



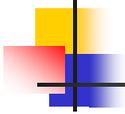
## Florida Building Code Advanced Training: Residential Swimming Pools

---

Florida Building Commission  
Department of Community Affairs  
2555 Shumard Oak Boulevard  
Tallahassee, FL 32399-2100  
(850) 487-1824  
<http://www.floridabuilding.org>

This presentation, developed by the Florida Swimming Pool Association in conjunction with Roy Lenois, Artesian Pools of East Florida, Inc., reflects private swimming pool-related provisions of the *Florida Building Code, Residential* and the *Florida Building Code, Building* as of October 1, 2005. Where section numbers are different in the slide from the notes section, identical code can be found in either document.

Note that this presentation is arranged primarily from the viewpoint of the inspector.



## Chapter 1: Administration Residential Code

- Chapter 41 of the *Florida Building Code, Residential* and Chapter 4 of the *Building Code, Building* provide code requirements for residential swimming pools. The language in both chapters is the same with the exception that Chapter 4 of the *Building Code, Building* is more inclusive.
- R101.2 Scope:...Construction standards or practices which are not covered by this code shall be in accordance with the provisions of *Florida Building Code, Building*.

**R101.2 Scope.** The provisions of the *Florida Building Code, Residential* shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with a separate means of egress and their accessory structures. Construction standards or practices which are not covered by this code shall be in accordance with the provisions of *Florida Building Code, Building*.

**Exception:** Existing buildings undergoing repair, alteration or additions, and change of occupancy shall comply with the *Florida Existing Building Code*.

**R101.2.1** The provisions of Chapter 1, *Florida Building Code, Building* shall govern the administration and enforcement of the *Florida Building Code, Residential*.



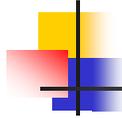
## R4101.1.2 Private swimming pools

- R4101.1.2 Words not defined shall have the meanings stated in the Florida Building Code:
  - Building
  - Mechanical
  - Plumbing
  - Fuel Gas
- Or *Florida Fire Prevention Code*
- Or in *Webster's Third New International Dictionary*

### **R4101.1.2 Words not defined.**

Words not defined herein shall have the meanings stated in the *Florida Building Code, Building; Florida Building Code, Mechanical; Florida Building Code, Plumbing; Florida Building Code, Fuel Gas* or *Florida Fire Prevention Code*. Words not defined in the Florida Building Code shall have the meanings stated in the *Webster's Third New International Dictionary of the English Language Unabridged*.

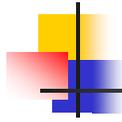
### **R4101.2 Definitions.**



- R4101.15 Gas piping.
  - Gas piping must comply with the *Florida Building Code, Fuel Gas*.
- R4101.16 Electrical.
  - Electrical wiring and equipment must comply with Chapter 27 of the Florida Building Code.
- R4101.3 Mechanical requirements.
  - All piping, equipment and materials used in the plumbing system of built-in-place swimming pools must conform to the *Florida Building Code, Plumbing* unless otherwise specified.

#### **424.2.3 Mechanical requirements.**

Unless otherwise specified in this code, all piping, equipment and materials used in the plumbing system of swimming pools that are built in place shall conform to the *Florida Building Code, Plumbing*.



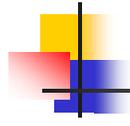
## R4101.4 Approvals

- R4101.4.1 Compliance.
  - Materials, piping, valves, equipment or appliances used in the construction of swimming pools or portions thereof must
    - comply with this code or
    - be of a type recommended and approved by a nationally recognized testing agency or
    - conform to other recognized standards acceptable to the administrative authority.

### **R4101.4 Approvals.**

#### **R4101.4.1 Compliance.**

All materials, piping, valves, equipment or appliances entering into the construction of swimming pools or portions thereof shall be of a type complying with this code or of a type recommended and approved by a nationally recognized testing agency or conforming to other recognized standards acceptable to the administrative authority.



## R4101.3 Approvals

- R4101.4.2 Items not covered.
  - The administrative authority can require that all equipment, materials, methods of construction and design features not covered in these requirements be proven to function adequately, effectively and without excessive maintenance and operational difficulties.

### **R4101.4 Approvals.**

#### **R4101.4.2 Items not covered.**

For any items not specifically covered in these requirements, the administrative authority is hereby authorized to require that all equipment, materials, methods of construction and design features shall be proven to function adequately, effectively and without excessive maintenance and operational difficulties.



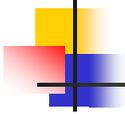
## R4101.4 Approvals

- R4101.4.3 Applicant responsibility.
  - Before any item is approved or accepted for tests, the applicant must provide such data, tests or other adequate proof that the device, material or product will satisfactorily perform the function for which it is intended.

### **R4101.4 Approvals.**

#### **R4101.4.3 Applicant responsibility.**

It shall be the responsibility of the applicant to provide such data, tests or other adequate proof that the device, material or product will satisfactorily perform the function for which it is intended, before such item shall be approved or accepted for tests.



## R4101.5 Alternate materials and methods of construction

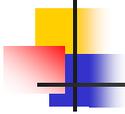
---

- R4101.5.1 Approval and authorization.
  - Provisions of this code are not intended to prevent the use of any alternate material, method of construction, appliance or equipment, provided any such alternate has been first approved and its use authorized by the administrative authority.

### **R4101.5 Alternate materials and methods of construction.**

#### **R4101.5.1 Approval and authorization.**

The provisions of this code are not intended to prevent the use of any alternate materials, method of construction, appliance or equipment, provided any such alternate has been first approved and its use authorized by the administrative authority.



## R4101.5 Alternate materials and methods of construction

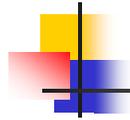
---

- R4101.5.2 Required tests.
  - The administrative authority may require tests by an approved agency, at the expense of the applicant, when there is insufficient evidence to substantiate claims for alternates.

### **R4101.5 Alternate materials and methods of construction.**

#### **R4101.5.2 Required tests.**

When there is insufficient evidence to substantiate claims for alternates, the administrative authority may require tests, as proof of compliance, to be made by an approved agency at the expense of the applicant.



## R4101.6 Engineering design

- R4101.6.1 Conformance standard.
  - Design, construction and workmanship shall be in conformity with the requirements of:
    - ANSI/NSPI-3 (*Standard for Permanently Installed Spas*)
    - ANSI/NSPI-4 (*Standard for Aboveground/Onground Residential Swimming Pools*); and
    - ANSI/NSPI-5 (*Standard for Residential Swimming Pools*)
    - ANSI/NSPI-6 (*Standard for Residential Portable Spas*)

### **R4101.6 Engineering design.**

#### **R4101.6.1 Conformance standard.**

Design, construction and workmanship shall be in conformity with the requirements of ANSI/NSPI-3; ANSI/NSPI-4; ANSI/NSPI-5; and ANSI/NSPI-6.

This change became effective October 1, 2005.



## 109.3 Required inspections

### 6. Swimming pool inspection

- The first inspection is made:
  - After excavation and installation of reinforcing steel, bonding and main drain
  - Before placing of concrete
- The final inspection is made:
  - When the swimming pool is complete
  - After all enclosure requirements are in place
- To pass final inspection and receive a certificate of completion, the pool must meet the safety features described in Section 424.2.17

## CHAPTER 1: ADMINISTRATION

### SECTION 109 INSPECTIONS

#### 109.3 Required inspections.

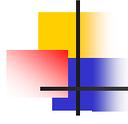
##### 6. Swimming pool inspection:

- First inspection to be made after excavation and installation of reinforcing steel, bonding and main drain and prior to placing of concrete.
- Final inspection to be made when the swimming pool is complete and all required enclosure requirements are in place.
- In order to pass final inspection and receive a certificate of completion, a residential swimming pool must meet the requirements relating to pool safety features as described in Section 424.2.17.

#### Notes:

**This presentation, while following the above list of “required inspections” is in much greater detail. You may find that some municipalities do not inspect for all of the code sections indicated.**

**Also included are some suggestions for making a better quality product with fewer complaints/call backs.**



## Additional Inspections

- Set backs per zoning requirements
- Construction fence required by OSHA

The U.S. Department of Labor Occupational Safety & Health Administration (OSHA) Regulations (Standards – 29 CFR);

**Part Number: 1926; Part Title: Safety and Health Regulations for Construction;**

**Subpart: M; Subpart Title: Fall Protection;**

**Standard Number: 1926.501; Title: Duty to have fall protection.**

For your information...

A letter (dated December 30, 1997) from Mr. David Grissom to Mr. Roy Gurnham, Director, Office of Construction and Maritime Compliance Assistance, Washington, D.C. states the following:

“My firm has a client who fell into a residential pool under construction not yet filled with water. Are there OSHA standards which apply whose purpose is to prevent an occurrence such as the one I have described? What OSHA standards apply which would eliminate or reduce the hazards of a person falling into a residential swimming pool not yet filled with water? ...”

The answer, dated June 8, 1998, states the following:

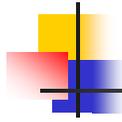
“...The edge of a completed swimming pool not yet filled with water would be considered an unprotected side or edge of a walking/working surface and conventional fall protection would be required if workers were exposed to a fall of 6 feet or more (1926.501(b)(1)). The alternative fall protection measures in Subpart M for residential construction apply only to work on a residential building being constructed. Those measures do not apply to employees exposed to fall hazards at the pool while they are off the building. Under the conditions that you describe, it appears as though section 1926.501(b)(15) would apply...”

1926.501(b)(15)

“Walking/working surfaces not otherwise addressed.” Except as provided in 1926.500(a)(2) or in 1926.501(b)(1) through (b)(14), each employee on a walking/working surface 6 feet (1.8 m) or more above lower levels shall be protected from falling by a guardrail system, safety system, safety net system, or personal fall arrest system

The definition for unprotected sides and edges is as follows:

“Unprotected sides and edges means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system, at least 39 inches (1.0 m) high.”



