side of the gate at least 3 inches below the top of the gate, and the gate and barrier shall have no opening greater than 1/2 inch within 18 inches of the release mechanism.



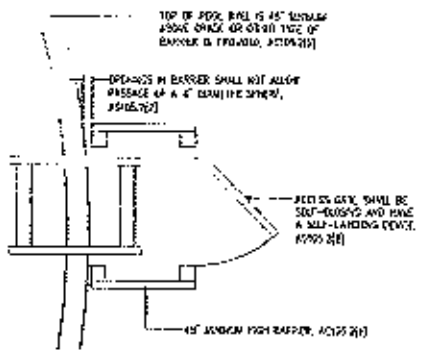
9. Where a wall of a dwelling serves as part of the barrier one of the following conditions shall be met:

   9.1. The pool shall be equipped with a power safety cover in compliance with ASTM F1346-91; or

   9.2. All doors with direct access to the pool through that wall shall be equipped with an alarm that produces an audible warning when the door and its screen, if present, are opened. The alarm shall sound continuously for a minimum of 30 seconds within 7 seconds after the door and its screen, if present, are opened and be capable of being heard throughout the house during normal activities. The alarm shall automatically reset under all conditions. The alarm system shall be equipped with a manual means, such as touchpad or switch, to temporarily deactivate the alarm for a single opening. Such deactivation shall last for not more than 15 seconds. The deactivation switch(es) shall be located at least 54 inches above the threshold of the door; or

   9.3. All doors with direct access to the pool through that wall shall be equipped with a self-closing and self-latching device with the release mechanism located a minimum of 54 inches above the door threshold. Swinging doors shall open away from the pool area.

10. Where an aboveground or on-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, then the ladder or steps shall be surrounded by a barrier which meets the requirements of Section AG105.2 Items 1 through 9.



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

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

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.

AG105.6 Temporary enclosure. A temporary enclosure shall be installed prior to the commencement of the installation of any in-ground swimming pool unless the permanent barrier specified in Section AG105.2 is in place prior to the commencement of the installation. The temporary enclosure shall be a minimum of 4 feet in height, shall have no openings that will allow passage of a 4-inch sphere and shall be equipped with a positive latching device on any openings.

AG105.7 Pool alarm. No building permit shall be issued for the construction or substantial alteration of a swimming pool at a residence occupied by, or being built for, one or more families unless a pool alarm is installed with the swimming pool. As used in this section, "pool alarm" means a device that emits a sound of at least 50 decibels when a person or an object weighing 15 pounds or more enters the water in a swimming pool.

Exception: Hot tubs and portable spas shall be exempt from this requirement.

SECTION AG106
ENTRAPMENT PROTECTION FOR SWIMMING POOL AND SPA SUCTION OUTLETS

AG106.1 General. Suction outlets shall be designed to produce circulation throughout the pool or spa. Single outlet systems, such as automatic vacuum cleaner systems, or other such multiple suction outlets whether isolated by valves or otherwise shall be protected against user entrapment.

AG106.2 Suction fittings. All Pool and Spa suction outlets shall be provided with a cover that conforms with ANSI/ASME A112.19.8M, or a 12" x 12" drain grate or larger, or an approved channel drain system.

Exception: Surface skimmers

AG106.3 Atmospheric vacuum relief system required. All pool and spa single or multiple outlet circulation systems shall be equipped with atmospheric vacuum relief should grate covers located therein become missing or broken. Such vacuum relief systems shall include at least one approved or engineered method of the type specified herein, as follows:

1. Safety vacuum release system conforming to ASME A112.19.17, or

2. An approved gravity drainage system

AG106.4 Dual drain separation. Single or multiple pump circulation systems shall be provided with a minimum of two (2) suction outlets of the approved type. A minimum horizontal or vertical distance of three (3) feet shall separate such outlets. These suction outlets shall be piped so that water is drawn through them simultaneously through a vacuum relief-protected line to the pump or pumps.

AG106.5 Pool cleaner fittings. Where provided, vacuum or pressure cleaner fitting(s) shall be located in an accessible position(s) at least (6) inches and not greater than twelve (12) inches below the minimum operational water level or as an attachment to the skimmer(s).

SECTION AG107
ABBREVIATIONS

AG107.1 General.

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

ASTM—American Society for Testing and Materials 1916 Race Street, Philadelphia, PA 19103

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

SECTION AG108
STANDARDS

AG108.1 General.

ANSI/NSPI

ANSI/NSPI-3-99 Standard for Permanently Installed Residential Spas AG104.1

ANSI/NSPI-4-99 Standard for Above-ground/On-ground Residential Swimming Pools AG103.2

ANSI/NSPI-5-03 Standard for Residential In-ground Swimming Pools AG103.1

ANSI/NSPI-6-99 Standard for Residential Portable Spas AG104.2

ANSI/ASME A112.19.8M-1987 Suction (R1996) Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathing Appliances AG106.2

ASTM

ASTM F 1346-91 (2003) Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs AG105.2, AG105.5

ASME

ASME A112.19.17 2002 Manufacturers Safety Vacuum Release Systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub and Wading Pool AG106.3

2003
INTERNATIONAL ENERGY CONSERVATION CODE

504.3 Swimming pools. Swimming pools shall be provided with energy-conserving measures in accordance with Section 504.3.1 through 504.3.3.

504.3.1 On-off switch. All pool heaters shall be equipped with an ON-OFF switch mounted for easy access to allow shutting off the operation of the heater without adjusting the thermostat setting and to allow restarting without relighting the pilot light.

504.3.2 Pool covers. Heated swimming pools shall be equipped with a pool cover.

> **Exception:** Outdoor pools deriving more than 20 percent of the energy for heating from renewable sources (computed over an operating season) are exempt from this requirement.

504.3.3 Time clocks. Time clocks shall be installed so that the pump can be set to run in the off-peak electric demand period and can be set for the minimum time necessary to maintain the water in a clear and sanitary condition in keeping with applicable health standards.

Chapter 41
SWIMMING POOLS

E4101
GENERAL

E4101.1 Scope. The provisions of this chapter shall apply to the construction and installation of electric wiring and equipment associated with all swimming pools, wading pools, decorative pools, fountains, hot tubs and spas, and hydro massage bathtubs, whether permanently installed or storable, and shall apply to metallic auxiliary equipment, such as pumps, filters and similar equipment. Sections E4102 through E4106 provide general rules for permanent pools, spas and hot tubs. Section E4107 provides specific rules for storable pools. Section E4108 provides specific rules for spas and hot tubs. Section E4109 provides specific rules for hydro massage bathtubs.

E4101.2 Definitions.

CORD- AND PLUG-CONNECTED LIGHTING ASSEMBLY. A lighting assembly consisting of a cord and plug connected transformer and a lighting fixture intended for installation in the wall of a spa, hot tub, or storable pool.

DRY-NICHE LUMINAIRE. A luminaire intended for installation in the wall of a pool or fountain in a niche that is sealed against the entry of pool water.

FORMING SHELL. A structure designed to support a wet niche 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.

MAXIMUM WATER LEVEL. The highest level that water can reach before it spills out.

NO-NICHE LUMINAIRE. A luminaire 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 may include pumps, air blowers, heaters, luminaires, controls and sanitizer generators.

PERMANENTLY INSTALLED SWIMMING AND WADING POOLS. Those that are constructed in the ground or partially in the ground, and all others capable of holding water with a depth greater than 42 inches (1067 mm), and all pools installed inside of a building, regardless of water depth, whether or not served by electrical circuits of any nature.

POOLCOVER, ELECTRICALLY OPERATED. Motor-driven equipment designed to cover and uncover the water surface of a pool by means of a flexible sheet or rigid frame.

SELF-CONTAINED SPA OR HOT TUB. A factory-fabricated unit consisting of a spa or hot tub vessel with all water-circulating, heating and control equipment integral to the unit. Equipment may include pumps, air blowers, heaters, luminaires, controls and sanitizer generators.

SPA OR HOT TUB. A hydro massage 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. They are 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.

STORABLE SWIMMING OR WADING POOL. Those that are constructed on or above the ground and are capable of holding water with a maximum depth of 42 inches (1067 mm), or a pool with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension.

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. A luminaire intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire will be completely surrounded by water.

E4102
WIRING METHODS FOR POOLS, SPAS, HOT TUBS AND HYDROMASSAGE BATHTUBS

E4102.1 General. Wiring methods used in conjunction with permanently installed swimming pools, spas, hot tubs or hydro massage bathtubs shall be installed in accordance with Table E4102.1 and Chapter 37 except as otherwise stated in this section. Storable swimming pools shall comply with Section E4107.

E4102.2 Flexible cords. Flexible cords used in conjunction with a pool, spa, hot tub or hydro massage bathtub shall be installed in accordance with the following:

1. For other than underwater luminaires, fixed or stationary equipment, rated at 20 amperes or less shall be permitted to be connected with a flexible cord to facilitate the removal or

disconnection for maintenance or repair. For other than storable pools, the flexible cord shall not exceed 3 feet (914 mm) in length. Cords that supply swimming pool equipment, shall have a copper equipment grounding conductor not smaller than 12 AWG and shall be provided with a grounding-type attachment plug.

2. Flexible cord that is supplied as part of a listed underwater swimming pool lighting luminaire shall be permitted to be installed in any of the permitted wiring methods from the luminaire to a deck box or other enclosure. Splices shall not be made within a raceway. The equipment grounding conductor shall be an insulated copper conductor that is not smaller than the supply conductors and not smaller than 16 AWG.

3. A listed packaged spa or hot tub installed outdoors that is GFCI protected, shall be permitted to be cord and plug connected provided that such cord does not exceed 15 feet (4572 mm) in length.

4. A listed packaged spa or hot tub rated at 20 amperes or less and installed indoors shall be permitted to be cord and plug connected to facilitate maintenance and repair.

5. For other than underwater and storable pool lighting luminaire, the requirements of Item1 shall apply to any cord equipped luminaire that is located within 16 feet (4877 mm) radially from any point on the water surface.

TABLE E4102.1
ALLOWABLE APPLICATIONS FOR WIRING METHODS [a, b, c, d, e, f, g]

WIRING LOCATION OR PURPOSE	AC, FMC, NM, SR, SE[B]	EMT[C]	ENT[B]	IMC, RMC, RNC	LFMC	LFNMC	UF	MC	Flex Cord[D]
Panelboard(s) that supply pool equipment: from service equipment to panelboard	A[E]	A	-	A	-	A	A[E]	A[E]	A
Wet-niche and no-niche luminaires: from branch circuit OCPD to deck or junction box	-	A	A	A	-	A	-	-	-
Wet-niche and no-niche luminaires: from deck or junction box to forming shell	-	-	-	A[D]	-	A	-	-	A
Dry niche: from branch circuit OCPD to luminaires	-	A	A	A	-	A	-	-	-
Pool-associated motors: from branch circuit OCPD to motor	A	A	A	A	A[F]	A[F]	A[B]	A	A
Packaged or self-contained outdoor spas and hot tubs with underwater luminaire: from branch circuit OCPD to spa or hot tub	-	A	A	A	-	A[F]	-	-	A
Packaged or self-contained outdoor spas and hot tubs without underwater luminaire: from branch circuit OCPD to spa or hot tub	A	A	A	A	A[F]	A	A[F]	A[B]	A
Indoor spa and hot tubs, hydromassage bathtubs, and other pool, spa or hot tub associated equipment: from branch circuit OCPD to equipment	A	A	A	A	A	A	A	A	A

For SI: 1 foot = 304.8 mm.

a. For all wiring methods, see Section E4105.2 for equipment grounding conductor requirements.
b. Limited to use within buildings.
c. Limited to use on or within buildings.
d. Metal conduit shall be constructed of brass or other approved corrosion resistant metal.
e. Permitted only for existing feeder panelboards where the equipment grounding conductor is insulated or covered.
f. Limited to use in lengths not to exceed 3 feet at pool, spa or hot tub equipment where flexibility is necessary.
g. Flexible cord shall be installed in accordance with Section E4102.2.

E4103
EQUIPMENT LOCATION AND CLEARANCES

E4103.1 Receptacle outlets. Receptacles outlets shall be installed and located in accordance with Sections E4103.1.1 through E4103.1.5. Distances shall be measured as the shortest path that an appliance supply cord connected to the receptacle would follow without penetrating a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

E4103.1.1 Location. Receptacles that provide power for water-pump motors or other loads directly related to the circulation and sanitation system shall be permitted to be located between 5 feet and 10 feet (1524 mm and 3048 mm) from the inside walls of pools and outdoor spas and hot tubs, and, where so located, shall be single and of the locking and grounding type and shall be protected by ground-fault circuit interrupters.

Other receptacles on the property shall be located not less than 10 feet (3048 m) from the inside walls of pools and outdoor spas and hot tubs.

E4103.1.2 Where required. At least one 125-volt 15- or 20-ampere receptacle supplied by a general-purpose branch circuit shall be located a minimum of 10 feet (3048 mm) from and not more

than 20 feet (6096 mm) from the inside wall of pools and outdoor spas and hot tubs. This receptacle shall be located not more than 6 feet, 6 inches (1981 mm) above the floor, platform or grade level serving the pool, spa or hot tub.

E4103.1.3 GFCI protection. All 125-volt receptacles located within 20 feet (6096 mm) of the inside walls of pools and outdoor spas and hot tubs shall be protected by a ground-fault circuit-interrupter.

E4103.1.4 Indoor locations. Receptacles shall be located not less than 5 feet (1524 mm) from the inside walls of indoor spas and hot tubs. A minimum of one 125-volt receptacle shall be located between 5 feet (1524 mm) and 10 feet (3048 mm) from the inside walls of indoor spas or hot tubs.

E4103.1.5 Indoor GFCI protection. One hundred twenty-five-volt receptacles located within 10 feet (3048 mm) of the inside walls of spas and hot tubs installed indoors shall be protected by ground-fault circuit-interrupters. One hundred twenty-five-volt receptacles located within 5 feet (1524 mm) of the inside walls of hydro massage bathtubs shall be protected by a ground-fault circuit-interrupter.

E4103.2 Switching devices. Switching devices shall be located not less than 5 feet (1524 mm) horizontally from the inside walls of pools, spas and hot tubs except where separated from the pool, spa or hot tub by a solid fence, wall, or other permanent barrier. Switching devices located in a room or area containing a hydro massage bathtub shall be located in accordance with the general requirements of this code.

E4103.3 Disconnecting means. An accessible disconnecting means to disconnect all ungrounded conductors for all utilization equipment, other than lighting, shall be provided and located within sight from all pools, spas, and hot tub equipment, and shall be located not less than 5 feet (1524 mm) from the inside walls of the pool, spa or hot tub.

E4103.4 Luminaires and ceiling fans. Lighting outlets, luminaires, and ceiling-suspended paddle fans shall be installed and located in accordance with Sections E4103.4.1 through E4103.4.5.

E4103.4.1 Outdoor location. In outdoor pool, outdoor spas and outdoor hot tubs areas, luminaires, lighting outlets, and ceiling-suspended paddle fans shall not be installed over the pool or over the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool except where no part of the luminaire or ceiling-suspended paddle fan is less than 12 feet (3658 mm) above the maximum water level.

E4103.4.2 Indoor locations. In indoor pool areas, the limitations of Section E4103.4.1 shall apply except where the luminaires, lighting outlets and ceiling-suspended paddle fans comply with all of the following conditions:

1. The luminaires are of a totally enclosed type; and
2. A ground-fault circuit interrupter is installed in the branch circuit supplying the luminaires or ceiling suspended (paddle) fans; and
3. The distance from the bottom of the luminaire or ceiling-suspended (paddle) fan to the maximum water level is not less than 7 feet, 6 inches (2286 mm).

E4103.4.3 Existing lighting outlets and luminaires. Existing lighting outlets and luminaires that are located within 5 feet (1524 mm) horizontally from the inside walls of pools and outdoor spas and hot tubs shall be permitted to be located not less than 5 feet (1524 mm) vertically above the maximum water level, provided that such luminaires and outlets are rigidly attached to the existing structure and ground-fault circuit-interrupter protection is provided for the branch circuit that supplies such luminaires and outlets.

E4103.4.4 Indoor spas and hot tubs.

1. Luminaires, lighting outlets, and ceiling-suspended paddle fans located over the spa or hot tub or within 5 feet (1524 mm) from the inside walls of the spa or hot tub shall be a minimum of 7 feet, 6 inches (2286 mm) above the maximum water level and shall be protected by a ground-fault circuit interrupter.

   Luminaires, lighting outlets, and ceiling-suspended paddle fans that are located 12 feet (3658 mm) or more above the maximum water level shall not require ground-fault circuit interrupter protection.

2. Luminaires protected by a ground-fault circuit interrupter and complying with Item 2.1. or 2.2. shall be permitted to be installed less than 7 feet, 6 inches (2286 mm) over a spa or hot tub.

2.1. Recessed luminaires shall have a glass or plastic lens and nonmetallic or electrically isolated metal trim, and shall be suitable for use in damp locations.

2.2. Surface-mounted luminaires shall have a glass or plastic globe and a nonmetallic body or a metallic body isolated from contact. Such luminaires shall be suitable for use in damp locations.