## FBC 1803

---

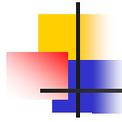
- Excavations near footings or foundations
  - Excavations must not remove lateral support from any footing or foundation without first underpinning or protecting the footing or foundation

### **CHAPTER 18: SOILS AND FOUNDATIONS**

#### **1803 EXCAVATION, GRADING AND FILL**

##### **1803.1.3 Excavations near footings or foundations.**

Excavations for any purpose shall not extend within 1 ft (305 mm) of the angle of repose or natural slope of the soil under any footing or foundation, unless such footing or foundation is first properly underpinned or protected against settlement.



## FBC 1805.3.3 Pools

- FBC 1805.3.3 Pools
  - Setback between pools and slopes shall be equal to one-half the building footing setback distance required.
  - Pool walls within a horizontal distance of 7 feet from the top of the slope shall be capable of supporting the water in the pool.

### CHAPTER 18 SOILS AND FOUNDATIONS

#### 1805 FOOTINGS AND FOUNDATIONS

##### 1805.3 Footings on or adjacent to slopes.

**1805.3.3 Pools.** The setback between pools regulated by this code and slopes shall be equal to one-half the building footing setback distance required by this section. That portion of the pool wall within a horizontal distance of 7 feet (2134 mm) from the top of the slope shall be capable of supporting the water in the pool without soil support.



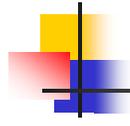
Notice visqueen protecting “wall” of pool from rain events. Also, chat rock placed in bottom (not required).



- For fiber glass pools, a hole inspection may be required to ensure compliance with the manufacturer's specifications for shape and hole clearance



Fiber glass pool being set into position.



## Inground Concrete Pool

- Check the lap on rebar (it must be 40× the bar diameter)
  - Examples:
    - $\frac{5}{8}$ " = 25" lap
    - $\frac{1}{2}$ " = 20" lap
    - $\frac{3}{8}$ " = 15" lap
  - Make sure steel is tied per code – A.C.I. 318

Check the lap on rebar per plans or A.C.I. (American Concrete Institute) 318

The minimum lap on the rebar is approximately 40 times the diameter of the rebar.

Example:

$\frac{5}{8}$ " = 25" lap

$\frac{1}{2}$ " = 20" lap

$\frac{3}{8}$ " = 15" lap

Make sure steel is tied per code.



## A.C.I. 318

---

- Make sure steel is elevated with proper coverage and clearances

Make sure steel is elevated with proper coverage and clearances.

### **CHAPTER 19: CONCRETE**

**1908 MODIFICATION TO ACI 381**

**RESERVED**



This image depicts lap on rebar, ties, and steel elevation.

- Per plan:
  - Verify steel coverage in pool walls
  - Check steel size and grade
  - Make sure steel is spaced



Verify steel coverage per ACI/plan in pool walls  
Check steel size and grade (plan/eng.)  
Make sure steel is spaced (per plan)



- Look for reinforcement at drain skimmer and light niche

Images refer to reinforcement at drain skimmer. Not required.

## NEC 680-23

- Top of the lighting fixture lens is at least 18 inches below the normal water level of the pool
  - Exception



### NATIONAL ELECTRICAL CODE HANDBOOK (EIGHTH EDITION)

#### B. Permanently Installed Pools

##### 680-20. Underwater Lighting Fixtures.

**NEC 680-23(a)(5) Luminaires** [Lighting fixtures] mounted in walls shall be installed with the top of the luminaire [fixture] lens not less than 450 mm (18 in) below the normal water level of the pool, unless the luminaire [lighting fixture] is listed and identified for use at lesser depths. No luminaire [fixture] shall be installed less than 100 mm (4 in) below the normal water level of the pool.

The commentary states:

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

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.

## NEC 680-26

- Make sure light niche is bonded



Image is of bond from light niche.

### NATIONAL ELECTRICAL CODE (2002 EDITION)

#### 680-26 Bonding.

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

*Fine Print Note: this section does not require that the 8 AWG or larger solid copper bonding conductor be extended or attached to any remote panelboard, service equipment, or any electrode.*

**680-26(a) Bonded Parts.** The parts specified in 680.26[B][1] through [B][5] shall be bonded together.

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

**[2] Underwater Lighting.** All forming shells and mounting brackets of a no-niche luminaires [fixture] shall be bonded unless a listed low-voltage lighting system with nonmetallic forming shells, not requiring bonding is used.

...continued

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



*...continued*

- [3] Metal Fittings.** All metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 100 mm (4 in) in any dimension and do not penetrate into the pool structure more than 25mm (1 in) shall not require bonding.
- [4] Electrical Equipment.** Metal parts of electrical equipment associated with the pool water circulating system, including pump motors and metal parts of equipment associated with pool covers, including electric motors, shall be bonded. Metal parts of listed equipment incorporating an approved system of double insulation and providing a means for grounding internal nonaccessible, non-current-carrying metal parts shall not be bonded. Where a double-insulated water-pump motor is installed under the provisions of this rule, a solid 8 AWG copper conductor that is of sufficient length to make a bonding connection to a replacement motor shall be extended from the bonding grid to an accessible point in the motor vicinity. Where there is no connection between the swimming pool bonding grid and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit.

## NEC 680-22



- Check for GFCI receptacle 10–20' from water's edge

Right photo: This receptacle—located within 10 feet of the inside wall of the pool—was made non-useable by covering it with a plate.

### NATIONAL ELECTRICAL CODE HANDBOOK (2002)

#### 680-22. Receptacles, Lighting Fixtures, Lighting Outlets, Switching Devices, and Ceiling-Suspended (Paddle) Fans.

##### (a) Receptacles.

- (3) Where a permanently installed pool is installed at a dwelling unit(s), at least one 125-volt 15- or 20-ampere receptacle on a general-purpose branch circuit shall be located a minimum of 10 ft (3.05 m) from and not more than 20 ft (6.08 m) from the inside wall of the pool. This receptacle shall be located not more than 6 ft 6 in (1.98 m) above the floor, platform, or grade level serving the pool.

The commentary states (in part):

The intent of this requirement is to permit ordinary appliances to be safely plugged in and used near the pool, but avoid the need for extension cords in the vicinity of the pool. The 10-ft minimum dimension was chosen since an appliance with a 6-ft cord could not be accidentally knocked into the pool.

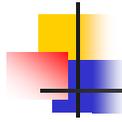
- (5) All 125-volt receptacles located within 20 ft (6.08 m) of the inside walls of a pool or fountain shall be protected by a ground-fault circuit interrupter.

The commentary states (in part):

This requirement applies to pools located outdoors or indoors, permanently installed or storable, as well as for residential or commercial use. Since people in this area are normally subjected to dampness and moisture, the GFCI requirements within the 20-ft space is most reasonable.

*Fine Print Note: In determining the above dimensions, the distance to be measured is the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.*

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



## NEC 680-26(b)(5) & 680-26(c)

- All metal needs to be bonded that will be within:
  - 5 feet of the inside walls of the pool or
  - 12 feet above the maximum water level of the pool
- All required bonded parts must be connected to a common bonding grid

### NATIONAL ELECTRICAL CODE HANDBOOK (2002)

#### 680-26. Bonding

##### (b) Bonded Parts.

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

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

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

The commentary states:

Section 680-26(b)(5) would also include, for example, a metal door frame or metal window frame.

##### 680-26(c) Common Bonding Grid.

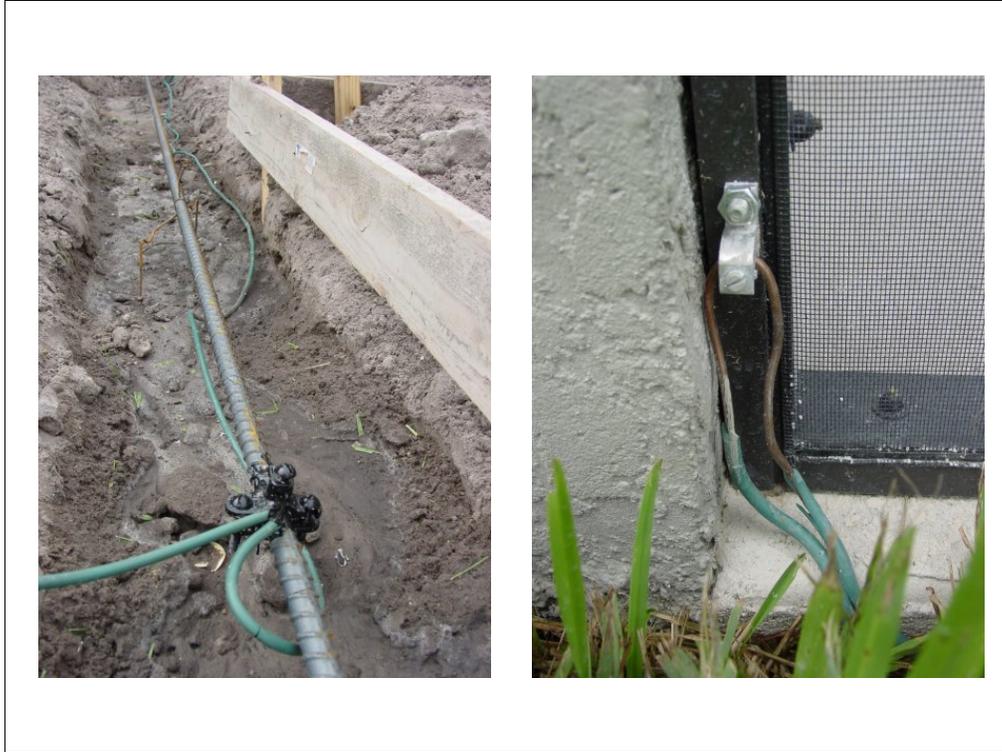
The parts specified in 680.26[B] shall be connected to a common bonding grid with a solid copper conductor, insulated, covered, or bare, not smaller than No. 8. Connection shall be made by exothermic welding or by pressure connectors or clamps that are labeled as being suitable for the purpose and are of stainless steel, brass, copper, or copper alloy. The common bonding grid shall be permitted to be any of the following:

- (1) The structural reinforcing steel of a concrete pool where the reinforcing rods are bonded together by the usual steel tie wires or the equivalent
- (2) The wall of a bolted or welded metal pool
- (3) A solid copper conductor, insulated, covered, or bare, not smaller than 8 AWG
- (4) Rigid metal conduit or intermediate metal conduit of brass or other identified corrosion-resistant metal conduit

The commentary states:

Section 680-26(b) in the 2002 Code was changed to recognize exothermic welding as a mean of connecting to a common bonding grid. This change also recognizes pressure connectors and clamps that are specifically listed for the purpose. Connections in pool areas must be suitable for wet conditions and high levels of chlorine.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002 National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.

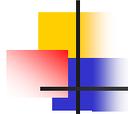


Examples of bonding (to deck and to screen enclosure).



- Cupping around piping
- Later followed by placement of hydraulic concrete around cupped out pipes (before plastering) may result in fewer call-backs

Not an inspection step. Just a suggestion.



## R4101.6 Engineering design

- R4101.6.3 Water velocity.
  - The water velocity cannot exceed 10 ft/s; in copper tubing the water velocity cannot exceed 8 ft/s (pool piping)
    - Exception: Jet inlet fittings
- R4101.6.5 Piping installation.
  - All piping materials must be installed in strict accordance with the manufacturer's installation standards.

### **R4101.6 Engineering design.**

#### **R4101.6.3 Water velocity.**

Pool piping shall be designed so the water velocity will not exceed 10 ft/s, for pressure piping and 8 ft/s for suction piping, except that the water velocity shall not exceed 8 ft/s in copper tubing.

**Exception:**

Jet inlet fittings shall not be deemed subject to this requirement.

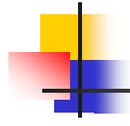
#### **R4101.6.5 Piping installation.**

All piping materials shall be installed in strict accordance with the manufacturer's installation standards.

**Exception:**

Primer and glue on exposed aboveground piping not required to be colored.





## 605.21 PVC plastic (plumbing)

- BOAF Interpretation Report #3643
  - Section 605.21 of the *Florida Building Code, Plumbing* does not apply to swimming pools.
  - The circulating piping for pools is considered to be process piping rather than plumbing.

**FBC 424.2.6.5 Piping installation.** All piping materials shall be installed in strict accordance with the manufacturer's installation standards.

**Exception:**

Primer and glue on exposed aboveground piping not required to be colored.  
Change to FBC 1 Oct 2005

**FBC 424.2.12.1 Pressure test.** All pool piping shall be tested and proved tight to the satisfaction of the administrative authority, under a static water or air pressure test of not less than 35 PSI for 15 minutes.

**Exception:**

Circulating pumps need not be tested as required in this section.

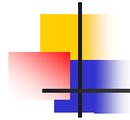
This change to the Florida Building Code on October 1, 2005 eliminated the requirement for piping to be "inspected and approved before being covered or concealed."



## 424.2.13.2 Joints and connections

---

- Joints and connections must conform to the *Florida Building Code, Plumbing*



## R4101.6.6 Engineering design

- R4101.6.6. Entrapment protection for suction inlets.
  - R4101.6.6.1 Location. Suction inlets must be installed, and arranged to produce circulation throughout the pool or spa.
  - See the FBC Informational Notice on Pool and Spa Drain Safety in the Notes section.

### 4101.6.6 Engineering design.

#### R4101.6.6. Entrapment protection for suction inlets.

**R4101.6.6.1 Location.** Suction inlets shall be provided and arranged to produce circulation throughout the pool or spa.

The following is the text of the December 4, 2001 informational notice on pool and spa drain safety:

“At the recommendation of the Pool and Spa Drain Safety Subcommittee, the Florida Building Commission developed information on pool entrapment protection criteria to aid building officials in deciding whether a design or system is compliant with section 424.2.6.6 of the Florida Building Code. No standard presently exists for such devices.

**Background:** The International Association of Plumbing and Mechanical Officials (IAPMO) IGC 160-2001a, “Interim Guide Criteria for Safety Vacuum Release System (SVRS) Devices for Swimming Pool Suction Fittings and Drains”, is the only guideline at this time for safety vacuum release systems. The Consumer Product Safety Commission, which publishes a document entitled “Guidelines for Entrapment Hazards: Making Pools and Spas Safer” (Pub. No. 363, 009801) asked ASTM to develop a standard for vacuum release systems. ASTM standard F15.51, “Standard Provisional Specification for Safety Vacuum Release Systems (SVRS) for Swimming Pools, Spas and Hot Tubs”, is still a draft. Also, further refinements in code language are needed to clarify the intent of section 424.2.6.6, Florida Building Code.

**Recommendations of the Commission:** 1. Vent piping designed by a Florida-registered engineer that relieves the vacuum to less than 4.5" of mercury in 3 seconds or less may be permitted. Such vent piping shall be designed and installed in such a manner that the air inlet port(s) cannot be defeated by reasonably anticipated conditions. 2. Vacuum relief systems designed to and meeting the performance levels set out in IAPMO IGC 160-2001a may be permitted. 3. Anti-vortex cover(s) serving as anti-entrapment devices may meet ANSI/ASME A112.19.8M (1987). 4. Cleaner suction inlets (for the temporary connection of automatic or manual pool cleaning devices) should be protected by a permanently installed self-closing flapper valve.

**Clarification:** Code language in section 424.2.6.6 uses the term “suction inlet”. The Plumbing Technical Advisory Committee to the Florida Building Commission feels this language should be clarified. In effect, the pump “suction inlets” are the “pool outlets.”



## R4101.6.6 Entrapment protection for suction inlets

- R4101.6.6.2 Testing and certification.
  - Pool and spa suction inlets must have covers that:
    - Have been tested and approved by a recognized testing facility
    - Comply with ANSI/ASME A112.19.8M.
    - Exceptions:
      1. Surface skimmers
      2. Grate or grates having a minimum area of 144 square inches or greater
    - Important safety note

### 424.2.6 Private Swimming pools.

#### 424.2.6.6 Entrapment protection for suction inlets.

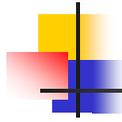
##### 424.2.6.6.2 Testing and certification.

All pool and spa suction inlets shall be provided with a cover that has been tested and accepted by a recognized testing facility and comply with ANSI/ASME A112.19.8M, *Suction Fittings for Use in Swimming Pools, Spas, Hot Tubs, and Whirlpool Bathtub Appliances*.

**Exceptions:**

1. Surface skimmers.
2. Grate or grates having a minimum area of 144 square inches or greater.

*Important safety note:* Do not use or operate pool or spa if the suction inlet fitting is missing, broken, or loose.



## R4101.6.6.3 Entrapment avoidance

- All pools and spas must have a backup system to provide vacuum relief should grate covers be missing or inoperative.
- Vacuum protection devices can be:
  - Approved Safety Vacuum Release System (SVRS).
  - Approved vent piping.
  - Other approved devices or means.

### **424.2.6 Private swimming pools.**

#### **424.2.6.6 Entrapment protection for suction inlets.**

##### **424.2.6.6.3 Entrapment avoidance.**

All pools and spas shall have a backup system which shall provide vacuum protection should grate covers be missing or inoperative with respect to their approved use. Vacuum protection devices shall consist of one of the following:

1. Approved Safety Vacuum Release System (SVRS).
2. Approved vent piping.
3. Other approved devices or means.



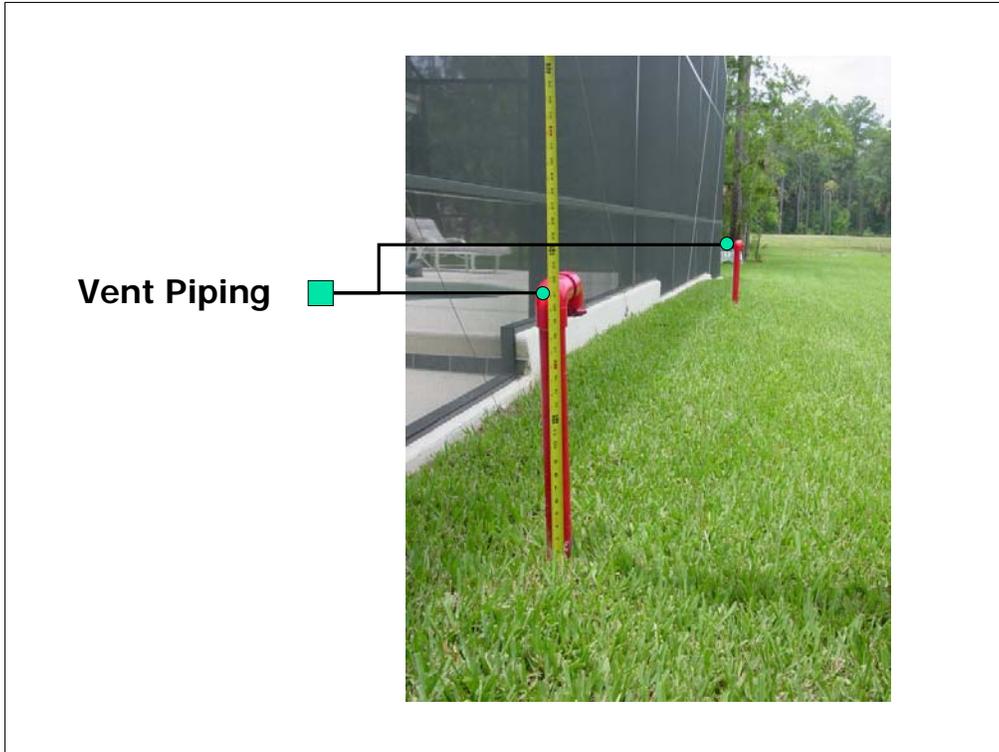
One anti-entanglement drain cover is the Anti-Hair Snare Plus™.