E4103.4.5 GFCI protection. Luminaires and outlets that are installed in the area extending between 5 feet (1524 mm) and 10 feet (3048 mm) from the inside walls of pools and outdoor spas and hot tubs shall be protected by ground fault circuit-interrupters except where such fixtures and outlets are installed not less than 5 feet (1524 mm) above the maximum water level and are rigidly attached to the structure.

E4103.5 Overhead conductor clearances. Except where installed with the clearances specified in Table E4103.5, the following parts of pools and outdoor spas and hot tubs shall not be placed under existing service-drop conductors or any other open overhead wiring; nor shall such wiring be installed above the following:

1. Pools and the areas extending 10 feet (3048 mm) horizontally from the inside of the walls of the pool;
2. Diving structures; or
3. Observation stands, towers, and platforms.

Utility-owned, -operated and -maintained communications conductors, community antenna system coaxial cables and the supporting messengers shall be permitted at a height of not less than 10 feet (3048 mm) above swimming and wading pools, diving structures, and observation stands, towers, and platforms.

E4103.6 Underground wiring. Underground wiring shall not be installed under or within the area extending 5 feet (1524 mm) horizontally from the inside walls of pools and outdoor hot tubs and spas except where the wiring is installed to supply pool, spa or hot tub equipment or where space limitations prevent wiring from being routed 5 feet (1524 mm) or more horizontally from the inside walls. Where installed within 5 feet (1524 mm) of the inside walls, the wiring method shall be rigid metal conduit, intermediate metal conduit or a nonmetallic raceway system. Metal conduit shall be corrosion resistant and suitable for the location. The minimum raceway burial depth shall be in accordance with Table E4103.6.

TABLE E4103.5
OVERHEAD CONDUCTOR CLEARANCES

	INSULATED SUPPLY OR SERVICE DROP CABLES, 0-750 VOLTS TO GROUND, SUPPORTED ON AND CABLED TOGETHER WITH AN EFFECTIVELY GROUNDED BARE MESSENGER OR EFFECTIVELY GROUNDED NEUTRAL CONDUCTOR (feet)	ALL OTHER SUPPLY OR SERVICE DROP CONDUCTORS (feet)	
		Voltage to ground	
		0-15 kV	Greater than 15- to 50 kV
A. Clearance in any direction to the water level, edge of water surface, base of diving platform, or permanently-anchored raft	22	25	27
B. Clearance in any direction to the diving platform	14	17	18
C. Horizontal limit of clearance measured from inside wall of the pool	This limit shall extend to the outer edge of the structures listed in Rows (A) and (B) above but not less than 10 feet.		

For SI: 1 foot = 304.8 mm.

TABLE E4103.6
MINIMUM BURIAL DEPTHS

WIRING METHOD	UNDERGROUND WIRING (inches)
Rigid metal conduit	6
Intermediate metal conduit	6
Nonmetallic raceways listed for direct burial without concrete encasement	18
Other approved raceways[a]	18

For SI: 1 inch = 25.4 mm.

a. Raceways approved for burial only where concrete-encased shall require a concrete envelope not less than 2 inches in thickness.

E4104
BONDING

E4104.1 Bonded parts. The following parts shall be bonded together:

1. All metallic parts of pool, spa and hot tub structures, including the reinforcing metal of pool, spa and hot tub shells, coping stones, and decks. The usual steel tie wires shall be considered suitable for bonding the reinforcing steel together, and welding or special clamping shall not be required. Such tie wires shall be made tight. Where reinforcing steel is effectively insulated by a listed encapsulating nonconductive compound, at the time of manufacture and installation, it shall not be required to be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, provisions shall be made for an alternate means to eliminate voltage gradients that would otherwise be provided by unencapsulated bonded reinforcing steel.
2. All forming shells and mounting brackets of no-niche luminaires except where a listed low-voltage lighting system is used that does not require bonding.
3. All metal fittings within or attached to pool, spa and hot tub structures. Isolated parts that are not over 4 inches (102 mm) in any dimension and do not penetrate into the pool structure more than 1 inch (25.4 mm) shall not require bonding. The metal bands or hoops used to secure wooden staves for a hot tub or spa shall not be required to be bonded.
4. Metal parts of electrical equipment associated with pool, spa and hot tub water circulating systems, including pump motors and metal parts of equipment associated with pool covers, including electric motors. Metal parts of listed equipment incorporating an approved system of double insulation and providing a means for grounding internal nonaccessible, noncurrent-carrying metal parts shall not be bonded. Where a double-insulated water-pump motor is installed under the provisions of this section, 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.
5. Metal-sheathed cables and raceways, metal piping and all fixed metal parts that are within 5 feet (1524 mm) horizontally of the inside walls of the pool, spa or hot tub and that are within 12 feet (3658 mm) above the maximum water level of the pool or any observation stands, towers or platforms, or from any diving structures, and that are not separated from the pool by a permanent barrier.

For pool water heaters rated at more than 50 amperes and having specific instructions regarding bonding and grounding, only those parts designated to bonded shall be bonded and only those parts designated to be grounded shall be grounded.

E4104.2 Parts not required to be bonded. Small conductive surfaces not likely to become energized, such as towel bars, mirror frames, and air and water jets and drain fittings that are not connected to metallic piping, and similar equipment installed on or within indoor spas and hot tubs shall not be required to be bonded.

E4104.3 Methods of bonding. It shall not be the intent to require that the 8 AWG or larger solid copper bonding conductor be extended or attached to any remote panelboard, service equipment, or any electrode, but only that it shall be employed to eliminate voltage gradients in the pool area as prescribed. Bonding shall be accomplished by one or more of the following methods:

1. Common Bonding Grid. The parts specified in Section E4104.1 above shall be connected to a common bonding grid with a solid copper conductor, insulated, covered, or bare, not smaller than 8 AWG. Connection shall be made by exothermic welding or by pressure connectors or clamps that are labeled as being suitable for the purpose and that are made of stainless steel, brass, copper or copper alloy.

   The common bonding grid shall be permitted to be any of the following:

   1.1. The structural reinforcing steel of a concrete pool where the reinforcing rods are bonded together by the usual steel tie wires made up tight or the equivalent; or

   1.2. The wall of a bolted or welded metal pool; or

   1.3. A solid copper conductor, insulated, covered, or bare, not smaller than 8 AWG.

2. For hot tubs and spas, metal to metal mounting on a common frame or base
3. The interconnection of threaded metal piping and fittings.

E4105
GROUNDING

E4105.1 Equipment to be grounded. The following equipment shall be grounded:

1. Wet-niche, dry-niche and no-niche underwater luminaires other than those low-voltage systems listed for the application without a grounding conductor.
2. All electrical equipment located within 5 feet (1524 mm) of the inside wall of the pool, spa or hot tub.
3. All electrical equipment associated with the recirculating system of the pool, spa or hot tub.
4. Junction boxes.
5. Transformer enclosures.
6. Ground-fault circuit-interrupters.
7. Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the pool, spa or hot tub.

E4105.2 Luminaires and related equipment. Wet-niche, dry-niche, or no-niche luminaires shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table E3808.12 but not smaller than 12 AWG. The 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 such circuit. The junction box, transformer enclosure, or other enclosure in the supply circuit to a wet-niche or no-niche luminaire and the field-wiring chamber of a dry niche luminaire shall be grounded to the equipment grounding terminal of the panelboard. The equipment grounding terminal shall be directly connected to the panelboard enclosure. The equipment grounding conductor shall be installed without joint or splice.

Exceptions:

1. Where more than one underwater luminaire 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, or between the field-wiring compartments of dry-niche luminaires, shall be permitted to be terminated on grounding terminals.
2. Where an underwater luminaire is supplied from a transformer, ground-fault circuit-interrupter, clock-operated switch, or a manual snap switch that is located between the panelboard and a junction box connected to the conduit that extends directly to the underwater luminaire, 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.

E4105.3 Nonmetallic conduit. Where a nonmetallic conduit is installed between a wet-niche luminaire and a junction box, transformer enclosure, or other enclosure, a 8 AWG insulated copper conductor shall be installed in this conduit with provisions for terminating in the forming shell, junction box or transformer enclosure, or ground-fault circuit-interrupter enclosure. The termination of the 8 AWG conductor 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.

E4105.4 Flexible cords. Wet-niche or no-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-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 grounding terminal in the supply junction box, transformer enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG.

E4105.5 Motors. Pool-associated motors shall be connected to a copper equipment grounding conductor sized in accordance with Table E3808.12, but not smaller than 12 AWG.

E4105.6 Panelboards. A panelboard that is not part of the service equipment, or source of a separately derived system shall have an equipment grounding conductor installed between its grounding terminal and the grounding terminal of the applicable service equipment or source of a separately derived system. The equipment grounding conductor shall be insulated, shall be sized in accordance with Table E3808.12, and shall be not smaller than 12 AWG.

E4105.7 Cord-connected equipment. Where fixed or stationary equipment is connected with a flexible cord to facilitate removal or disconnection for maintenance, repair, or storage, as provided in Section E4102.2, 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.

E4105.8 Other equipment. Other electrical equipment shall be grounded in accordance with Section E3808.

E4106
EQUIPMENT INSTALLATION

E4106.1 Transformers. Transformers used for the supply of underwater luminaires, together with the transformer enclosure, shall be listed for the purpose. Such transformers shall be of an isolated winding type having a grounded metal barrier between the primary and secondary windings.

E4106.2 Ground-fault circuit-interrupters. Ground-fault circuit-interrupters shall be self-contained units, circuitbreaker types, receptacle types or other approved types.

E4106.3 Wiring on load side of ground-fault circuit-interrupters and transformers. For other than grounding conductors, conductors installed on the load side of a ground-fault circuit-interrupter or transformer used to comply with the provisions of Section E4106.4, shall not occupy raceways, boxes, or enclosures containing other conductors except where the other conductors are protected by ground-fault circuit interrupters or are grounding conductors. Supply conductors to a feed-through type ground-fault circuit interrupter shall be permitted in the same enclosure. Ground-fault circuit interrupters shall be permitted in a panelboard that contains circuits protected by other than ground-fault circuit interrupters.

E4106.4 Underwater luminaires. The design of an underwater luminaire supplied from a branch circuit either directly or by way of a transformer meeting the requirements of Section E4106.1, shall be such that, where the 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). In addition, a ground-fault circuit-interrupter shall be installed in the branch circuit supplying luminaires operating at more than 15 volts, so 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 path from any ungrounded part of the branch circuit or the luminaire to ground. Compliance with this requirement shall be obtained by the use of a listed underwater luminaire and by installation of a listed ground-fault circuit-interrupter in the branch circuit. Luminaires that depend on submersion for safe operation shall be inherently protected against the hazards of overheating when not submerged.

E4106.4.1 Maximum voltage. Luminaires shall not be installed for operation on supply circuits over 150 volts between conductors.

E4106.4.2 Luminaire location. Luminaires mounted in walls shall be installed with the top of the fixture lens not less than 18 inches (457 mm) below the normal water level of the pool, except where the luminaire is listed and identified for use at a depth of not less than 4 inches (102 mm) below the normal water level of the pool. A luminaire facing upward shall have the lens adequately guarded to prevent contact by any person.

E4106.5 Wet-niche luminaires. Forming shells shall be installed for the mounting of all wet-niche underwater luminaires and shall be equipped with provisions for conduit entries. Conduit shall extend from the forming shell to a suitable junction box or other enclosure located as provided in Section E4106.8. Metal parts of the luminaire and forming shell in contact with the pool water shall be of brass or other approved corrosion-resistant metal.

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

Luminaires shall be bonded to and secured to the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to remove the luminaire from the forming shell.

E4106.6 Dry-niche luminaires. Dry-niche luminaires shall be provided with provisions for drainage of water and means for accommodating one equipment grounding conductor for each conduit entry. Junction boxes shall not be required but, if used, shall not be required to be elevated or located as specified in Section E4106.8 if the luminaire is specifically identified for the purpose.

E4106.7 No-niche luminaires. No-niche luminaires shall be listed for the purpose and shall be installed in accordance with the requirements of Section E4106.5. Where connection to a forming shell is specified, the connection shall be to the mounting bracket.

E4106.8 Junction boxes and enclosures for transformers or ground-fault circuit interrupters. Junction boxes for underwater luminaires and enclosures for transformers and ground-fault circuit-interrupters that supply underwater luminaires shall comply with the following:

E4106.8.1 Junction boxes. A junction box connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be:

1. Listed and labeled for the purpose; and
2. Equipped with threaded entries or hubs or a nonmetallic hub listed for the purpose; and

3. Constructed of copper, brass, suitable plastic, or other approved corrosion-resistant material; and

4. Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass, or other approved corrosion-resistant metal that is integral with the box; and

5. Located not less than 4 inches (102 mm), measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 8 inches (203 mm) above the maximum pool water level, whichever provides the greatest elevation, and shall be located not less than 4 feet (1219 mm) from the inside wall of the pool, unless separated from the pool by a solid fence, wall or other permanent barrier. Where used on a lighting system operating at 15 volts or less, a flush deck box shall be permitted provided that an approved potting compound is used to fill the box to prevent the entrance of moisture; and the flush deck box is located not less than 4 feet (1219 mm) from the inside wall of the pool.

E4106.8.2 Other enclosures. An enclosure for a transformer, ground-fault circuit-interrupter or a similar device connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be:

1. Listed and labeled for the purpose, comprised of copper, brass, suitable plastic, or other approved corrosion-resistant material; and

2. Equipped with threaded entries or hubs or a nonmetallic hub listed for the purpose; and

3. Provided with an approved seal, such as duct seal at the conduit connection, that prevents circulation of air between the conduit and the enclosures; and

4. Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass or other approved corrosion-resistant metal that is integral with the enclosures; and

5. Located not less than 4 inches (102 mm), measured from the inside bottom of the enclosure, above the ground level or pool deck, or not less than 8 inches (203 mm) above the maximum pool water level, whichever provides the greater elevation, and shall be located not less than 4 feet (1219 mm) from the inside wall of the pool, except where separated from the pool by a solid fence, wall or other permanent barrier.

E4106.8.3 Protection of junction boxes and enclosures. 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 or adjacent to fixed structures.

E4106.8.4 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 shall be provided with grounding terminals in a quantity not less than the number of conduit entries plus one.

E4106.8.5 Strain relief. The termination of a flexible cord of an underwater luminaire within a junction box, transformer enclosure, ground-fault circuit-interrupter, or other enclosure shall be provided with a strain relief.

E4106.9 Underwater audio equipment. Underwater audio equipment shall be identified for the purpose.

E4106.9.1 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.

E4106.9.2 Wiring methods. Rigid metal conduit or intermediate metal conduit of brass or other identified corrosion-resistant metal, rigid nonmetallic conduit, or liquid-tight flexible nonmetallic conduit (LFNC-B) shall extend from the forming shell to a suitable junction box or other enclosure as provided in Section E4106.8. Where rigid nonmetallic conduit or liquid-tight flexible nonmetallic conduit is used, a 8 AWG solid or stranded insulated copper equipment grounding conductor shall be installed in this conduit with provisions for terminating in the forming shell and the junction box. The termination of the 8 AWG conductor in the forming shell shall be covered with, or encapsulated in, a suitable potting compound to protect such

connection from the possible deteriorating effect of pool water.

E4106.9.3 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.

E4106.10 Electrically operated pool covers. The electric motors, controllers, and wiring for pool covers shall be located not less than 5 feet (1524 mm) from the inside wall of the pool except where 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 electric motor and controller shall be connected to a circuit protected by a ground-fault circuit-interrupter. The device that controls the operation of the motor for an electrically operated pool cover shall be located so that the operator has full view of the pool.

E4106.11 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 more than 60 amperes. The ampacity of the branch-circuit conductors and the rating or setting of overcurrent protective devices shall be not less than 125 percent of the total nameplate load rating.

E4106.12 Pool area heating. The provisions of Sections E4106.12.1 through E4106.12.3 shall apply to all pool deck areas, including a covered pool, where electrically operated comfort heating units are installed within 20 feet (6096 mm) of the inside wall of the pool.

E4106.12.1 Unit heaters. Unit heaters shall be rigidly mounted to the structure and shall be of the totally enclosed or guarded types. Unit heaters shall not be mounted over the pool or within the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool.

E4106.12.2 Permanently wired radiant heaters. Electric radiant heaters shall be suitably guarded and securely fastened to their mounting devices. Heaters shall not be installed over a pool or within the area extending 5 feet (1524 mm) horizontally from the inside walls of the pool and shall be mounted not less than 12 feet (3658 mm) vertically above the pool deck.

E4106.12.3 Radiant heating cables prohibited. Radiant heating cables embedded in or below the deck shall be prohibited.

E4106.13 Double insulated pool pumps. A permanently installed pool shall be permitted to be provided with listed cord- and plug-connected pool pumps incorporating an approved system of double insulation that provides a means for grounding only the internal and nonaccessible, noncurrent carrying metal parts of the pump.

E4107
STORABLE SWIMMING POOLS

E4107.1 Pumps. A cord-connected pool filter pump for use with storable pools shall incorporate an approved system of double insulation or its equivalent and shall be provided with means for grounding only the internal and nonaccessible noncurrent-carrying metal parts of the appliance.

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

E4107.2 Ground-fault circuit-interrupters required. Electrical equipment, including power-supply cords, used with storable pools shall be protected by ground-fault circuit-interrupters.