- “The above photo represents an anti-entanglement main drain cover that:
  - Must be installed onto main drains or frames affixed **horizontally** [*emphasis added by editor*] to the bottom of pools, spas, hot tubs and the like.
  - And must be secured to sump with stainless steel screws as per manufacturers instructions.
- The pictured unit above offers an anti-entanglement geometry to prevent hair entanglement.
- The dome shape combined with the hi-low step design prevents a child from forming a vacuum seal over the drain, therefore eliminating the hazard of body entrapment. The above pictured anti-entanglement cover is childproof.

The hi-low step design is uncomfortable to sit or stand on.

- The openings of this cover reject the insertion of an 8mm rod. Pool toys will not pass through the openings. This dimension will prevent toe or finger entrapment of young children. This dimension also precludes an interference grip which in turn prevents upward forces that could remove it from the main drain without use of tools.
- The universal fastening design allows retrofitting onto most U.S. drains and also has an adapter / mud ring for insertion onto all circular 6" to 10" sumps.
- The above pictured ANSI/NSF Standard 50-2000 certified anti-entanglement product is made of PVC with UV inhibitors as well as chemical resistant properties.
- It is imperative not to exceed the safe flow rate as stamped on any fitting or appliance.
- The above pictured anti-entanglement cover geometry also incorporates a manual back up procedure that works by moving the hair to the covers center for ease of removal in unusual circumstances.
- Due to hi-lo step design the above pictured unit is pool cleaner friendly.”
  - Source: Triodyne Safety Systems, LLC (Ron Schroader)

**See disclaimer on inside front cover of this booklet.**



Vent piping—generally located a minimum of 18 inches above the water line, but depends on engineer's specifications.



This is an example of another approved safety vacuum release device.

“Vac-Alert Model VA-2000 Safety Vacuum Release System (SVRS) is a backup system which provides vacuum relief, with cover(s) in place or missing. The Vac-Alert SVRS unit is an all-mechanical design, which is field adjustable to site-specific hydraulic conditions. The SVRS is mounted on the main suction outlet line to a pool and/or spa, between the suction outlet and the circulation pump. The SVRS should be installed within five (5) feet of the circulation pump. It is recommended that a test valve be installed upstream of the SVRS unit. The SVRS unit is adjusted to seal against normal operating vacuum levels. Should the vacuum level in the main suction outlet line exceed the SVRS adjustment level by 2.0 to 3.0 inches of mercury, the SVRS unit will open and allow air to cavitate the circulation pump. The test valve is closed to simulate a main suction outlet blockage while the circulation pump is running. Test valve closure should actuate the SVRS unit. The SVRS unit is equipped with a manual reset. The SVRS unit should be tested three (3) times to verify proper vacuum level adjustment.”

— Source: Vac-Alert Industries, LLC (George Pellington, P.E.)

**See disclaimer on inside front cover of this booklet.**



## R4101.6.6 Entrapment protection for suction inlets

- R4101.6.6.4 Suction inlets per pump.
  - There must be a minimum of two suction inlets for each pump in the suction inlet system, separated by:
    - A minimum of 3 feet or
    - Located on two different planes. For example:
      - One on the bottom and one on the vertical wall, or
      - One each on two separate vertical walls
  - They must be plumbed so water is drawn through them
    - Simultaneously
    - through a common line to the pump

### **424.2.6 Private swimming pools.**

#### **424.2.6.6 Entrapment protection for suction inlets.**

##### **424.2.6.6.4 Suction inlets per pump.**

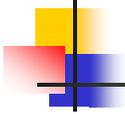
A minimum of two suction inlets shall be provided for each pump in the suction inlet system, separated by a minimum of 3 feet or located on two different planes; i.e., one on the bottom and one on the vertical wall, or one each on two separate vertical walls. These suction inlets shall be plumbed such that water is drawn through them simultaneously through a common line to the pump. When a skimmer is used in conjunction with a single main outlet to meet the requirements of this section, the common suction line must be in compliance with Section 424.2.6.6.3 such that a vacuum cannot be drawn on any single main outlet or skimmer.



■ Separated by 3'

■ Located on two different planes





## R4101.6.6 Entrapment protection for suction inlets

- R4101.6.6.5 Cleaner fittings.
  - Where provided, the vacuum or pressure cleaner fitting(s) must be in an accessible position(s)
    - At least 6 inches, and not greater than 12 inches, below the minimum operating water level or
    - As an attachment to the skimmer(s)
    - All cleaner suction inlets shall be protected by an approved, permanently installed, self closing flapper assembly.

### **424.2.6 Private swimming pools.**

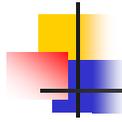
#### **424.2.6.6 Entrapment protection for suction inlets.**

##### **424.2.6.6.5 Cleaner fittings.**

Where provided, the vacuum or pressure cleaner fitting(s) shall be located in an accessible position(s) at least 6 inches and not greater than 12 inches below the minimum operating water level or as an attachment to the skimmer(s). All cleaner suction inlets shall be protected by an approved, permanently installed, self-closing flapper assembly.



Example.



## R4101.12 Tests

- R4101.12.1 Pressure test.
  - All pool piping must be tested and proved tight for 15 minutes under a static water or air pressure test of not less than 35 psi.
    - Exception:
      - Circulating pumps need not be tested.

*...continued*

### **424.2.12 Tests.**

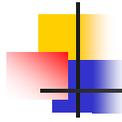
#### **424.2.12.1 Pressure test.**

All pool piping shall be tested and proved tight to the satisfaction of the administrative authority, under a static water or air pressure test of not less than 35 psi for 15 minutes.

**Exception:**

Circulating pumps need not be tested as required in this section.

This change became effective October 1, 2005.



## R4101.12 Tests

---

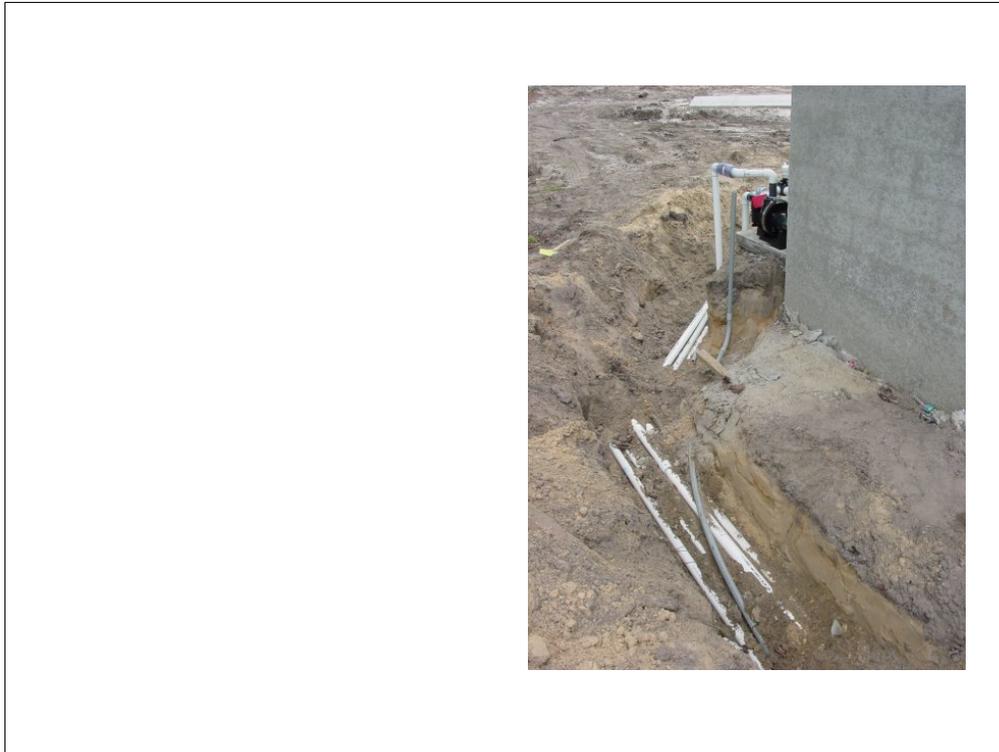
*...continued*

- R4101.12.2 Drain and waste piping.
  - All drain and waste piping must be tested by filling to overflowing
  - All joints must be tight

### **424.2.12 Tests.**

#### **424.2.12.2 Drain and waste piping.**

All drain and waste piping shall be tested by filling with water to the point of overflow and all joints shall be tight.



## NATIONAL ELECTRICAL CODE HANDBOOK (2002)

**680-10. Underground Wiring Location.** Underground wiring shall not be permitted under the pool or within the area extending 5 ft (1.52 m) horizontally from the inside wall of the pool unless this wiring is necessary to supply pool equipment permitted by this article. Where space limitations prevent wiring from being routed 5 ft (1.52 m) or more from the pool, such wiring shall be permitted where installed in rigid metal conduit, intermediate metal conduit, or a nonmetallic raceway system. All metal conduit shall be corrosion resistant and suitable for the location. The minimum burial depth shall be as follows.

Wiring Method	Minimum Burial (in)
Rigid metal conduit	6
Intermediate metal conduit	6
Nonmetallic raceways listed for direct burial without concrete encasement	18
Other approved raceways*	18

Note: For SI units. 1 in = 25.4 mm.

\* Raceways approved for burial only where concrete encased shall require a concrete envelope not less than 2 in (50.8 mm) thick.