E4107.3 Luminaires. Luminaires for storable pools shall not have exposed metal parts and shall be listed for the purpose as an assembly. In addition, luminaires for storable pools shall comply with the requirements of Section E4107.3.1 or E4107.3.2.

E4107.3.1 Fifteen (15) volts or less. A luminaire installed in or on the wall of a storable pool shall be part of a cord and plug-connected lighting assembly. The assembly shall:

1. Have a luminaire lamp that operates at 15 volts or less; and
2. Have an impact-resistant polymeric lens, luminaire body, and transformer enclosure; and
3. Have a transformer meeting the requirements of section E4106.1 with a primary rating not over 150 volts.

E4107.3.2 Not over 150 volts. Lighting assembly without a transformer, and with the luminaire lamp(s) operating at not over 150 volts, shall be permitted to be cord- and plug connected where the assembly is listed as an assembly for the purpose and complies with all of the following:

1. It has an impact-resistant polymeric lens and luminaire body.
2. A ground-fault circuit interrupter with open neutral protection is provided as an integral part of the assembly.
3. The luminaire lamp is permanently connected to the ground-fault circuit interrupter with open-neutral protection.
4. It complies with the requirements of Section E4106.4.
5. It has no exposed metal parts.

E4108
SPAS AND HOT TUBS

E4108.1 Ground-fault circuit-interrupters. The outlet(s) that supplies a self-contained spa or hot tub, or a packaged spa or hot tub equipment assembly, or a field-assembled spa or hot tub with a heater load of 50 amperes or less, shall be protected by a ground-fault circuit-interrupter.

A listed self-contained unit or listed packaged equipment assembly marked to indicate that integral ground-fault circuit-interrupter protection is provided for all electrical parts within the unit or assembly, including pumps, air blowers, heaters, luminaires, controls, sanitizer generators and wiring, shall not require that the outlet supply be protected by a ground-fault circuit interrupter.

A combination pool/hot tub or spa assembly commonly bonded need not be protected by a ground-fault circuit interrupter.

E4108.2 Electric water heaters. Electric spa and hot tub water heaters shall be listed and shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not more than 60 amperes. The ampacity of the branch-circuit conductors, and the rating or setting of overcurrent protective devices, shall be not less than 125 percent of the total nameplate load rating.

E4108.3 Underwater audio equipment. Underwater audio equipment used with spas and hot tubs shall comply with the provisions of Section E4106.9.

E4109
HYDROMASSAGE BATHTUBS

E4109.1 Ground-fault circuit-interrupters. Hydro massage bathtubs and their associated electrical components shall be protected in accordance with Section E4108. All 125-volt, single-phase receptacles not exceeding 30 amperes and located within 5 feet (1524 mm) measured horizontally of the inside walls of a hydro massage tub shall be protected by a ground-fault circuit interrupter(s).

E4109.2 Other electric equipment. Luminaires, switches, receptacles, and other electrical equipment located in the same room, and not directly associated with a hydro massage bathtub, shall be installed in accordance with the requirements of this code relative to the installation of electrical equipment in bathrooms.

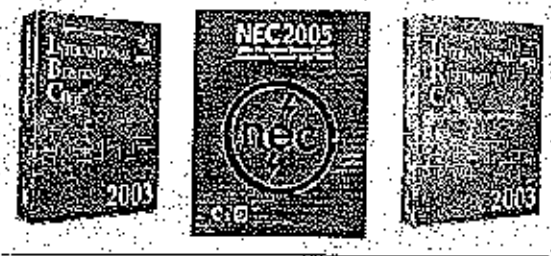
E4109.3 Accessibility. Hydromassage bathtub electrical equipment shall be accessible without damaging the building structure or building finish. Ground-fault circuit-interrupter devices shall be located in a readily accessible location for testing purposes. Ground-fault circuit-interrupter devices shall not be installed within the enclosure of the hydromassage tub.

E4109.4 Bonding. All metal piping systems, metal parts of electrical equipment, and pump motors associated with the hydro massage tub shall be bonded together using a copper bonding jumper, insulated, covered, or bare, not smaller than 8 AWG solid.

Metal parts of listed equipment incorporating an approved system of double insulation and providing a means for grounding internal nonaccessible, noncurrent-carrying metal parts shall not be bonded.

Swimming Pools

2003 IBC, 2005 NEC and 2003 IRC



IBC and IRC

- Swimming Pool: any structure intended for swimming, recreational bathing or wading that contains water over 24 inches deep. This includes in-ground, above ground and on-ground pools; hot tubs; spas and fixed in place wading pools.

NEC

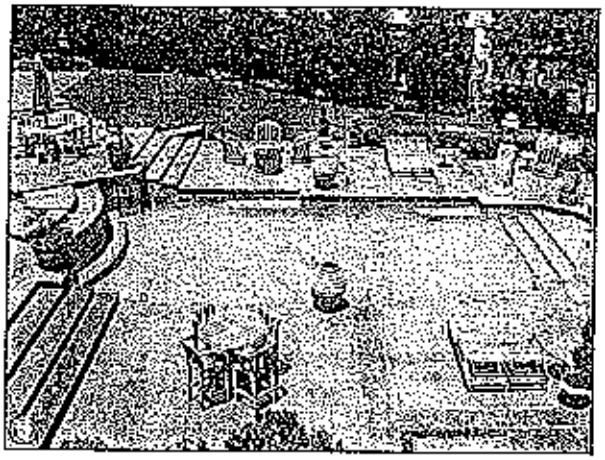
- **Pool.** Manufactured or field-constructed equipment designed to contain water on a permanent or semi permanent basis and used for swimming, wading, or other purposes.

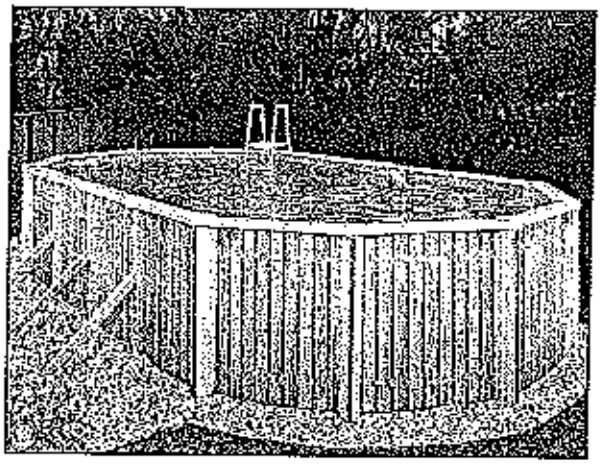
NEC

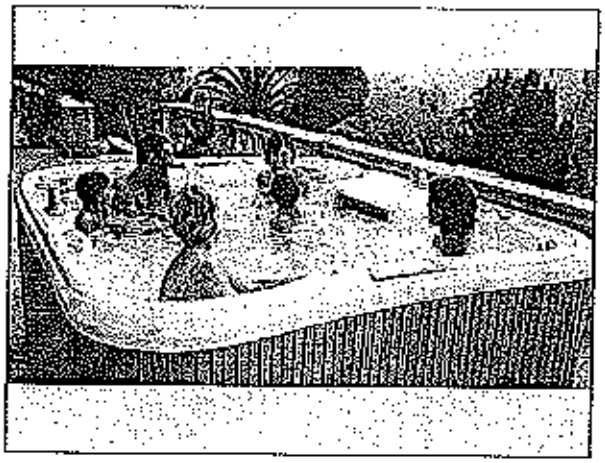
- **Permanently Installed Swimming, Wading, and Therapeutic Pools.** Those that are constructed in the ground or partially in the ground, and all others capable of holding water in a depth greater than 1.0 m (42 in.), and all pools installed inside of a building, regardless of water depth, whether or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

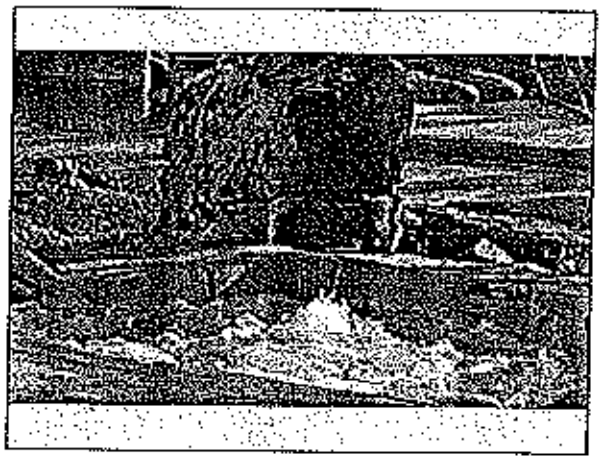
NEC

- **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.



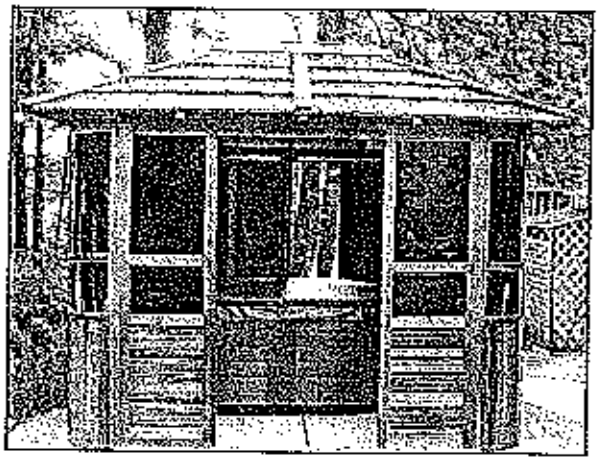






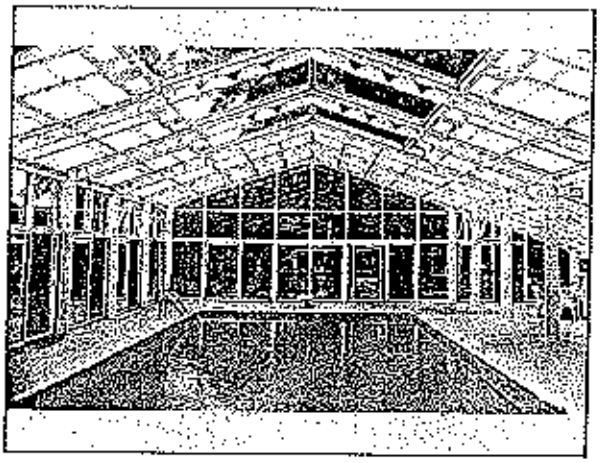
IRC R308.4 & IBC 2406.3

- Hazardous glazing locations requiring safety glazing materials:
  - Glazing in doors and enclosures for hot tubs and whirlpools
  - Glazing in any portion of a building wall enclosing those compartments where the bottom exposed edge of the glazing is less than 60 inches above a standing surface



IRC R308.4 & IBC 2406.3

- Hazardous glazing locations requiring safety glazing materials:
  - Glazing in walls and fences enclosing swimming pools, hot tubs and spas where all of the following conditions are present:
    - The bottom edge of the glazing on the pool or spa side is less than 60 inches above a walking surface on the pool or spa side of the glazing; and
    - The glazing is within 60 inches horizontally of the water's edge of a swimming pool or spa



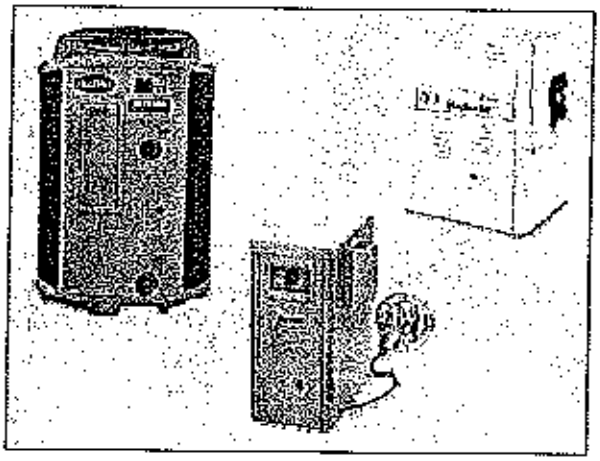
IRC

IBC 3109.1.1

- No person shall construct, substantially alter or reconstruct a swimming pool until the construction documents and water discharge provisions have been approved by the Department of Public Health, in accordance with the regulations adopted pursuant to section 19a-36 of the Connecticut General Statutes
  - Exception: Owner occupied detached 1, 2 or 3 family residences where the pool is intended to be used by the owner and invited guests

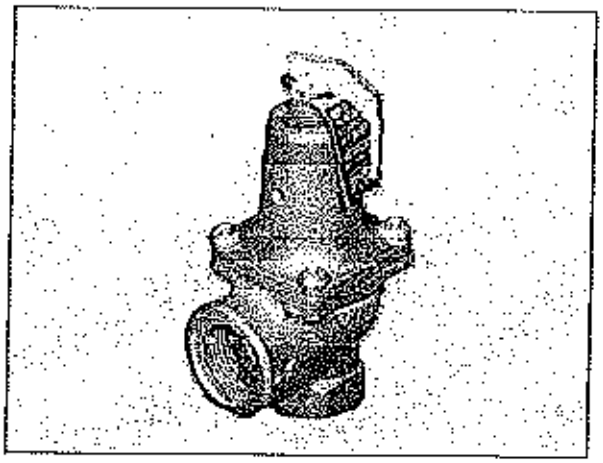
IRC and IMC

- **IRC M2006.1 and IMC 916.1 General:**
  - Pool and spa heaters shall be installed in accordance with the manufacturer's installation instructions.
  - Oil fired pool heaters shall be tested in accordance with UL 726.
  - Electric pool and spa heaters shall be tested in accordance UL 1261.



IRC

- **M2006.3 Temperature and pressure-limiting devices.** Pool heaters shall have temperature and pressure-relief valves.
- **M2006.4 Bypass valves.** Where an integral bypass system is not provided as a part of the pool heater, a bypass line and valve shall be installed between the inlet and outlet piping for use in adjusting the flow of water through the heater.



IRC Appendix G

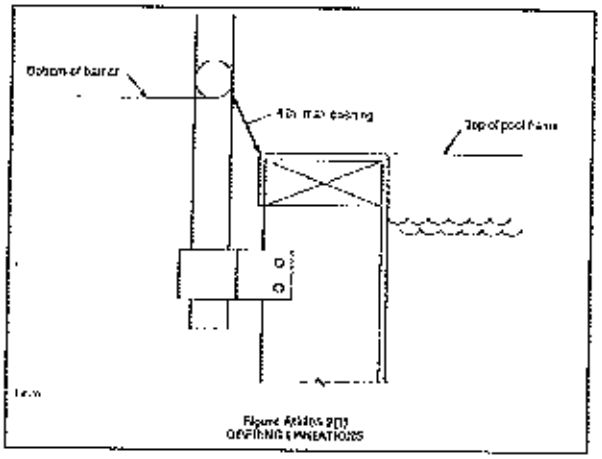
- AG 101.1 Applies to pools in or on the lot of a 1 & 2 family dwelling
- Definitions:
  - Barrier: fence, wall, building wall or combination thereof which surrounds and obstructs access to the swimming pool
  - Portable spa: nonpermanent structure intended for recreational bathing, all controls, circulators and heaters are an integral part

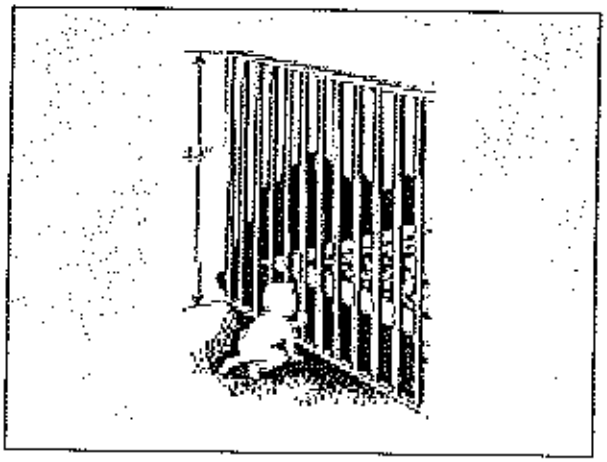
IRC Appendix G

- AG 102 Definitions:
  - Swimming pool: Any structure intended for recreational bathing with water over 24 inches deep. Includes:
    - In ground
    - Above ground
    - On ground
    - Hot tubs
    - Spas
  - Indoor swimming Pool: totally contained within a structure and surrounded on four sides by walls of said structure
  - Outdoor swimming pool: all others

Residential and Public Swimming Pool Barriers

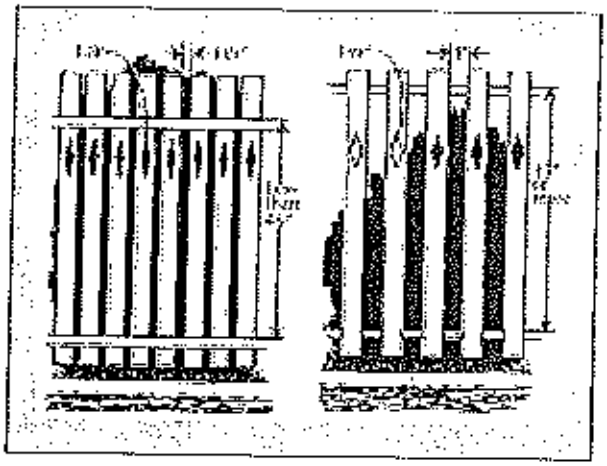
- AG 105.2 and IBC 3109.4.1
- Top of barrier shall be 48 inches above grade
  - Maximum clearance between grade and bottom of barrier shall be 2 inches
  - Above ground pools
    - May be pool structure itself
    - If section is added maximum clearance is 4 inches
- Openings in barrier shall not allow passage of a 4 inch diameter sphere