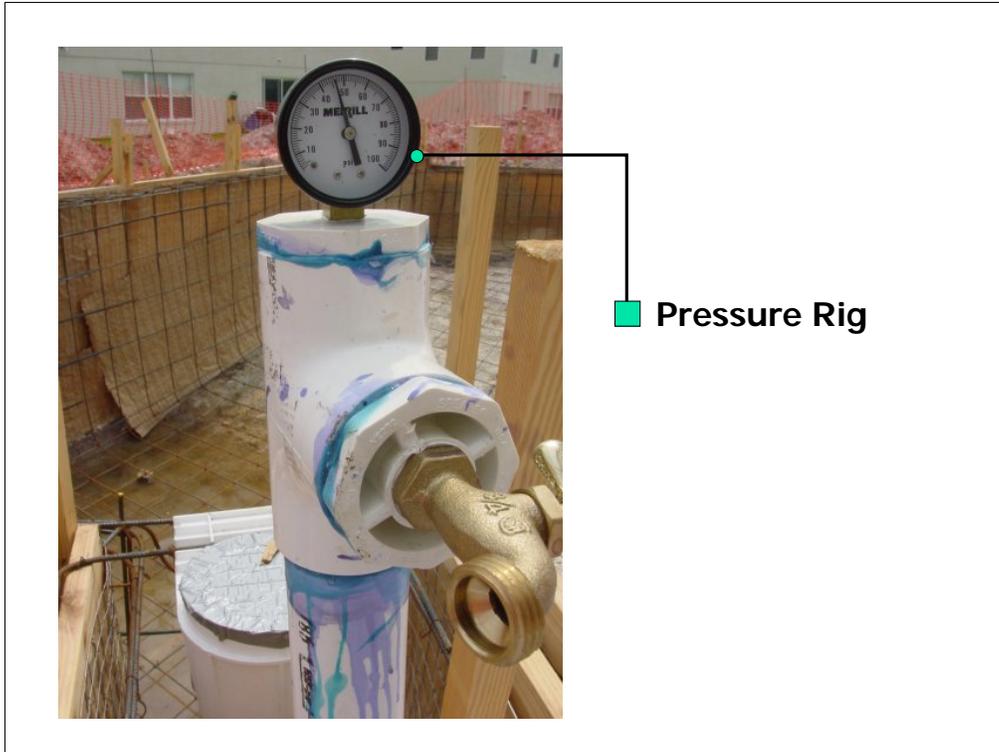
### Article 344 Rigid Metal Conduit

**344.26. Bends – Number in One Run.** There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, e.g., conduit bodies and boxes.

The Commentary states:

Limiting the number of bends in a conduit run reduces pulling tension on conductors and helps ensure easy insertion or removal of conductors during later phases of construction, when the conduit may be permanently enclosed by the finish of the building. Adjustments during that time are often impossible.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



Skimmer pressure test.



Main drain pressure test.



Pressure test on manifold for infloor cleaning system.

## R320.1.6 and R320.1.4

- Make sure slab of deck is treated for termites within 1' of structure and covered with 6 mil visqueen



### **R320: PROTECTION AGAINST TERMITES**

#### **R320.1.6**

If soil treatment is used for subterranean termite prevention, chemical soil treatments shall also be applied under all exterior concrete or grade within 1 foot (305 mm) of the primary structure sidewalls. Also, a vertical chemical barrier shall be applied promptly after construction is completed, including initial landscaping and irrigation/sprinkler installation. Any soil disturbed after the chemical vertical barrier is applied shall be promptly retreated.

#### **R320.1.4**

If soil treatment is used for subterranean termite prevention, chemically treated soil shall be protected with a minimum 6 mil vapor retarder to protect against rainfall dilution. If rainfall occurs before vapor retarder placement, retreatment is required. Any work, including placement of reinforcing steel, done after chemical treatment until the concrete floor is poured, shall be done in such manner as to avoid penetrating or disturbing treated soil.

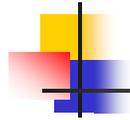
## R506.1 and plan

- Check thickness of slab – generally a minimum of 3½"



### **R506: CONCRETE FLOORS (ON GROUND)**

**R506.1 General.** Concrete slab-on-ground floors shall be a minimum 3.5 inches (89 mm) thick (for expansive soils, see Section R403.1.8). The specified compressive strength of concrete shall be as set forth in Section R402.2.



## FBC 1803.5

- Check compaction – 90% Modified Proctor

This inspection has been questioned as to whether or not it applies to pool decks. The scope for the chapter states: (1801.1 The provisions of this chapter shall apply to foundation systems in those areas not subject to scour or water pressure by wind and wave action...)

### CHAPTER 18: SOILS AND FOUNDATIONS

#### 1803 EXCAVATION, GRADING AND FILL

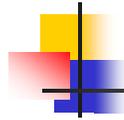
**1803.5 Compacted fill material.** Where footings will bear on compacted fill material, the compacted fill shall comply with the provisions of an approved report, which shall contain the following:

1. Specifications for the preparation of the site prior to placement of compacted fill material.
2. Specifications for material to be used as compacted fill.
3. Test method to be used to determine the maximum dry density and optimum moisture content of the material to be used as compacted soil.
4. Maximum allowable thickness of each lift of compacted fill material.
5. Field test method for determining the in-place dry density of the compacted fill.
6. Minimum acceptable in-place dry density expressed as a percentage of the maximum dry density determined in accordance with Item 3.
7. Number and frequency of field tests required to determine compliance with Item 6.

**Exception:** Compacted fill material less than 12 inches (305 mm) in depth need not comply with an approved report, provided it has been compacted to a minimum of 90 percent Modified Proctor in accordance with ASTM D 1557. The compaction shall be verified by a qualified inspector approved by the building official.



Check footing for screen enclosure, which is dependent on size of screen enclosure. In this instance, #5 (5/8") rebar was required.



## R506.2.4 Joints

- Concrete slabs on ground should have joints unless they contain:
  - Synthetic fiber reinforcement ( $\frac{1}{2}$  – 2" in length in dosage amounts of 0.75 to 1.5 lb/yd<sup>3</sup>) or 0.5 to 1.5 lb/yd<sup>3</sup> (see code language below)
  - 6 × 6 W1.4 × W1.4 welded wire reinforcement fabric located in the middle to the upper 1/3 of the slab

### CHAPTER 5: FLOORS

#### R506 CONCRETE FLOORS (ON GROUND)

**R506.2.4 Joints.** Concrete slabs on ground shall be provided with joints in accordance with ACI 224.3R or other approved methods. Joints shall be designed by an architect or engineer.

**Exception:** Joints are not required in unreinforced plain concrete slabs on ground or in slabs for one- and two-family dwellings complying with one of the following:

1. Concrete slabs on ground containing synthetic fiber reinforcement. Fiber lengths and dosage amounts shall comply with one of the following.
  - (1) Fiber lengths shall be  $\frac{1}{2}$  inch to 2 inches (13 mm to 51 mm) in length. Dosage amounts shall be from 0.75 to 1.5 pounds per cubic yard (0.45 to 0.89 kg/m<sup>3</sup>) in accordance with the manufacturer's recommendations. Synthetic fibers shall comply with ASTM C 1116. The manufacturer or supplier shall provide certification of compliance with ASTM C 1116 when requested by the building official; or,
  - (2) Fiber length shall be from  $\frac{1}{2}$  inch to 2 inches (13 mm to 51 mm) in length, monofilament or fibrillated. Dosage amounts shall be from 0.5 to 1.5 pounds per cubic yard (0.30 to 0.89 kg/m<sup>3</sup>) to achieve minimum 40 percent reduction of plastic shrinkage cracking of concrete versus a control mix in accordance with ICBO AC32. Independent test results using minimum six (6) test specimens shall be provided to the building official showing compliance with ICBO AC32. Synthetic fiber shall comply with ASTM C1116, Paragraph 4.1.3, Type III. The manufacturer or supplier shall provide certification of compliance with ASTM C1116 when requested by building official.
2. Concrete slabs on ground containing 6x6 W1.4 x W1.4 welded wire reinforcement fabric located in the middle to the upper 1/3 of the slab. Welded wire reinforcement fabric shall be supported with approved materials or supports at spacings not to exceed 3 ft (914 mm) or in accordance with the manufacturer's specifications. Welded plain wire reinforcement fabric for concrete shall conform to ASTM A 185, *Standard Specification for Steel Welded Wire Reinforcement Fabric, Plain, for Concrete Reinforcement*.



Freshly poured pool deck showing expansion joints.



## R4101.13 Drain piping

- R4101.13.1 Slope to discharge.
  - Drain piping serving gravity overflow gutter drains and deck drains must be installed to provide continuous grade to the point of discharge.

### **424.2.13 Drain piping.**

#### **424.2.13.1 Slope to discharge.**

Drain piping serving gravity overflow gutter drains and deck drains shall be installed to provide continuous grade to point of discharge.



## **ANSI/NSPI-5 1995 AMERICAN NATIONAL STANDARD FOR RESIDENTIAL INGROUND SWIMMING POOLS.**

### **ARTICLE VII**

#### **7.0 Decks – General Requirements**

##### **7.2 Drainage**

###### **7.2.1**

Deck(s) shall be sloped to effectively drain towards the perimeter areas or deck drains.

###### **7.2.2**

Level areas for diving equipment installation are permitted.

###### **7.2.2.1**

A minimum slope for decking of 1/8 inch per linear foot (3 mm : 305 mm) shall be provided, except for wood decking.

###### **7.2.3**

Site drainage shall direct all perimeter deck drainage, general site and roof drainage away from the pool area.