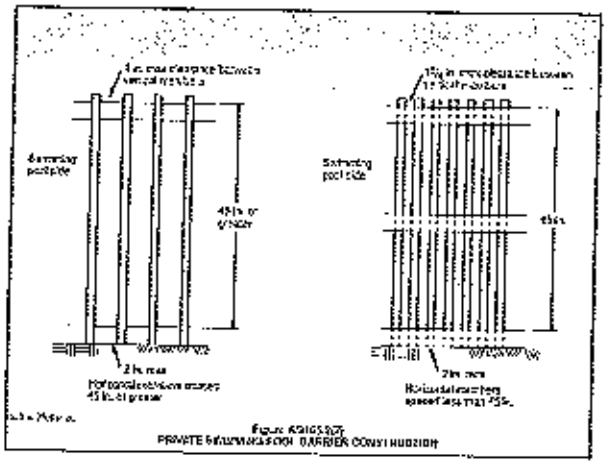
Barriers for Outdoor Pools

- Solid barriers with no openings shall not contain indentations or protrusions.
- Where barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches:
  - The horizontal members shall be located on the pool side
  - Spacing between vertical members shall not exceed 1-3/4 inches
  - Decorative cutout openings shall not exceed 1-3/4 inches in width



Barriers for Outdoor Pools

- Where barrier is composed of horizontal and vertical members and the distance between the tops of horizontal members is 45 inches or more:
  - Spacing between the vertical members shall not allow the passage of a 4-inch diameter sphere
  - Decorative cutouts within vertical members shall not exceed 1-3/4 inches in width
- Maximum mesh size for chain link fences shall not exceed 2-1/4 inches square
  - Unless slats reduce openings to 1-3/4 inches



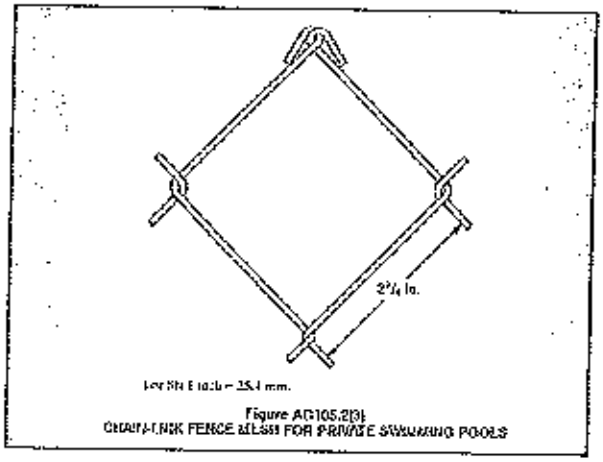


Figure AG105.2(3)
CHAIN-LINK FENCE DETAIL FOR PRIVATE SWIMMING POOLS

Barriers for Outdoor Pools

- Lattice fence openings shall not exceed 1-3/4 inches
- Access gates shall meet all the above requirements and:
  - Gates shall be equipped with a locking and self latching device
  - Pedestrian gates shall:
    - Open away from the pool
    - Be self closing and latching

Barriers for Outdoor Pools

- Self latching devices
  - Where the release mechanism of the device is less than 54 inches from bottom of gate:
    - Release mechanism shall be on pool side at least 3 inches below top of gate
    - Barrier shall have no opening greater than ½ inch within 18 inches of the release mechanism

Barriers for Indoor and Outdoor Pools AG 105.2 & IBC 3109.4.1.8

- Wall of a Dwelling as Part of the Barrier; One of three choices:
  1. Pool shall be equipped with a power safety cover

Barriers for Indoor and Outdoor Pools AG 105.2 & IBC 3109.4.1.8

- Wall of a Dwelling as Part of the Barrier; One of three choices:
  2. Doors with direct access to the pool:
     1. Shall be equipped with alarm:
        1. Sound for 30 second within 7 seconds of opening
        2. Capable of being heard throughout the house
        3. Automatically reset
        4. Manual means to bypass for single opening (15 sec.)
        5. Located minimum 54 inches above threshold

Barriers for Indoor and Outdoor Pools AG 105.2 & IBC 3109.4.1.8

- Wall of a Dwelling as Part of the Barrier; One of three choices:
  3. Doors shall be self closing and latching
     1. With release mechanism minimum 54 inches above threshold
     2. Swinging doors to open away from the pool

Barriers for Pools

- Above ground or on ground pools:
  - When pool structure is used as barrier and access is via ladder
    - The ladder or steps shall be surrounded by barrier that meets prior items

Barriers for Pools

- AG 105.4, IBC 3109.4.3
  - Barriers shall be located so as to prohibit permanent structures, equipment or similar objects from being used to climb the barriers
- AG 105.5 residential only
  - Spas and Hot tubs with a safety cover complying with ASTM F 1346 shall be exempt from the barrier provisions

Temporary enclosure

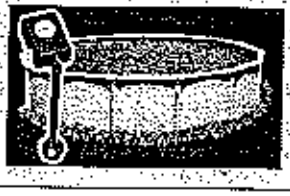
- AG 105.6, IBC 3109.6
  - A temporary enclosure shall be installed prior to the commencement of the installation of any in-ground pool, or
    - The permanent barrier is first in place
  - The temporary enclosure shall:
    - be a minimum of 4 feet in height
    - Have no openings that will allow the passage of a 4 inch sphere
    - Be equipped with a positive latching device on any openings

Pool Alarm

- AG 105.7, IBC 3109.7
  - NO building permit shall be issued for the construction or substantial alteration of a swimming pool at a residence occupied by, or being built for, one or more families unless a pool alarm is installed with the swimming pool
  - Pool Alarm means a device that emits a sound of at least 50 decibels when a person or an object weighing 15 pounds or more enters the water in a swimming pool
    - Hot tubs and spas are exempt from this requirement

Appendix G

- Pool Alarm is required
  - A device that emits a sound of at least 50 decibels when a person or an object weighing 15 pounds or more enters the water in a swimming pool.



Entrapment avoidance

- IBC requires compliance with Section 11 of ANSI/NSPI-1 2003
- IRC spells it out....

Entrapment Protection

- AG106.1, .2
  - Single outlet circulators shall be protected against user entrapment
  - All suction outlets shall be provided with
    - A cover conforming with ANSI/ASME A112.19.8M
    - Or, have a minimum 12" x 12" drain grate
    - Or, have an approved channel drain system

Entrapment Protection

- AG106.3
  - All pool and spa single or multiple systems shall be equipped with atmospheric vacuum relief should grate covers located therein become missing or broken
  - Shall be approved or engineered to:
    - ASME A112.19.17
    - Or, approved gravity drainage system

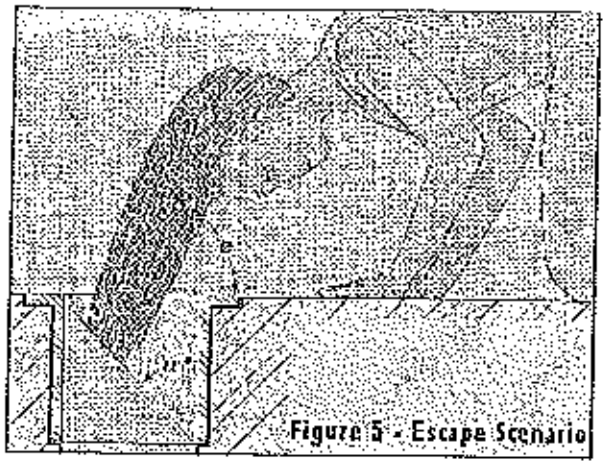
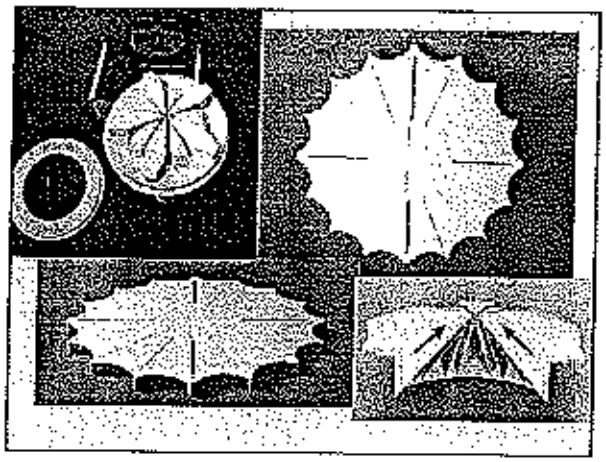
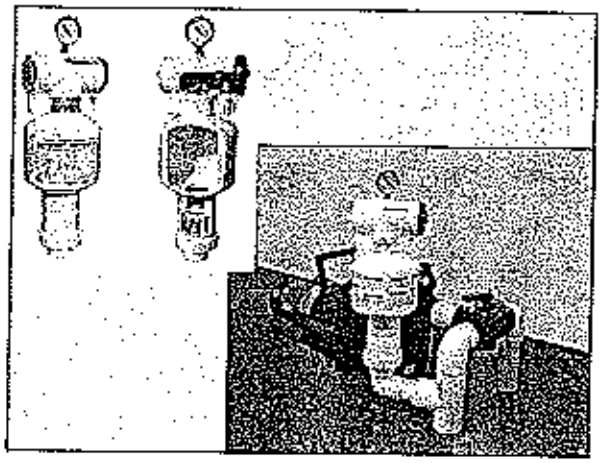
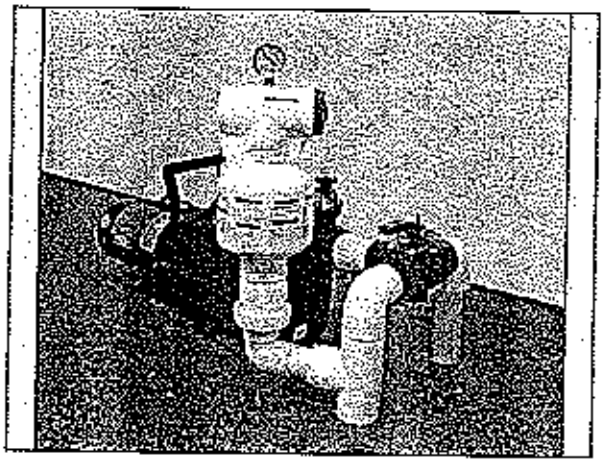


Figure 5 - Escape Scenario







Entrapment Protection

- AG106.4
  - Single or multiple pump circulation systems shall be provided with a minimum of two suction outlets of the approved type
  - A minimum of three feet shall separate such outlets
  - These suction outlets shall be piped so that water is drawn through them simultaneously through a vacuum relief protected line to the pump(s)

Entrapment Protection

- AG106.5
  - Where provided, vacuum or pressure cleaner fitting(s) shall be located in an accessible position(s)
    - between 6 and 12 inches below the minimum operational water level
    - Or, as an attachment to the skimmers

IBC 3109.8

- Accessibility
  - Public swimming pools, when less than 50 meters in length, shall be provided with ramps or approved fixed or portable lifting equipment for the purpose of providing assisted access to the water for persons with disabilities.

IBC 3109.8

- Accessibility
  - Public swimming pools, when 50 meters or more in length, shall be provided with ramps.
  - All public swimming pools, pool decks, toilet facilities, showers, locker and dressing areas shall be accessible and located along accessible routes.

IBC 3109.8.1

- Slopes and handrails
  - 24 inches below water
    - Slope of 1:8
  - Above 24 inches
    - Slope of 1:12
  - All ramps shall have handrails on both sides per 1010.8

IBC 3109.9

- Pool Structure
  - The pool structure shall be engineered and designed to withstand the expected forces to which the pool will be subjected.

IECC 101.4.1

- Residential buildings shall use one of the following:
  - Chapter 4
    - Systems approach
  - Chapter 5
    - Performance of individual components
    - Performance of total building envelope
    - Acceptable practice for each component
    - Prescriptive specification for individual component
  - Chapter 6
    - Simplified Prescriptive Specification

IECC 504.3

- Pools with heaters:
  - Shall have an ON-OFF switch with easy access
  - Shall have a pool cover
    - Exc.: pools deriving more than 20% of the energy from renewable sources
- Time clocks shall be installed so that the pump can be set to run in off peak electrical demand periods

IRC Inclusion article

- **E3301.1 Applicability.** The provisions of Chapters 33 through 42 shall establish the general scope of the electrical system and equipment requirements of this code. Chapters 33 through 42 cover those wiring methods and materials most commonly encountered in the construction of one- and two-family dwellings and structures regulated by this code. Other wiring methods, materials and subject matter covered in the NFPA 70 are also allowed by this code.

Electrical Requirements

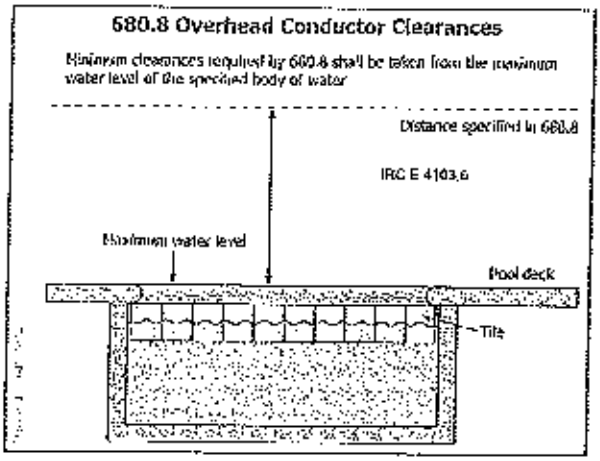
- Combined rules from the IRC and the NEC

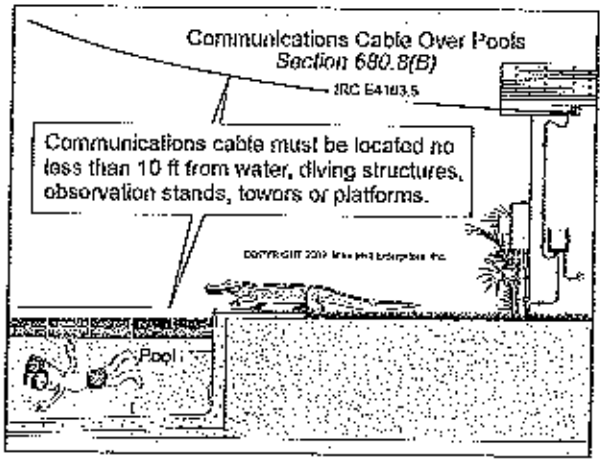
Disclaimer article

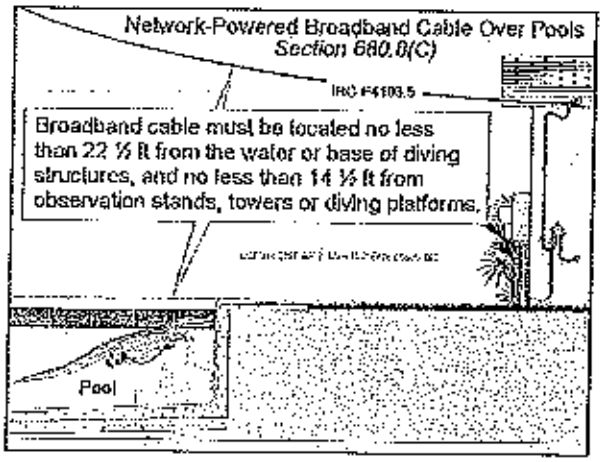
- **E3301.2 Scope.** ..... The omission from these chapters of any material or method of construction provided for in the referenced standard NFPA 70 shall not be construed as prohibiting the use of such material or method of construction. Electrical systems, equipment or components not specifically covered in these chapters shall comply with the applicable provisions of the NFPA 70.

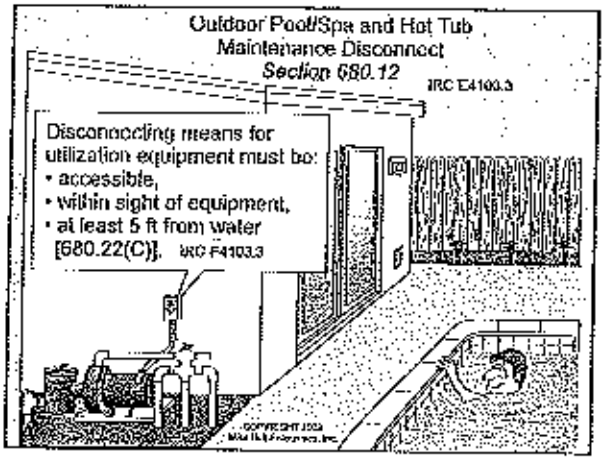
CT Supplement

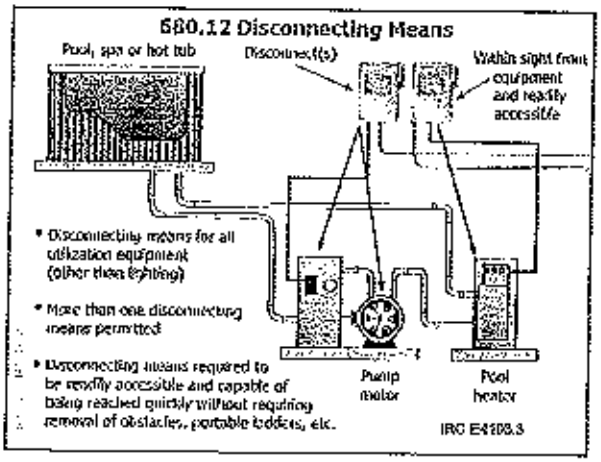
- **(Add) E3301.2.1 Alternative compliance.** Compliance with the requirements of the 2005 National Electrical Code portion of the 2005 State Building Code shall be deemed to be alternative compliance to the requirements of Chapters 33 through 42 of this code.

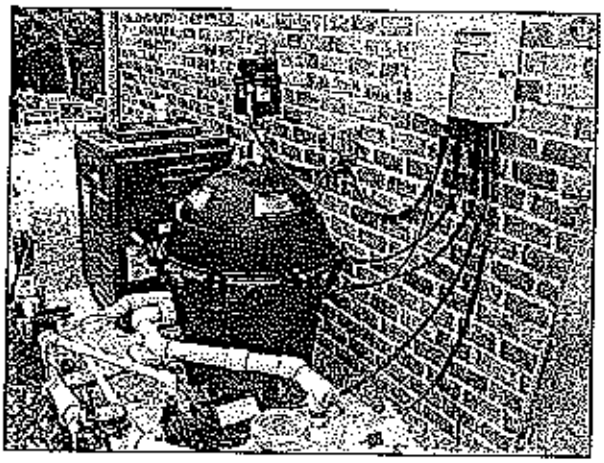

680.8 Overhead Conductor Clearances
Minimum clearances required by 680.8 shall be taken from the maximum water level of the specified body of water
Distance specified in 680.8
IRC E 4103.6
Maximum water level
Pool deck
Tile

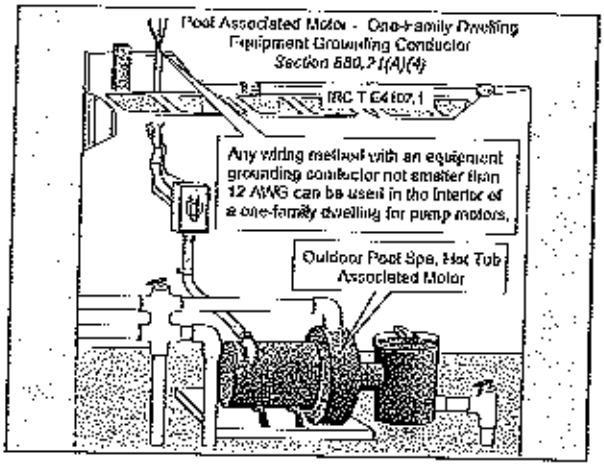

Communications Cable Over Pools
Section 680.8(B)
IRC E4103.5
Communications cable must be located no less than 10 ft from water, diving structures, observation stands, towers or platforms.
Pool

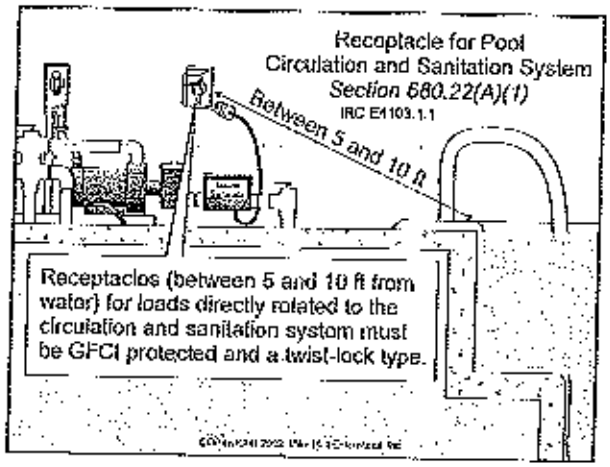

Network-Powered Broadband Cable Over Pools
Section 680.8(C)
IRC E4103.5
Broadband cable must be located no less than 22 ½ ft from the water or base of diving structures, and no less than 14 ½ ft from observation stands, towers or diving platforms.
Pool

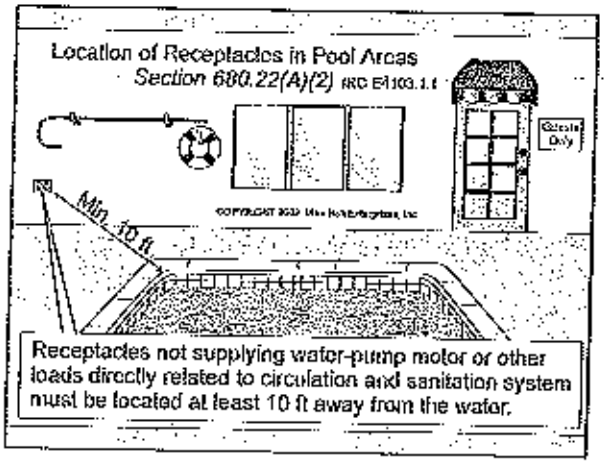

Outdoor Pool/Spa and Hot Tub
Maintenance Disconnect
Section 680.12
IRC E4103.3
Disconnecting means for utilization equipment must be:
• accessible,
• within sight of equipment,
• at least 5 ft from water [680.22(C)].
IRC E4103.3

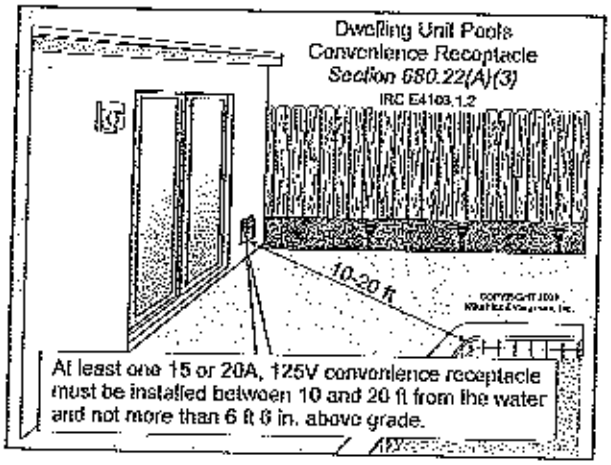

680.12 Disconnecting Means
Pool, spa or hot tub
Disconnect(s)
Within sight from equipment and readily accessible
• Disconnecting means for all utilization equipment (other than lighting)
• More than one disconnecting means permitted
• Disconnecting means required to be readily accessible and capable of being reached quickly without requiring removal of obstacles, portable ladders, etc.
Pump motor
Pool heater
IRC E4103.3

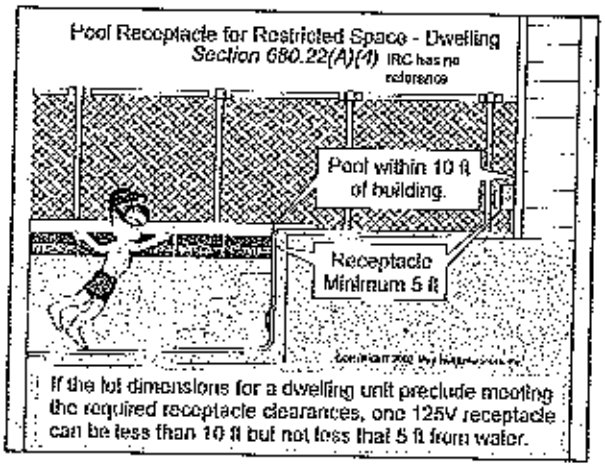


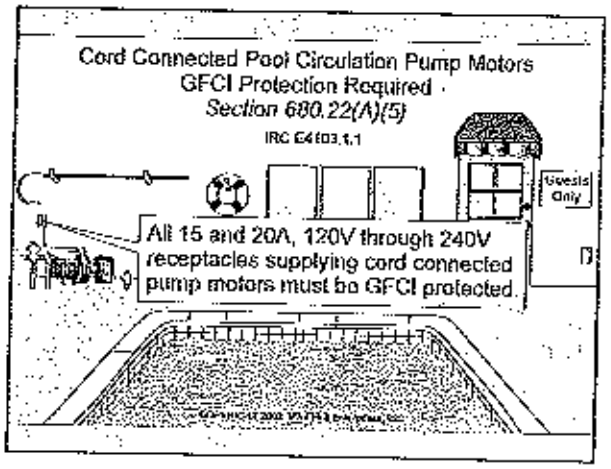

Pool Associated Motor - One-Family Dwelling
Equipment Grounding Conductor
Section 680.21(A)(4)
IRC T E4107.1
Any wiring method with an equipment grounding conductor not smaller than 12 AWG can be used in the interior of a one-family dwelling for pump motors.
Outdoor Pool Spa, Hot Tub Associated Motor

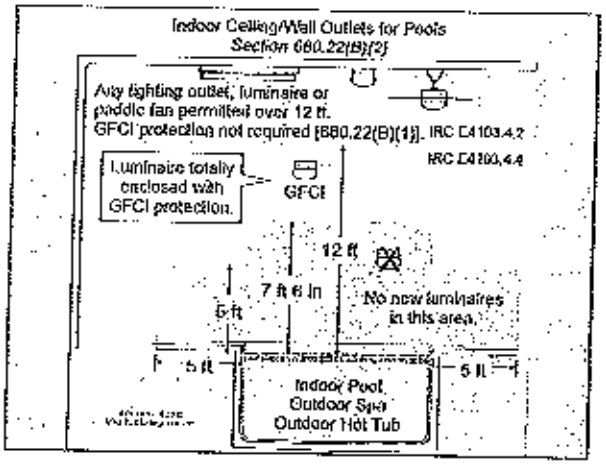

Receptacle for Pool
Circulation and Sanitation System
Section 680.22(A)(1)
IRC E4103.1.1
Between 5 and 10 ft
Receptacles (between 5 and 10 ft from water) for loads directly related to the circulation and sanitation system must be GFCI protected and a twist-lock type.

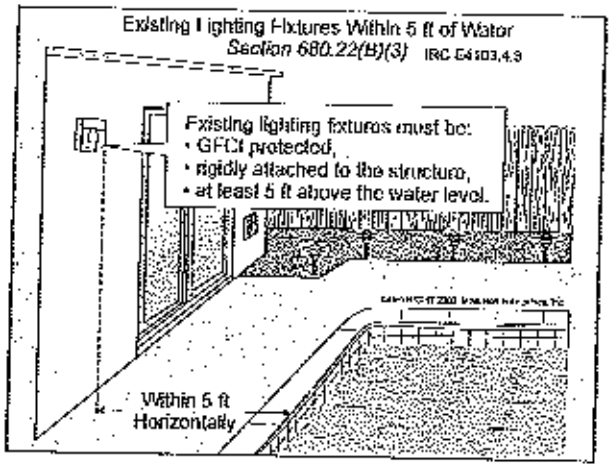

Location of Receptacles in Pool Areas
Section 680.22(A)(2) IRC E4103.1.1
Min. 10 ft
Receptacles not supplying water-pump motor or other loads directly related to circulation and sanitation system must be located at least 10 ft away from the water.

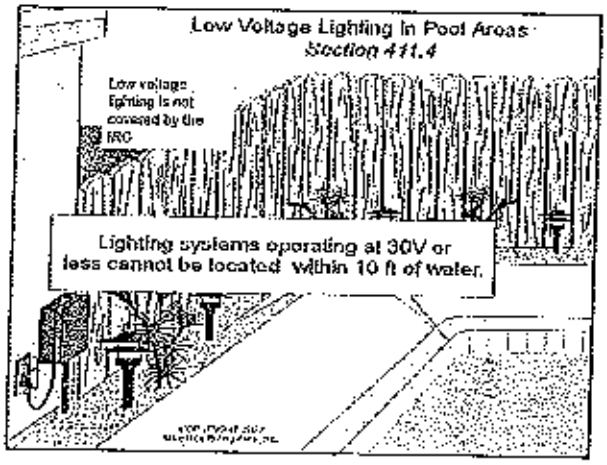

Dwelling Unit Pools
Convenience Receptacle
Section 680.22(A)(3)
IRC E4103.1.2
10-20 ft
At least one 15 or 20A, 125V convenience receptacle must be installed between 10 and 20 ft from the water and not more than 6 ft 6 in. above grade.

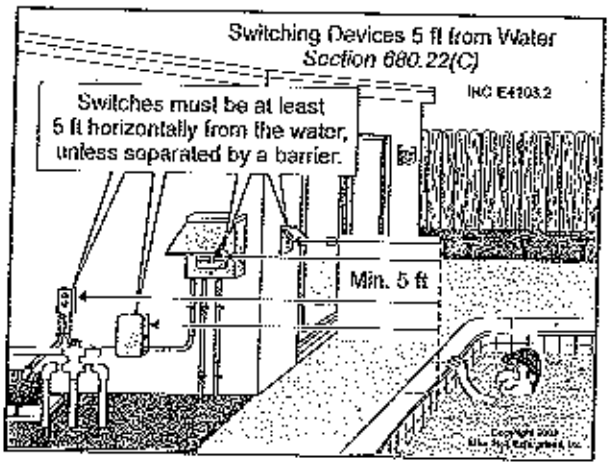

Pool Receptacle for Restricted Space - Dwelling
Section 680.22(A)(1) IRC has no reference
Pool within 10 ft of building.
Receptacle Minimum 5 ft
If the lot dimensions for a dwelling unit preclude meeting the required receptacle clearances, one 125V receptacle can be less than 10 ft but not less that 5 ft from water.

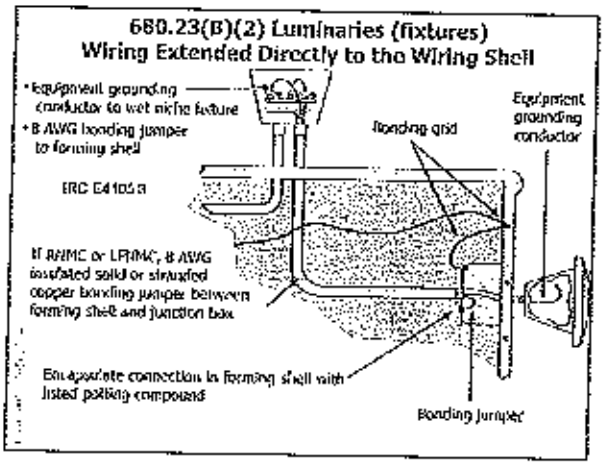

Cord Connected Pool Circulation Pump Motors
GFCI Protection Required
Section 680.22(A)(5)
IRC E4103.1.1
Guests Only
All 15 and 20A, 120V through 240V receptacles supplying cord connected pump motors must be GFCI protected.

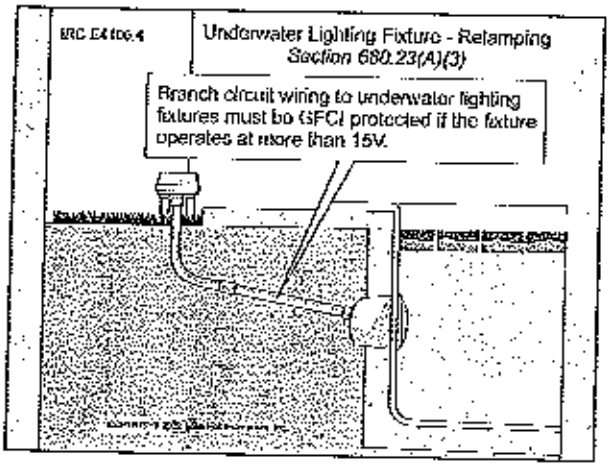

Indoor Ceiling/Wall Outlets for Pools
Section 680.22(B)(2)
Any lighting outlet, luminaire or paddle fan permitted over 12 ft. GFCI protection not required [680.22(B)(1)]. IRC E4103.4.2
IRC E4103.4.4
Luminaire totally enclosed with GFCI protection.
GFCI
12 ft
7 ft 6 in
5 ft
No new luminaires in this area.
5 ft
5 ft
Indoor Pool
Outdoor Spa
Outdoor Hot Tub

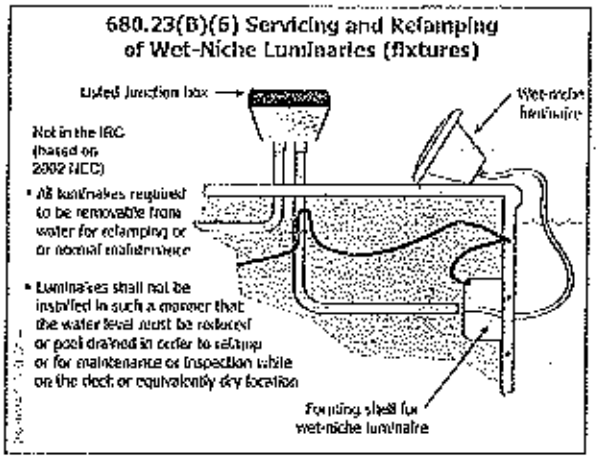

Existing Lighting Fixtures Within 5 ft of Water
Section 680.22(B)(3) IRC E4103.4.3
Existing lighting fixtures must be:
• GFCI protected,
• rigidly attached to the structure,
• at least 5 ft above the water level.
Within 5 ft Horizontally

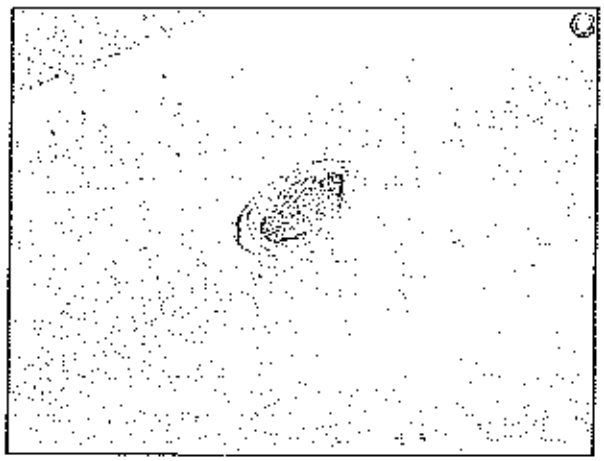

Low Voltage Lighting in Pool Areas
Section 411.4
Low voltage lighting is not covered by the IRC
Lighting systems operating at 30V or less cannot be located within 10 ft of water.