## NEC 680-26 Pools and Spas

- Minimum #8 bond wire on pump



### NATIONAL ELECTRICAL CODE HANDBOOK (2002)

#### 680-26. Bonding

##### (B) Bonded Parts.

- (4) Metal parts of electrical equipment associated with the pool water circulating system, including pump motors and metal parts of equipment associated with pool covers, including electric motors. 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.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



## NEC 680-12

- Check for all equipment disconnects within sight from all pools, spas, and hot tub equipment. [ this is a 2002 change ]

### **NATIONAL ELECTRICAL CODE HANDBOOK (2002)**

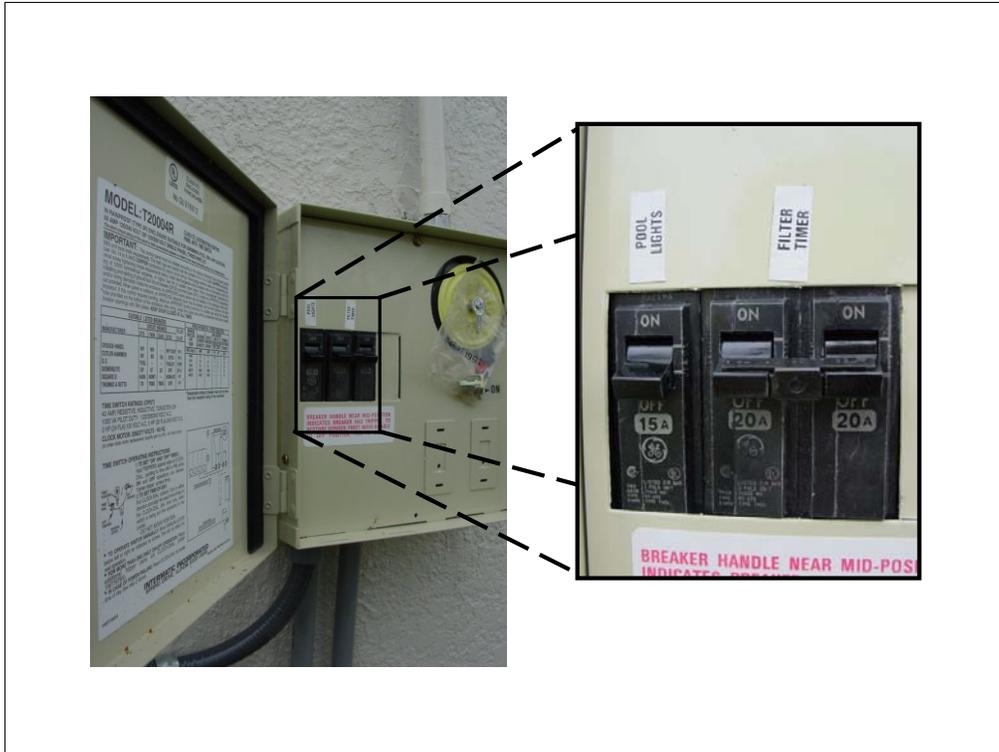
#### **680-12. Disconnecting Means.**

One or more means to disconnect all ungrounded conductors shall be provided for all utilization equipment other than lighting. Each means shall be accessible and within sight from the equipment.

The Commentary states:

A disconnecting means is required to be installed within sight of the pool, spa, and hot tub equipment to allow service personnel to disconnect the power while servicing these units. This requirement ensures that a disconnect is available to workers servicing pool, spa, and hot tub equipment such as motors, heaters, and lighting fixtures.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



This slide shows disconnects for pool lights, filter, and timer (pump).

## NEC 406.8



- Look for waterproof-while-in-use plug covers

### NATIONAL ELECTRICAL CODE HANDBOOK (2002)

#### 406.8. Receptacles in Damp or Wet Locations. (in part)

##### (a) Damp Locations.

A receptacle installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure for the receptacle that is weatherproof when the receptacle is covered (attachment plug cap not inserted and receptacle covers closed). An installation suitable for wet locations shall also be considered suitable for damp locations. A receptacle shall be considered to be in a location protected from the weather where located under roofed open porches, canopies, marquees, and the like, and will not be subjected to a beating rain or water runoff.

##### (b) Wet Locations.

2(A) A receptacle installed in a wet location where the product intended to be plugged into it is not attended while in use (e.g., sprinkler system controllers, landscape lighting, holiday lights, etc.) shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

The Commentary states:

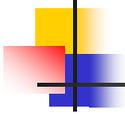
Section 406.8(b)(1) applies to receptacles for cord- and plug-connected equipment likely to be used outdoors or in a wet location for long periods of time. Example include pump motors, vending machines, and so on. The intent is that receptacles for this application remain weatherproof while they are in use.

2(B) A receptacle installed in a wet location where the product intended to be plugged into it will be attended while in use (e.g., portable tools, etc.) shall have an enclosure that is weatherproof when the attachment plug cap is removed.

The Commentary states:

Section 410-57(b)(2) applies to receptacles for cord- and plug-connected portable tools or other portable equipment likely to be used outdoors for a specific purpose and then removed. Examples include gardening tools, television sets, radios, and so on.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



## R4101.17 Residential swimming barrier requirement

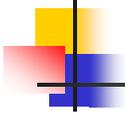
---

- Look for barrier
  - Exception:
    - A swimming pool with an approved safety pool cover complying with ASTM F 1346.

### **424.2.17 Residential Swimming barrier requirement.**

Residential swimming pools shall comply with Sections 424.2.17.1 through 424.2.17.3.

**Exception:** A swimming pool with an approved safety pool cover complying with ASTM F 1346.



## R4101.17 Residential swimming barrier requirement

---

- R4101.17.1 Outdoor swimming pools.
  - Outdoor swimming pools must be provided with a barrier complying with R4101.17.1.1 through R4101.17.1.14.

### **424.2.17 Residential swimming barrier requirement.**

#### **424.2.17.1 Outdoor swimming pools.**

Outdoor swimming pools shall be provided with a barrier complying with 424.2.17.1.1 through 424.2.17.1.14.



## R4101.17.1 Outdoor swimming pools

- R4101.17.1.1
  - The top of the barrier must be at least 48 inches above grade, measured on the side of the barrier which faces away from the swimming pool.
  - The maximum vertical clearance between grade and the bottom of the barrier must be 2 inches, measured on the side of the barrier which faces away from the swimming pool.

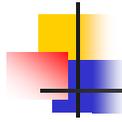
*...continued*

### **424.2.17 Residential swimming barrier requirement.**

**424.2.17.1.1** The top of the barrier shall be at least 48 inches above grade measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches measured on the side of the barrier which faces away from the swimming pool...

*...continued*





## R4101.17.1.1

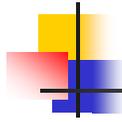
*...continued*

- Where the top of the pool structure is above grade, the barrier may be:
  - at ground level 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 must be 4 inches.

*...continued*

### **R4101.17 Residential Swimming barrier requirement.**

**R4101.17.1.1** ...Where the top of the pool structure is above grade the barrier may be at ground level 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.



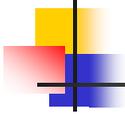
## R4101.17.1 Outdoor swimming pools

- R4101.17.1.2
  - The barrier cannot have any gaps, openings, indentations, protrusions, or structural components that could allow a young child to crawl under, squeeze through, or climb over the barrier
  - One end of the barrier must be removable only with the aid of tools
  - Openings in the barrier cannot allow passage of a 4-inch diameter sphere

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.2** The barrier may not have any gaps, openings, indentations, protrusions, or structural components that could allow a young child to crawl under, squeeze through, or climb over the barrier as herein described below. One end of a removable child barrier shall not be removable without the aid of tools. Openings in any barrier shall not allow passage of a 4-inch diameter sphere.



## R4101.17.1 Outdoor swimming pool

### R4101.17.1.3

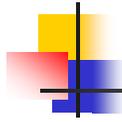
---

- Solid barriers without openings cannot have indentations or protrusions, except for normal construction tolerances and tooled masonry joints.

#### **R4101.17 Residential swimming barrier requirements.**

##### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.3** Solid barriers which do not have openings shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.



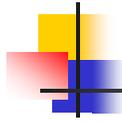
## R4101.17.1 Outdoor swimming pools

- R4101.17.1.4
  - 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 must be located on the swimming pool side of the fence.
  - Spacing between vertical members cannot exceed 1¾ inches in width.
  - Where there are decorative cutouts within vertical members, spacing within the cutouts cannot exceed 1¾ inches in width.

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.4** 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 fence. Spacing between vertical members shall not exceed 1¾ inches in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1¾ inches in width.



## R4101.17.1 Outdoor swimming pools

- R4101.17.1.5
  - 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 must be less than 4 inches.
  - Where there are decorative cutouts within vertical members, spacing within the cutouts cannot be more than 1¾ inches in width.

### **424.2.17 Residential swimming barrier requirements.**

#### **424.2.17.1 Outdoor swimming pools.**

**424.17.1.5** 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 exceed 4 inches. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 ¾ inches in width.



## R4101.17 Outdoor swimming pools

- R4101.17.1.6
  - Maximum mesh size for chain link fences must be a 2¼-inch square unless
    - the fence is provided with slats fastened at the top or bottom which reduce the openings to no more than 1¾ inches.
- R4101.17.1.7
  - Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members must be no more than 1¾ inches.

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.6** 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 bottom which reduce the openings to no more than 1 ¾ inches.

**R4101.17.1.7** Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be no more than 1 ¾ inches.



## R4101.17.1 Outdoor swimming pools

### R4101.17.1.8

---

- When access gates are provided they must comply with the requirements of R4101.17.1.1 through R4101.17.1.7
  - They must have a self-latching locking device at least 54 inches from the bottom of the gate
  - The device release mechanism must be located on the pool side of the gate
  - It must be placed so that it cannot be reached by a young child over the top or through any opening or gap.

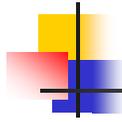
*...continued*

## **R4101.17 Residential swimming barrier requirements.**

### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.8** Access gates, when provided, shall be self-closing and shall comply with the requirements of R4101.17.1.1 through R4101.17.1.7 and shall be equipped with a self-latching locking device located on the pool side of the gate. Where the device release is located no less than 54 inches from the bottom of the gate, the device release mechanism may be located on either side of the gate and so placed that it cannot be reached by a young child over the top or through any opening or gap from the outside...

*...continued*



## R4101.17.1.8

*...continued*

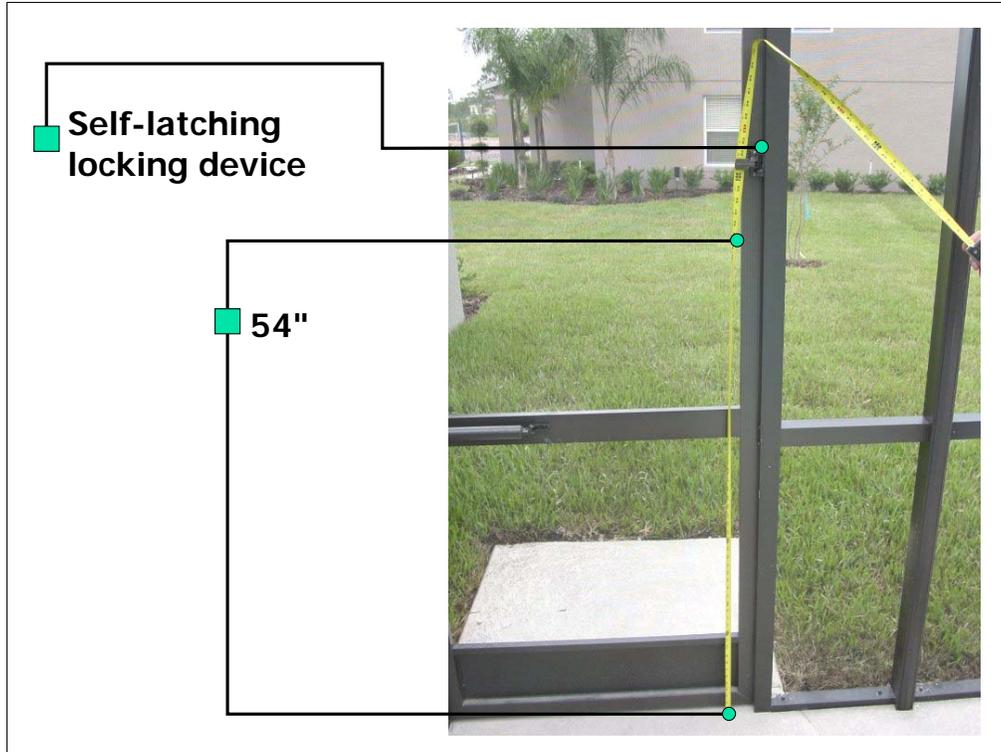
- Gates that provide access to the swimming pool must:
  - Open outward away from the pool
  - Have no opening greater than ½ inch within 18 inches of the release mechanism (applies to barrier as well)

*...continued*

### **424.2.17 Residential swimming barrier requirements.**

#### **424.2.17.1 Outdoor swimming pools.**

**424.2.17.1.8** ...Gates that provide access to the swimming pool must open outward away from the pool. The gates and barrier shall have no opening greater than ½ inch within 18 inches of the release mechanism.



Look for self closing-self latching door/gate and  
Locking mechanism for door/gate must be at least 54" high on pool side



## R4101.17.1 Outdoor swimming pools

- R4101.17.1.9
  - Where a wall of a dwelling serves as part of the barrier, one of the following shall apply:
    1. All doors and windows providing direct access from the home to the pool must be equipped with an exit alarm that complies with UL 2017 that
      - Has a minimum sound pressure rating of 85 dB A at 10 feet.

*...continued*

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.9** Where a wall of a dwelling serves as part of the barrier, one of the following shall apply:

1. All doors and windows providing direct access from the home to the pool shall be equipped with an exit alarm complying with UL 2017 that has a minimum sound pressure rating of 85 dB A at 10 feet (3048 mm)...

*...continued*

SB4442 allows any alarm that complies with UL 2017, including battery operated. This change became effective July 1, 2005.



## R4101.17.1.9

*...continued*

- The exit alarm must produce a continuous audible warning when the door and its screen are opened
- The alarm must:
  - Sound immediately after the door is opened
  - Be capable of being heard throughout the house during normal household activities.

*...continued*

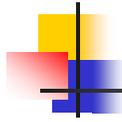
*...continued*

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.9** ...The exit alarm shall produce a continuous audible warning when the door and its screen are opened. The alarm shall sound immediately after the door is opened and be capable of being heard throughout the house during normal household activities...

*...continued*



## R4101.17.1.9

*...continued*

- The alarm must have a switch to temporarily deactivate the alarm for a single opening.
  - The deactivation cannot last more than 15 seconds.
  - The switch must be at least 54 inches above the threshold of the door.
  - Separate alarms are not required if door and window sensors are wired to a central alarm.

*...continued*

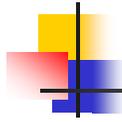
*...continued*

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.9** ...The alarm shall be equipped with a manual means to temporarily deactivate the alarm for a single opening. Such deactivation shall last no more than 15 seconds. The deactivation switch shall be located at least 54 inches above the threshold of the door. Separate alarms are not required for each door or window if sensors wired to a central alarm sound when contact is broken at any opening...

*...continued*



## R4101.17.1.9

*...continued*

- **Exceptions:**

- A. Screened or protected windows with a bottom sill height of at least 48 inches (measured from the interior finished floor at the pool access level)
- B. Windows facing the pool on floors above the first story.
- C. Screened or protected pass-through kitchen windows at least 42 inches high, with a counter beneath.

*...continued*

*...continued*

### **R4101.17 Residential swimming barrier requirements.**

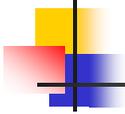
#### **R4101.17.1 Outdoor swimming pools.**

##### **R4101.17.1.9 ...**

###### **Exceptions:**

- A. Screened or protected windows having a bottom sill height of 48 inches or more measured from the interior finished floor at the pool access level.
- B. Windows facing the pool on floor above the first story.
- C. Screened or protected pass-through kitchen windows 42 inches or higher with a counter beneath...

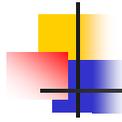
*...continued*

- 
- Check for alarms at doors and windows (if homeowner chose it as an option)



Note: Keep in mind **Florida Statute 515.27 Residential swimming pool safety feature options**, which states:

- (1) In order to pass final inspection and receive a certificate of completion, a residential swimming pool must meet at least one of the following requirements relating to pool safety features:
  - (a) The pool must be isolated from access to a home by an enclosure that meets the pool barrier requirements of s. 515.29;
  - (b) The pool must be equipped with an approved safety pool cover;
  - (c) All doors and windows providing direct access from the home to the pool must be equipped with an exit alarm that has a minimum sound pressure rating of 85 dB A at 10 feet; or
  - (d) All doors providing direct access from the home to the pool must be equipped with a self-closing, self-latching device with a release mechanism placed no lower than 54 inches above the floor.



## R4101.17.1.9

*...continued*

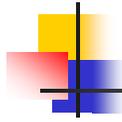
2. All doors providing direct access from the home to the pool must be equipped with
  - a self-closing, self-latching device
  - with positive mechanical latching/locking
  - installed at least 54 inches above the threshold
  - which is approved by the authority having jurisdiction.

*...continued*

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.9** ... 2. All doors providing direct access from the home to the pool must be equipped with a self-closing, self-latching device with positive mechanical latching/locking installed a minimum of 54 inches above the threshold, which is approved by the authority having jurisdiction.



## R4101.17.1 Outdoor swimming pools

### ■ R4101.17.1.10

- Where an aboveground 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,

the ladder or steps must either

- Be capable of being secured, locked or removed to prevent access, or
- Be surrounded by a barrier which meets the requirements of R4101.17.1.1 through R4101.17.1.9 and R4101.17.1.12 through R4101.17.1.14

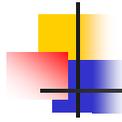
*...continued*

## **R4101.17 Residential swimming barrier requirements.**

### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.10** Where an aboveground 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, the ladder or steps either shall be capable of being secured, locked or removed to prevent access, or the ladder or steps shall be surrounded by a barrier which meets the requirements of Sections R4101.17.1.1 through R4101.17.1.9 and Sections R4101.17.1.12 through R4101.17.1.14...

*...continued*



## R4101.17.1.10

*...continued*

- When the ladder or steps are secured, locked or removed, any opening created must not allow the passage of a 4-inch-diameter sphere.

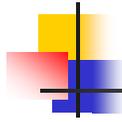
Inspect ladders with regard to bonding, capability of being secured, locked or removed to prevent access, or the ladder or steps shall be surrounded by a barrier which meets the requirements.

*...continued*

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.10** ... When the ladder or steps are secured, locked or removed, any opening created shall not allow the passage of a 4-inch-diameter sphere.



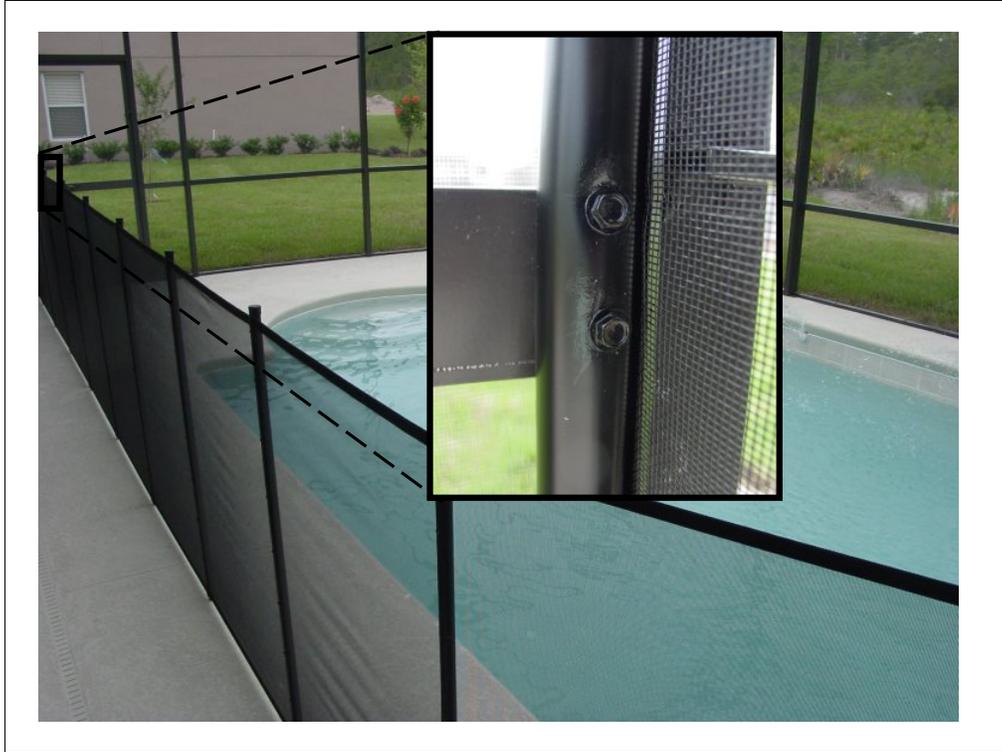
## R4101.17.1 Outdoor swimming pools

- R4101.17.1.11
  - Standard screen enclosures which meet the requirements of section R4101.17 may be utilized as part of or all of the “barrier” and shall be considered a “non-dwelling” wall.
  - One end of the barrier must be removable only with the aid of tools.