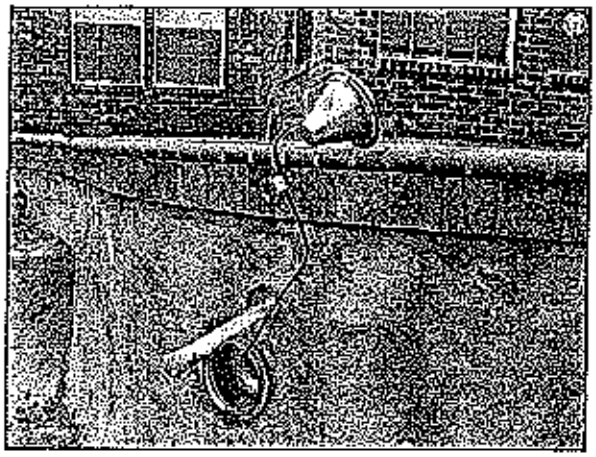

Switching Devices 5 ft from Water
Section 680.22(C)
IRC E4103.2
Switches must be at least 5 ft horizontally from the water, unless separated by a barrier.
Min. 5 ft

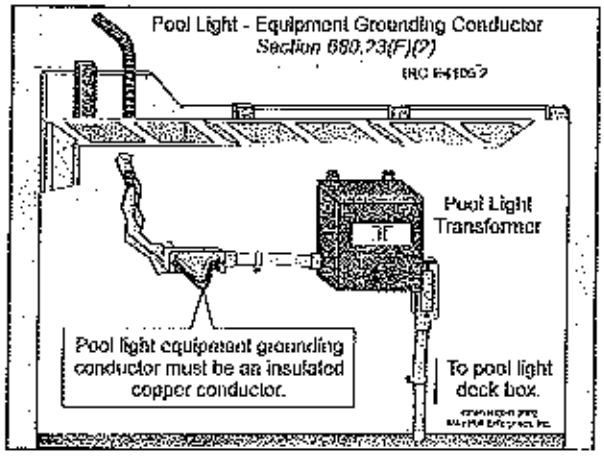

680.23(B)(2) Luminaries (fixtures)
Wiring Extended Directly to the Wiring Shell
* Equipment grounding conductor to wet niche fixture
* 8 AWG bonding jumper to forming shell
IRC E4105.8
Bonding grid
Equipment grounding conductor
If RNMC or LFNMC, 8 AWG insulated solid or stranded copper bonding jumper between forming shell and junction box
Encapsulate connection in forming shell with listed potting compound
Bonding jumper

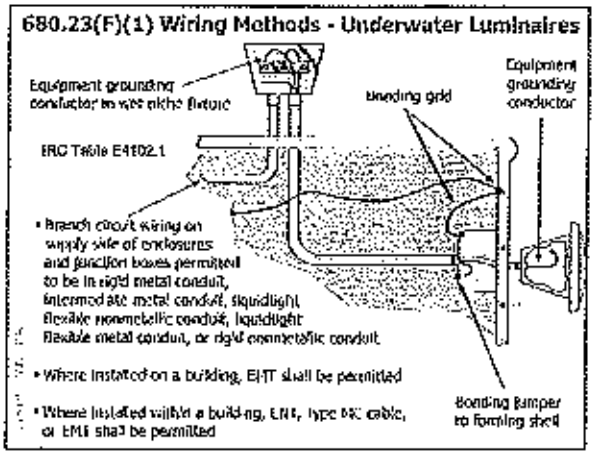

IRC E4105.4
Underwater Lighting Fixture - Relamping
Section 680.23(A)(3)
Branch circuit wiring to underwater lighting fixtures must be GFCI protected if the fixture operates at more than 15V.

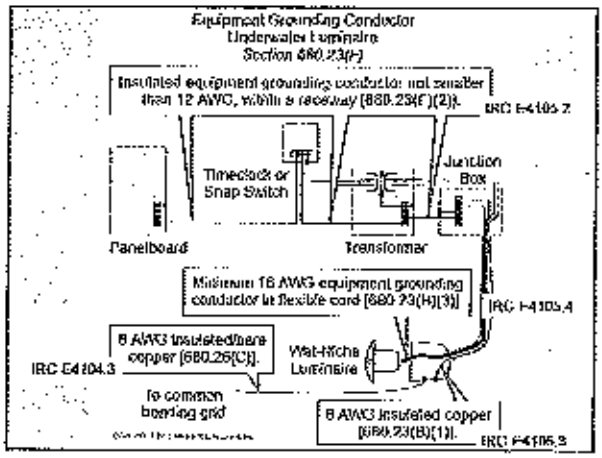

680.23(B)(6) Servicing and Relamping of Wet-Niche Luminaries (fixtures)
Listed junction box
Wet-niche luminaire
Not in the IRC (based on 2002 NEC)
• All luminaires required to be removable from water for relamping or for normal maintenance
• Luminaires shall not be installed in such a manner that the water level must be reduced or pool drained in order to relamp or for maintenance or inspection while on the deck or equivalently dry location
Forming shell for wet-niche luminaire

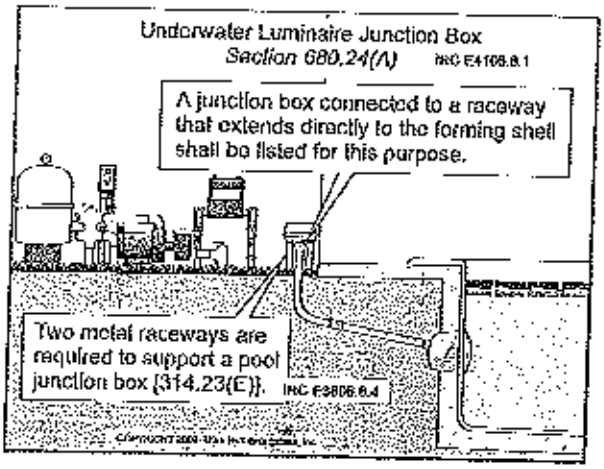


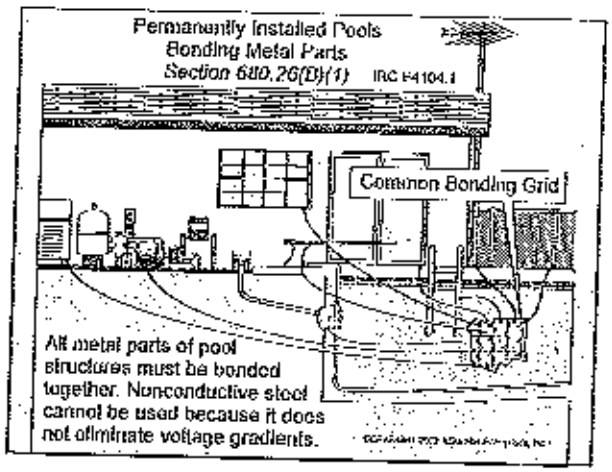


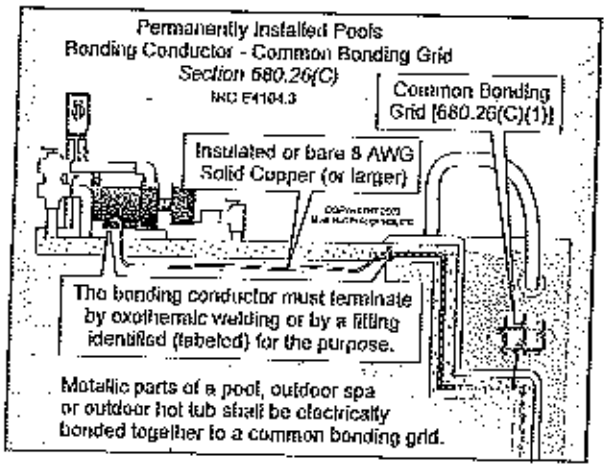

Pool Light - Equipment Grounding Conductor
Section 680.23(F)(2)
IRC E4105.2
Pool Light Transformer
Pool light equipment grounding conductor must be an insulated copper conductor.
To pool light deck box.

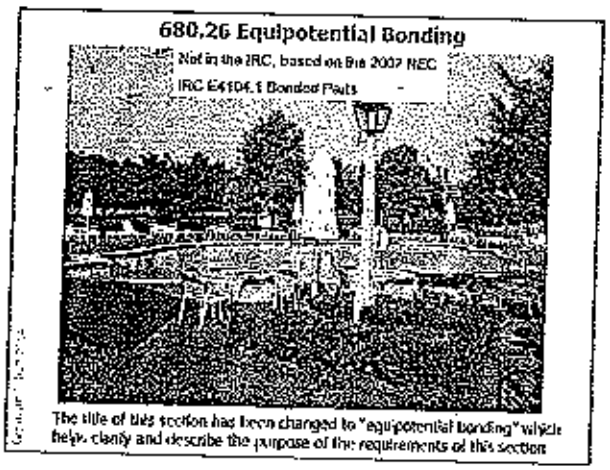

680.23(F)(1) Wiring Methods - Underwater Luminaires
Equipment grounding conductor to wet-niche fixture
Bonding grid
Equipment grounding conductor
IRC Table E4102.1
• Branch circuit wiring on supply side of enclosures and junction boxes permitted to be in rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, or rigid nonmetallic conduit
• Where installed on a building, ENT shall be permitted
• Where installed within a building, ENT, type NM cable, or EMT shall be permitted
Bonding jumper to forming shell

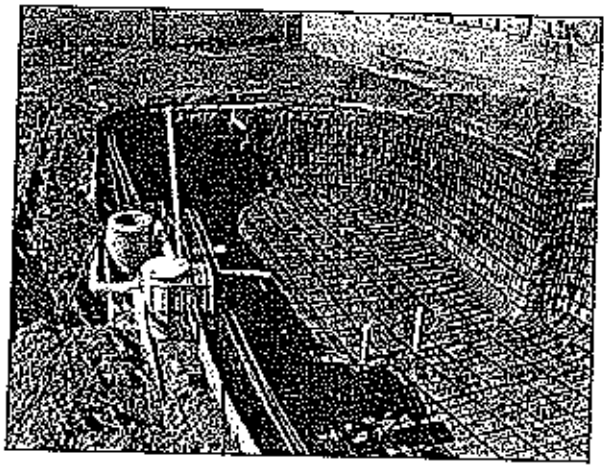

Equipment Grounding Conductor
Underwater Luminaire
Section 680.23(F)
Insulated equipment grounding conductor not smaller than 12 AWG, within a raceway (680.23(F)(2)).
IRC E4105.2
Timeclock or Snap Switch
Junction Box
Panelboard
Transformer
Minimum 16 AWG equipment grounding conductor in flexible cord (680.23(H)(3))
IRC E4105.4
8 AWG insulated/bare copper (680.26(C)).
IRC E4104.3
Wet-niche Luminaire
To common bonding grid
8 AWG insulated copper (680.23(B)(1)).
IRC E4105.3

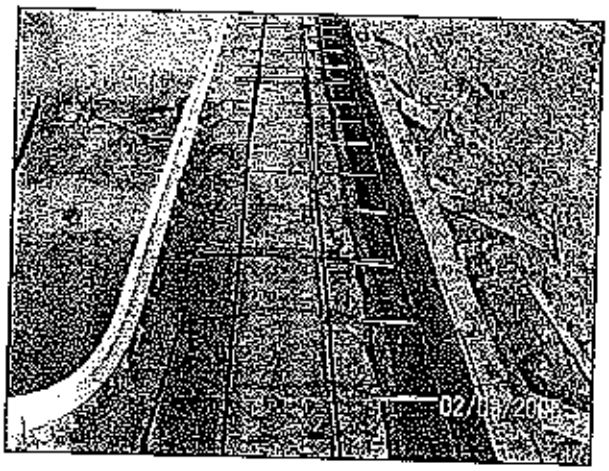

Underwater Luminaire Junction Box
Section 680.24(A)
IRC E4108.8.1
A junction box connected to a raceway that extends directly to the forming shell shall be listed for this purpose.
Two metal raceways are required to support a pool junction box [314.23(E)].
IRC E3806.6.4


Permanently Installed Pools
Bonding Metal Parts
Section 680.26(B)(1)
IRC E4104.1
Common Bonding Grid
All metal parts of pool structures must be bonded together. Nonconductive steel cannot be used because it does not eliminate voltage gradients.


Permanently Installed Pools
Bonding Conductor - Common Bonding Grid
Section 680.26(C)
IRC E4104.3
Common Bonding Grid [680.26(C)(1)]
Insulated or bare 8 AWG Solid Copper (or larger)
The bonding conductor must terminate by exothermic welding or by a fitting identified (labeled) for the purpose.
Metallic parts of a pool, outdoor spa or outdoor hot tub shall be electrically bonded together to a common bonding grid.


680.26 Equipotential Bonding
Not in the IRC, based on the 2007 NEC
IRC E4104.1 Bonded Parts
The title of this section has been changed to "equipotential bonding" which helps clarify and describe the purpose of the requirements of this section

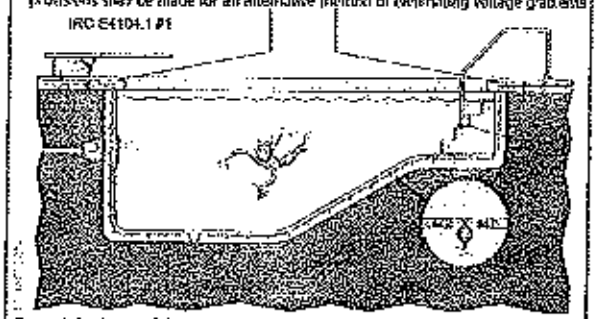




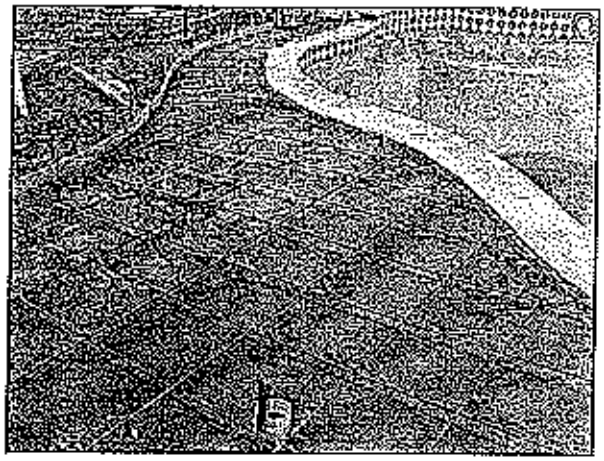
680.26(B)(1) Metallic Structural Components

Where reinforcing steel for coping stones and deck is insulated by encapsulating nonconductive compound or another conductive material is not available, provisions shall be made for an alternative method of eliminating voltage gradients

IRC E4104.1 #1

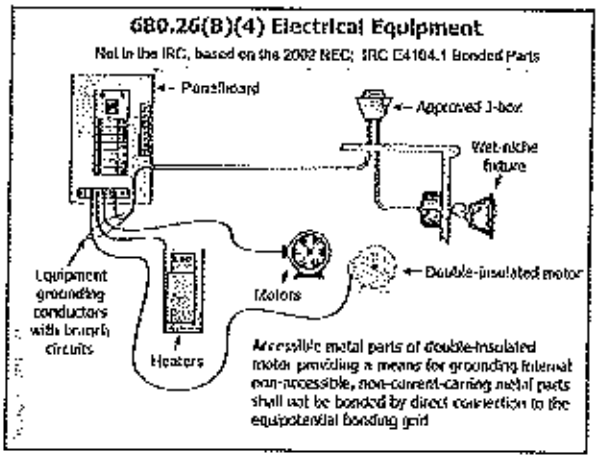


Reinforcing steel that is insulated by encapsulating nonconductive compound at the time of manufacture and installation not required to be bonded



680.26(B)(4) Electrical Equipment

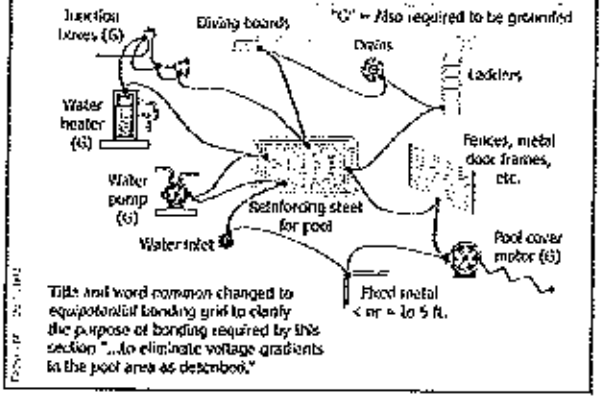
Not in the IRC, based on the 2002 NEC; IRC E4104.1 Bonded Parts



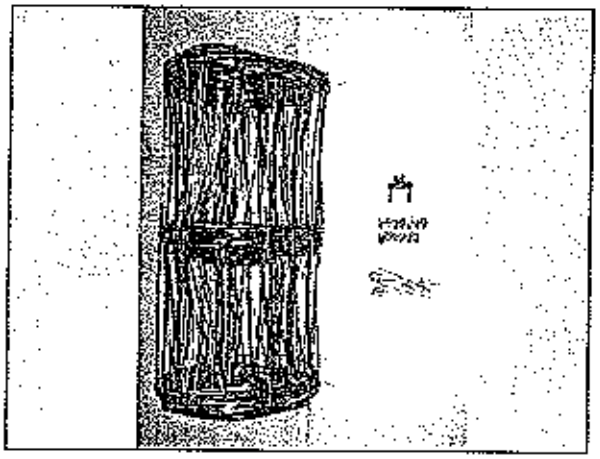
Accessible metal parts of double-insulated motor providing a means for grounding internal non-accessible, non-current-carrying metal parts shall not be bonded by direct connection to the equipotential bonding grid

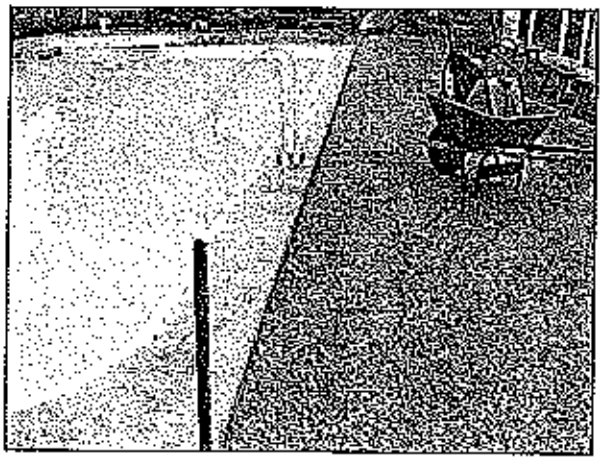
680.26(C) Equipotential Bonding Grid

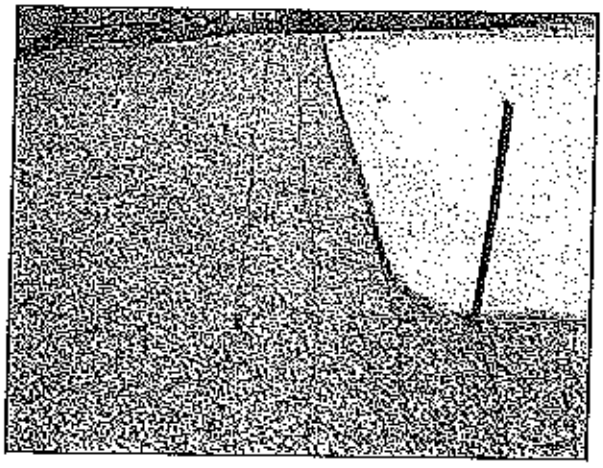
IRC E4104.1 Bonded Parts

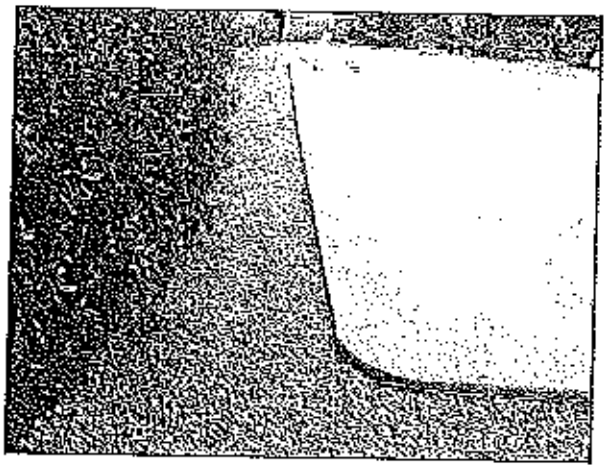


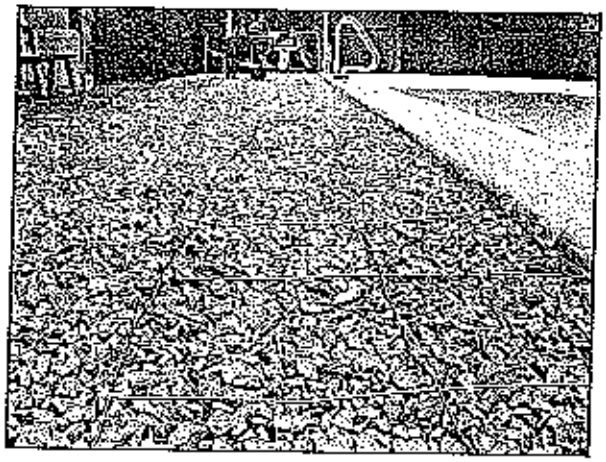
Title and word common changed to *equipotential* bonding grid to clarify the purpose of bonding required by this section "...to eliminate voltage gradients in the pool area as described."

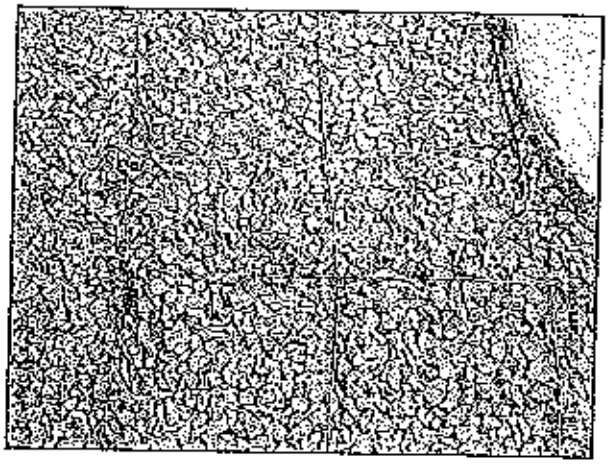


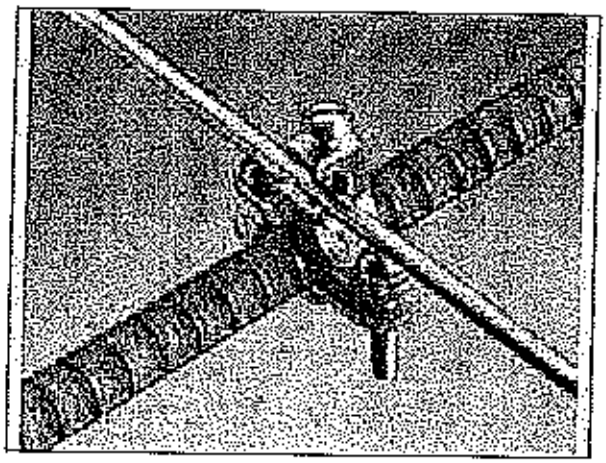


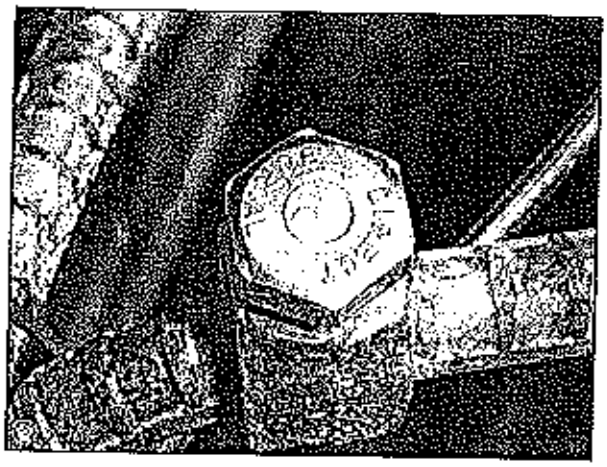


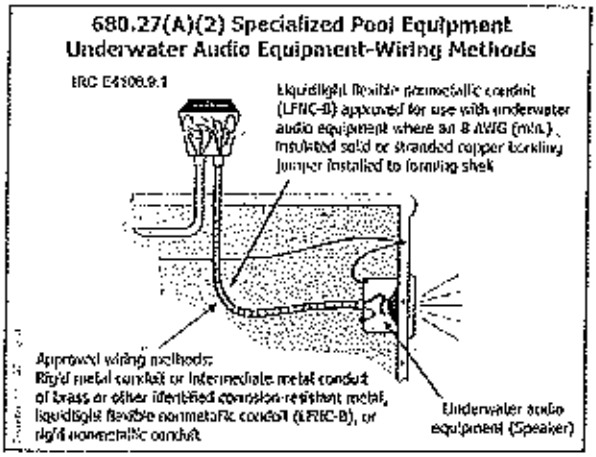


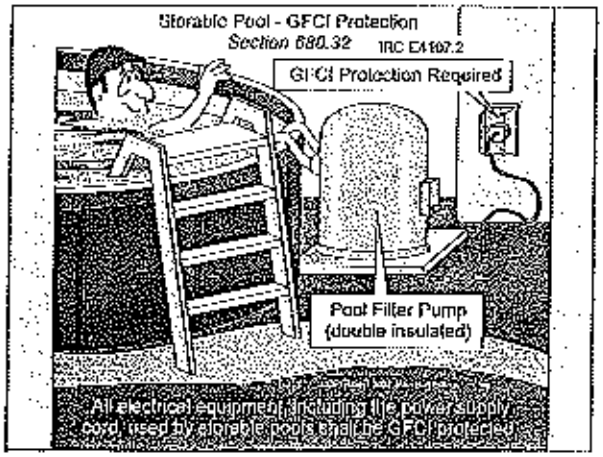


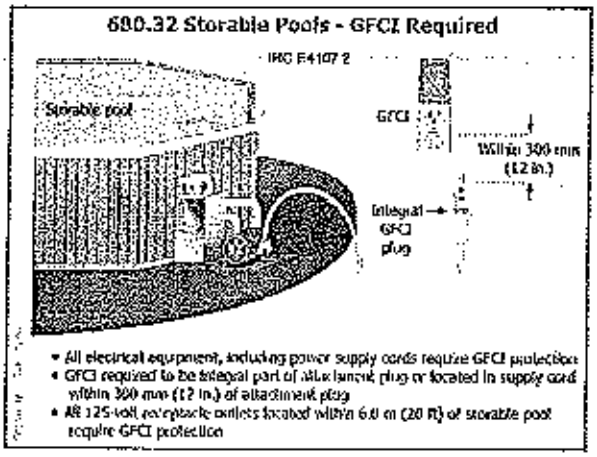


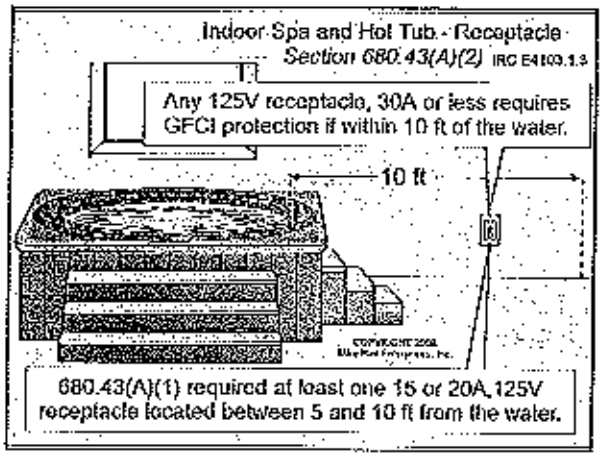


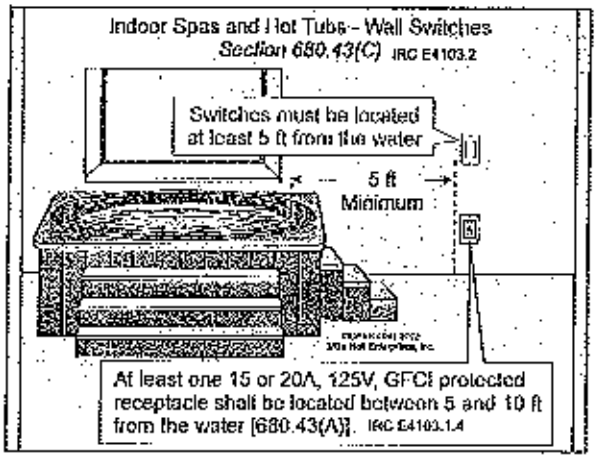


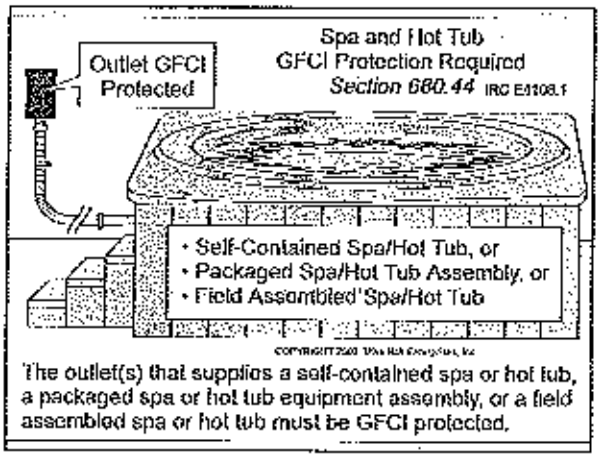

680.27(A)(2) Specialized Pool Equipment
Underwater Audio Equipment-Wiring Methods
IRC E4108.9.1
Liquidtight flexible nonmetallic conduit (LFNC-B) approved for use with underwater audio equipment where an 8 AWG (min.) insulated solid or stranded copper bonding jumper installed to forming shell
Approved wiring methods:
Rigid metal conduit or intermediate metal conduit of brass or other identified corrosion-resistant metal, liquidtight flexible nonmetallic conduit (LFNC-B), or rigid nonmetallic conduit
Underwater audio equipment (Speaker)


Storable Pool - GFCI Protection
Section 680.32 IRC E4107.2
GFCI Protection Required
Pool Filter Pump
(double insulated)
All electrical equipment, including the power supply cord, used by storable pools shall be GFCI protected


680.32 Storable Pools - GFCI Required
IRC E4107.2
Storable pool
GFCI
Within 300 mm (12 in.)
Integral GFCI plug
• All electrical equipment, including power supply cords require GFCI protection
• GFCI required to be integral part of attachment plug or located in supply cord within 300 mm (12 in.) of attachment plug
• All 125-volt receptacle outlets located within 6.0 m (20 ft) of storable pool require GFCI protection


Indoor Spa and Hot Tub - Receptacle
Section 680.43(A)(2) IRC E4103.1.3
Any 125V receptacle, 30A or less requires GFCI protection if within 10 ft of the water.
10 ft
680.43(A)(1) required at least one 15 or 20A, 125V receptacle located between 5 and 10 ft from the water.


Indoor Spas and Hot Tubs - Wall Switches
Section 680.43(C) IRC E4103.2
Switches must be located at least 5 ft from the water
5 ft Minimum
At least one 15 or 20A, 125V, GFCI protected receptacle shall be located between 5 and 10 ft from the water [680.43(A)]. IRC E4103.1.4


Outlet GFCI Protected
Spa and Hot Tub
GFCI Protection Required
Section 680.44 IRC E4108.1
• Self-Contained Spa/Hot Tub, or
• Packaged Spa/Hot Tub Assembly, or
• Field Assembled Spa/Hot Tub
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 must be GFCI protected.

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- Round Post Adaptor
- Gate Handle
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Magnetic Pool Safety Gate Latches

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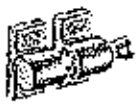
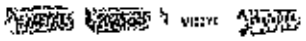
Vertical Pull

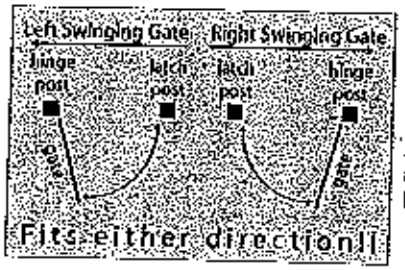
Side Pull



Fits all materials



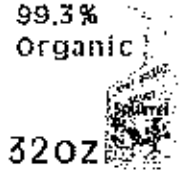
MAGNA•LATCH safety gate latches are a revolutionary breakthrough in latching security for most gates around swimming pools, homes and other child safety areas (childcare centers).

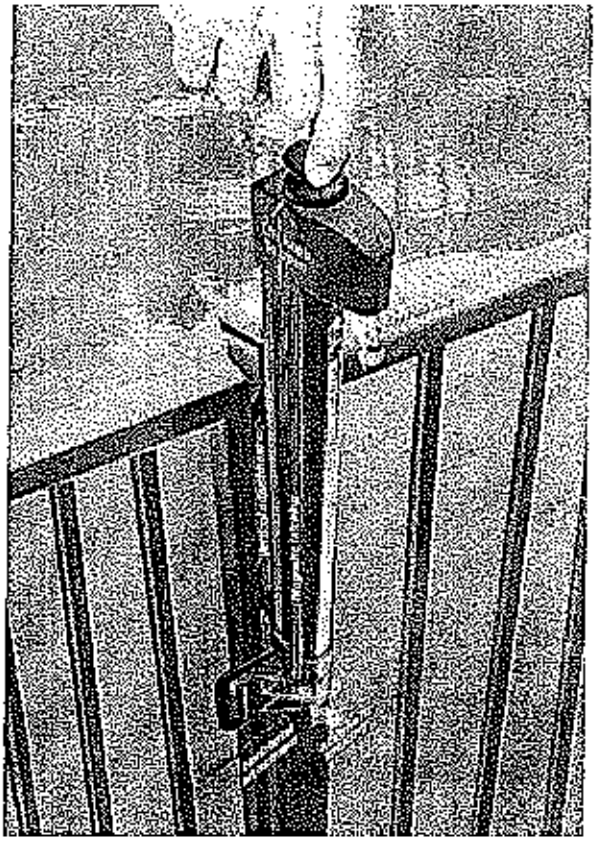


Powered by the latest 'Permanent Magnets' (which never lose power) these quality latches incur no mechanical interference to closure and so offer unprecedented reliability, safety and child resistance.

All latches adapt readily to most new or existing gates of any material – metal, wood or vinyl. The Top Pull model is key-lockable for added safety.

Are Squirrels chewing on your latch?





Won't damage plastic parts.

LOKK-LATCH

Lokk Latch is a general purpose gravity latch that is key lockable. This versatile latch will work on both left and right swinging gates and comes with a limited lifetime warranty. This is no ordinary latch, buy Lokk Latch.

LOKK-BOLT

Lokk Bolt is a security drop bolt (aka drop rod) that is key lockable. Features a Kwikset keyway (so a locksmith can key it alike to most house doors) and a limited lifetime warranty. Avoid the pitfalls of those other drop rods, buy Lokk Bolt.

TRU-CLOSE

Tru Close self closing pool gate hinges will never rust, bind, sag or stain your fence. They feature adjustable tension and a limited lifetime warranty. Buy Tru Close when safety counts.

Fenceflax.com & MagnaLatch.net are distributors for products from D&D Technologies, not the manufacturer. All warranty issues are handled directly by the manufacturer. Items in stock ordered by 3:00 PM EST generally ship that same day (Mon-Fri) except for weekends & holidays. For transit times and item availability please fill out our contact form. All returned merchandise is subject to a 15% (35 min) restocking fee. Returns must be in their original unopened packages. All prices are U.S. Dollars. Any duties, import fees, brokerage fees, taxes and/or currency exchange charges are to be paid by the recipient (buyer). All shipments are FOB Dover, Delaware USA

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For Quick-Install Instructions, Please Click Here

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CPSC Staff Interpretation

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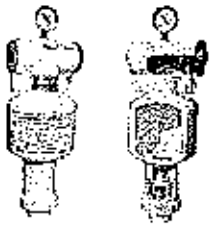

The Life You Save Could Be Your Child's, Or Your Own.

What is Suction Entrapment?

When a swimmer becomes stuck to a drain or suction outlet in a swimming pool, spa, wading pool, or hot tub, the force of the filtration system can be tremendous. This "suction entrapment" will hold the bather in its grip until either the vacuum is broken, or he or she drowns, defying the rescue efforts of onlookers. Vac-Alert provides an important layer or protection to suction entrapment with our safety vacuum release system.

In the news...

- **Virginia Graeme Baker Pool And Spa Safety Act**
- **Federal Pool Safety Legislation Passes Congress**
- **Mum offered holiday for dead son**
- **CPSC Recommends Installation of Safety Vacuum Release System (SVRS)**
- **NEWS from CPSC**
- **Drowned boy's arm was stuck in intake valve**

Read More...

Vac Alert's VA-2000 SVRS

- **The perfect safety solution** for every pump that draws water, including pools, spas, fountains, slides and vacuum ports.
- **Self monitoring,** non electrical and low maintenance.
- **Easy to install** within thirty minutes. An installation DVD is included with every unit. It is recommended to use a pool professional.
- **Long lasting design** features moisture resistant PVC, and stainless steel construction.
- **Proven to work** - some states such as Texas, North Carolina, and other places like Ontario, Canada are requiring commercial pool owners use equipment like Vac-Alert to retrofit pools and spas.
- **Meets all requirements** of the International Code Council, both the International Building

MEMBER ICC INTERNATIONAL CODE COUNCIL

VA-2000 meets and exceeds IBC and IRC codes.

Vac-Alert VA-2000 in Compliance with ASME/ANSI A112.19.17 as required by the International Building Codes (IBC) and the International Residential Codes (IRC)

The Vac-Alert VA-2000 was tested by Applied Research Laboratories and found to comply with ASME/ANSI 112.19.17, "Manufactured Safety Vacuum Release Systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub and Wading Pool Suction Systems."

The ASME/ANSI 112.19.17 is the required standard in the International Building Code (IBC) adn the International Residential Code (IRC) for items that provide vacuum relief (SVRS).

Code (IBC) and the International Residential Code (IRC). Meets or exceeds all the ANSI/ASME performance standards for safety vacuum release systems.

- **3-year limited warranty** ensures reliability.
- **Won't damage** your pump when tripped.

For more information, call **Vac-Alert at 1-800-374-7405** or **click here to find your Regional Sales Office.**

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Your Peace of Mind
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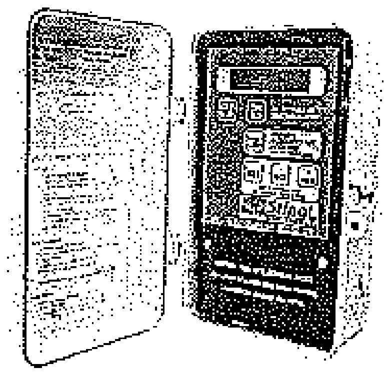
PRODUCTS - SR-500 STINGL SWITCH

SR-500 Stingl Switch

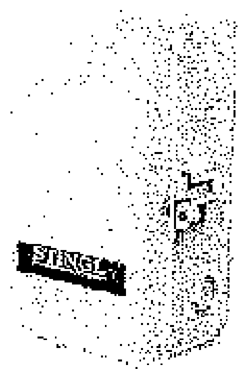
(Safety Vacuum Release System)

The Model SR-500 is a Safety Vacuum Release System (SVRS) which works by monitoring the vacuum on the suction side of the pool or spa pump. When a blockage occurs in the main drain or skimmer a sudden rise in vacuum will cause the SR-500 to shut down pump operation and activate an audible alarm. The pump will remain off with the alarm sounding until manually reset.

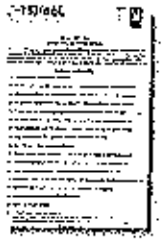


Features and Benefits

- Complies with ASME/ANSI 112.19.17 as required by the International Building Codes (IBC) and the International Residential Codes (IRC)
- Meets all current codes and standards for SVRSs on new and existing pools and spas
- Can act as pool controller with programmable timer, or as stand alone SVRS working in conjunction with existing pool controller
- Newest state-of-art NEC microprocessor technology-- guaranteed reliability and performance
- Vacuum monitored 128 times per second -- rapid response and accurate readings
- Power monitored 50/60 times per second -- insures continuous power detection
- Can act as a pool and spa controller - with fully programmable 24 hour timer, or as stand alone SVRS working in conjunction with existing pool and spa controller
- Integrates with existing timer box - (for easy retrofit)
- Low vacuum sensing - (prevents cavitations or running the pump dry, eliminating costly equipment failure)
- 30 minute maintenance override - (for pool or spa service)
- Accessible extra dry contact -- auxiliary equipment can be added
- Power back-up -- insures settings and reading will be saved (30 minute rapid recharge)
- Display error readout - (prevents guessing during troubleshooting)
- Works on all size pumps
- Easy and trouble free installation - (no pipes to cut or glue)



- Turns off pump in milliseconds upon detecting sudden vacuum change
- Multiple audible alarm capabilities – allows for quicker alert to harmful situations
- Provides a layer of protection, reducing entrapment risk



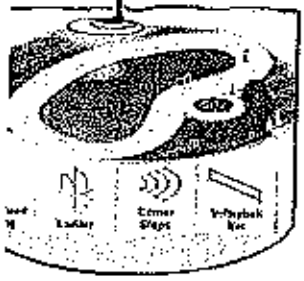
Click here for the SR-500 Features and Benefits sheet
(PDF 71KB)

Click here for the SR-500 Brochure
(PDF 315KB)

Click here for the SR-500 Tri-Fold Brochure
(PDF - 248 KB)

Pool Safety: General Guidelines

Stratum™ VRS
Suction Outlets
General Guidelines



Stratum™ VRS

An Additional Layer of Protection.

When it comes to pools and safety you can never be too careful. Understanding and knowing how to keep swimmers safe is a subject where we can never know, or do, too much. Hayward strives to be a responsible corporation concerning the growing need for energy efficient, environmentally friendly products. We work hard to continue to raise the bar to provide industry changing, innovative products that meet the demands of our customers and the growing concerns of the public.

When it comes to pool safety, multiple layers of protection are crucial. As an additional layer of protection, Hayward introduces Stratum™ VRS (vacuum release system)—the next level in peace of mind.

Recent regulatory updates have called for addition methods to avoid suction outlet entrapment. According to the National Safe Kids organization more than two-thirds of parents (66 percent) are not at all or only somewhat familiar with the topic of suction entrapment and entanglement. According to the CPSC, there are five categories of potential suction entrapment hazards and there is no single product that protects against all five-entrapment hazards. The five hazards are:

1. Hair entanglement
2. Body suction entrapment
3. Limb entrapment
4. Evisceration/disembowelment
5. Mechanical entrapment

Stratum provides an additional layer of protection against body

RESOURCES

- Tech Specs
- Owner's Manuals
- Replacement Parts

In this issue... Hayward POOLSIDE

New products, backyard safety, expert advice, makeover ideas and entertaining tips. Sign up >

suction entrapment risks. It monitors and reacts to changes in suction pressure (vacuum). Stratum is the first and only system that simultaneously vents the suction line to atmosphere and turns off the power to the pump.

Stratum is effective in monitoring the suction pressure in single or multiple suction outlet (drain) systems, which share a common suction line. It features an automatic restart after certain activations and is programmed with an internal checking system that performs performance diagnostics during each start-up.

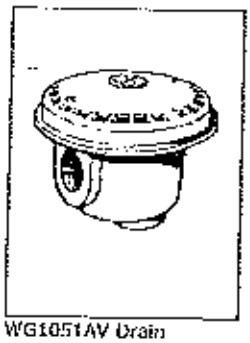
Supervision is always your primary layer of protection. For more information on layers of protection click here. For information about Suction entrapment risks visit www.cpsc.gov

In Ground Pools: General Pool and Spa

Products
+ Pumps
+ Filters
+ Heaters
+ Cleaners
+ Controls
+ Chlorinators
+ Lighting
+ General Pool and Spa
+ Totally Hayward™ System
+ Owner's Manuals
+ Literature & Brochures
+ Replacement Parts
Maintenance
Saving Energy & Money
Rebate Center
Warranty Registration

Suction Outlets & Fittings

Hayward covers safety with variety and style. New safety suction outlets meet all federal requirements.


WG1051AV Drain


WG1053AV Drain

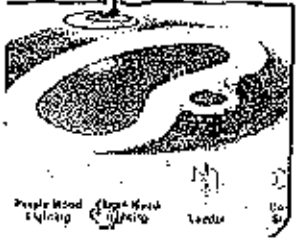
For concrete or vinyl/fiberglass pools, Hayward industry approved suction outlets and covers are available in a wide range of styles, sizes and colors to satisfy any installation requirement. Whether you install frame and covers, for residential or commercial pools, or sump-type drains, Hayward suction outlets set the standard in quality and value.

Legislation leads to performance enhancements:
Two major changes in the pool industry address the enhanced performance requirements for pool safety.

1. The American Society of Mechanical Engineers (ASME) has released ANSI/ASME A112.19.8 - 2007 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs. The revisions for this standard include testing of outlet covers to prevent hair entanglement, body entrapment, and finger entrapment as well as improved Ultra Violet (UV) stability of outlet covers.
2. The Virginia Graeme Baker Pool and Spa Safety act promotes the safe use of pools, spas and hot tubs by imposing mandatory federal requirements for suction entrapment avoidance. Effective December 20, 2008 the Act will be administered by the U.S. Consumer Products Safety Commission (CPSC).*

What do the mandatory federal requirements mean?
Specifically, the mandatory federal requirements are as follows:

+ By December 20, 2008 each swimming pool or spa drain cover manufactured, distributed or entered into commerce in the United States shall conform to the ANSI/ASME A112.19.8 2007 Suction Fittings for Use in Swimming Pools,



Wading Pools, Spas and Hot Tubs published by ASME. Compliance with this standard will be enforced by the CPSC as a consumer product safety rule.

- Hayward WG Series Suction Outlet products comply with provisions of the ANSI/ASME A112.19.8 – 2007 standard and the Virginia Graeme Baker Pool and Spa Safety Act.

It is important to determine if a drain cover is compliant with the requirements.
Hayward drain covers compliant with the new standard will have ANSI/ASME embossment on each drain cover to indicate it is compliant.

- **Warning! Read and follow all instructions.**
- Product Notes
- Technical Specifications

Warning! Read and follow all instructions.

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- Failure to follow instructions can cause severe injury and/or death.
- A minimum of two functioning suction outlets per pump must be installed. Suction outlets in the same plane (i.e. floor or wall), must be installed a minimum of three feet (3') [1 meter] apart, as measured from pipe center to pipe center.
- Dual suction fittings shall be placed in such locations and distances to avoid "dual blockage" by a user.
- Dual suction fittings shall not be located on seating areas or on the backrest for such seating areas.
- The maximum system flow rate shall not exceed the flow rating of any listed (per ASME/ANSI A112.19.8-2007) suction outlet cover installed.
- Never use Pool or Spa if any suction outlet component is damaged, broken, cracked, missing, or not securely attached.
- Replace damaged, broken, cracked, missing or not securely attached suction outlet components immediately.
- In addition, two or more suction outlets per pump installed in accordance with latest APSP, IAF Standards and CPSC guidelines, follow all National, State and Local codes applicable.

Product Notes

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NOTE: See "Guidelines for Addressing Entrapment Hazards with Pools and Spas," U.S. Consumer Product Safety Commission, Publication #363-009081, (301) 504-0400 or www.cpsc.gov/cpscpub/pubs/363.pdf.

Learn more about the Virginia Graeme Baker Pool and Spa Safety Act and the Stratum® VRS, an additional layer of protection.

Technical Specifications

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Deluxe Suction Outlets

Model Number	Side	Bottom	Description
WG1153AVPAK2	1 1/2"	2"	Dual Sumps with covers, for Concrete
WG1154AVPAK2	2"	2"	Dual Sumps with covers, for Concrete

Open Area – 7 sq. in.
Standard screws are 3/16" max. wall thickness.

Frames and Covers

Model Number	Size	Description	Flow Rate
WG1030AVPAK2	7 7/8" Dia	Dual pack White	125
WG1030AVBKPAK2	7 7/8" Dia	Dual pack Black	125
WG1030AVGRPAK2	7 7/8" Dia	Dual pack Gray	125
WG1048E*	7 7/8" Dia	Floor Cover	125
WG1048EW*	7 7/8" Dia	Wall Cover	72
WGX1048B*		Vinyl Ring	--

Open Area – 14 sq. in.
*Add BLK for Black or GR for Gray color.

Hydrostatic Relief Valve

Model Number	Size	Description
SP1056	1 1/2", 2"	Spring Loaded

Main Drain Collector Tube

Model Number	Size	Description
SP1055	1 1/2", 2"	12" long collector tube

Suction Outlets for Concrete

Model Number	Side	Bottom	Description
WG1051AVPAK2	1 1/2"	1 1/2"	Dual Sumps with covers, for Concrete
WG1052AVPAK2	2"	1 1/2"	Dual Sumps with covers, for Concrete
WG1053AVPAK2	1 1/2"	2"	Dual Sumps with covers, for Concrete
WG1054AVPAK2	2"	2"	Dual Sumps with covers, for Concrete
WB1051X			Adjustable Collar for Plaster Concrete

Open Area – 7 sq. in.
*Standard screws are 3/16" max, wall thickness

Suction Outlets for Vinyl or Fiberglass

Model Number	Size	Description
WG1048AVPAK2	1 1/2"	Dual Sumps with covers, for Vinyl or Fiberglass
WG1049AVPAK2	2"	Dual Sumps with covers, for Vinyl or Fiberglass

Open Area – 8.1 sq. in.
*Standard screws are 3/16" max, wall thickness

THE "LIFT OFF" STEPS, A-FRAME LADDER AND CLASSIC LADDER NEED TO BE SURROUNDED WITH A FENCE.

THE BILTMORE AND EASY ENTRY MEET CODE REQUIREMENTS WITHOUT ANY FENCE.