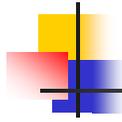
### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.11** Standard screen enclosures which meet the requirements of Section R4101.17 may be utilized as part of or all of the “barrier” and shall be considered a “non-dwelling” wall. Removable child barriers shall have one end of the barrier nonremovable without the aid of tools.



Example.



## R4101.17.1 Outdoor swimming pools

- R4101.17.1.12
  - The barrier must be placed around the perimeter of the pool and must be separate from any fence, wall, or other enclosure surrounding the yard unless:
    - the fence, wall, or other enclosure or portion thereof is situated on the perimeter of the pool,
    - is being used as part of the barrier, and
    - meets the barrier requirements of this section.

### **R4101.17 Residential swimming barrier requirements.**

#### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.12** The barrier must be placed around the perimeter of the pool and must be separate from any fence, wall, or other enclosure surrounding the yard unless the fence, wall, or other enclosure or portion thereof is situated on the perimeter of the pool, is being used as part of the barrier, and meets the barrier requirements of this section.



## R4101.17.1 Outdoor swimming pools

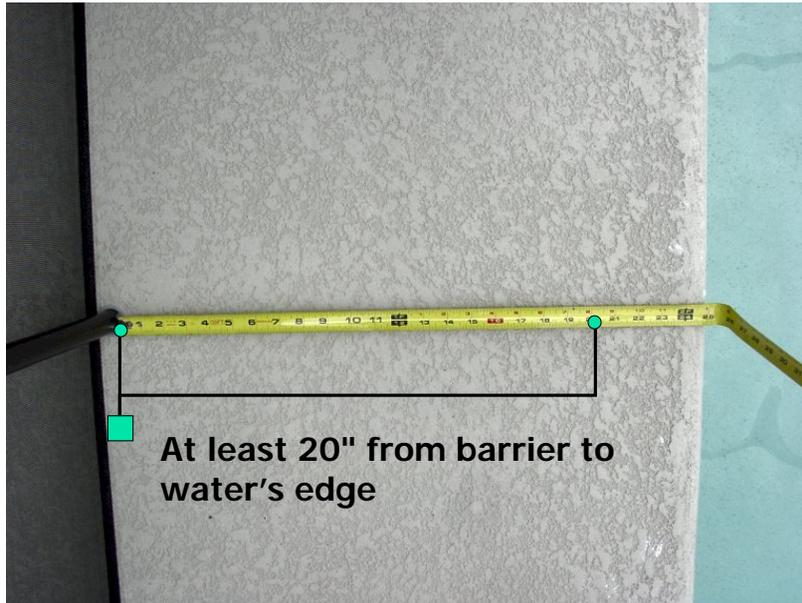
### ■ R4101.17.1.13

- The barrier must be placed sufficiently away from the water's edge to prevent a young child or medically frail elderly person who may get through the barrier from immediately falling into the water.
- "Sufficiently away from the water's edge" means no less than 20 inches from the barrier to the water's edge.
- Dwelling or non-dwelling walls—when used as part or all of the "barrier" and meeting the other barrier requirements—may be as close to the water's edge as permitted by this code.

## **R4101.17 Residential swimming barrier requirements.**

### **R4101.17.1 Outdoor swimming pools.**

**R4101.17.1.13** Removable child barriers must be placed sufficiently away from the water's edge to prevent a young child or medically frail elderly person who may manage to penetrate the barrier from immediately falling into the water. Sufficiently away from the water's edge shall mean no less than 20 inches from the barrier to the water's edge. Dwelling or non-dwelling walls including screen enclosures, when used as part or all of the "barrier" and meeting the other barrier requirements, may be as close to the water's edge as permitted by this code.





## R4101.17.1 Outdoor swimming pools

- R4101.17.1.14
  - A wall of a dwelling may serve as part of the barrier if it does not contain any door or window that opens directly from the home to the swimming pool.
- R4107.17.1.14.1
  - Adjacent permanent natural or permanent man-made features such as bulkheads, canals, lakes, etc. may be permitted as a barrier.

### **424.2.17 Residential swimming barrier requirements.**

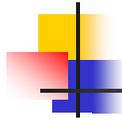
#### **424.2.17.1 Outdoor swimming pools.**

**424.2.17.1.14** A wall of a dwelling may serve as part of the barrier if it does not contain any door or window that opens to provide direct access from the home to the swimming pool.

### **R4101.17 Residential swimming barrier requirements.**

**R4101.17.1.14.1 Adjacent waterways.** Permanent natural or permanent man-made features such as bulkheads, canals, lakes, navigable waterways, etc., adjacent to a public or private swimming pool or spa may be permitted as a barrier when approved by the authority having jurisdiction. When evaluating such barrier features, the authority may perform on-site inspections and review evidence such as surveys, aerial photographs, water management agency standards and specifications, and any other similar documentation to verify, at a minimum, the following:

1. The barrier feature is not subject to natural changes, deviations, or alterations and is capable of providing an equivalent level of protection as that provided by the code.
2. The barrier feature clearly impedes, prohibits or restricts access to the swimming pool or spa.



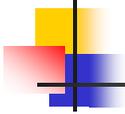
## R4101.17.1 Outdoor swimming pools

### ■ R4101.17.1.15

- A mesh safety barrier meeting the requirements of Section R4101.17 and the minimum requirements as stated in this section shall be considered a barrier.

**R4101.17.1.15** A mesh safety barrier meeting the requirements of Section R4101.17 and the following minimum requirements shall be considered a barrier as defined in this section:

1. Individual component vertical support posts shall be capable of resisting a minimum of 52 pounds (229 N) of horizontal force prior to breakage when measured at a 36-inch (914 mm) height above grade. Vertical posts of the child mesh safety barrier shall extend a minimum of 3 inches (76 mm) below deck level and shall be spaced no greater than 36 inches (914 mm) apart.
2. The mesh utilized in the barrier shall have a minimum tensile strength according to ASTM D 5034 of 100 lbf., and a minimum ball burst strength according to ASTM D 3787 of 150 lbf. The mesh shall not be capable of deformation such that a ¼-inch (6.4 mm) round object could pass through the mesh.  
The mesh shall receive a descriptive performance rating of no less than “trace discoloration” or “slight discoloration” when tested according to ASTM G 53 (Weatherability, 1,200 hours.)
3. When using a molding strip to attach the mesh to the vertical posts, this strip shall contain, at a minimum, #8 by ½-inch (12.7 mm) screws with a minimum of two screws at the top and two at the bottom with the remaining screws spaced a maximum of 6 inches (152 mm) apart on center.
4. Patio deck sleeves (vertical post receptacles) placed inside the patio surface shall be of nonconductive materials.
5. A latching device shall attach each barrier section at a height no lower than 45 inches (11,613 mm) above grade. Common latching devices that include, but are not limited to, devices that provide the security equal to or greater than that of a hook and eye type latch incorporating a spring actuated retaining lever (commonly referred to as a safety gate hook).
6. The bottom of the child mesh safety barrier shall not be more than 1 inch (25 mm) above the deck or installed surface (grade).



## R4101.17 Residential swimming barrier requirement

- R4101.17.2 Indoor swimming pools.
  - All walls surrounding indoor swimming pools must comply with R4101.17.1.9.
- R4101.17.3 Prohibited locations.
  - A barrier cannot be located in a way that allows any permanent structure, equipment, or window that opens to provide access from the home to the swimming pool.

### **R4101.17 Residential Swimming barrier requirement.**

#### **R4101.17.2 Indoor swimming pools.**

All walls surrounding indoor swimming pools shall comply with Section R4101.17.1.9.

#### **R4101.17.3 Prohibited locations.**

A barrier may not be located in a way that allows any permanent structure, equipment, or window that opens to provide access from the home to the swimming pool.



## NEC 680-32 GFCI

- Regarding storable pools:
  - All electrical equipment, including power-supply cords, used with storable pools must have a ground-fault circuit interrupter

### NATIONAL ELECTRICAL CODE HANDBOOK (EIGHTH EDITION)

#### III. Storable Pools

##### **680-32. Ground-Fault Circuit Interrupters Required.**

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

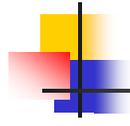
The Commentary states:

A storable pool may be readily disassembled and has a maximum wall height of 42 in. Pools of any dimension with inflatable walls are considered storable. See the definition of *storable swimming or wading pool* in Section 680-4. This type of pool and its associated equipment does not require bonding conductors. However, the filter pump is required to be double insulated, and grounding means consisting of an equipment grounding conductor that is an integral part of the flexible cord is required to be provided. There are portable filter pumps for use with storable pools listed by Underwriters Laboratories Inc. The receptacle is required to be located at least 10 ft from the pool [see Section 680-6(22)], and all electrical equipment is required to have ground-fault circuit-interrupter protection for personnel.

*Fine Print Note: Where flexible cords are used, see Section 400-4.*

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.





## R4101.7 Pumps

- R4101.7.1 Strainer.
  - Pool circulating pumps, when used with a pressure filter, must be equipped on the inlet side with an approved type hair and lint strainer
- R4101.7.2 Installation.
  - Pumps shall be installed in accordance with manufacturer recommendations.

### **R4101.7 Pumps**

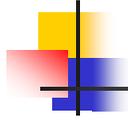
#### **R4101.7.1 Strainer.**

Pool circulating pumps shall be equipped on the inlet side with an approved type hair and lint strainer when used with a pressure filter.

#### **R4101.7.2 Installation.**

Pumps shall be installed in accordance with manufacturer recommendations.

This change became effective October 1, 2005.



## R4101.7 Pumps

- R4101.7.3 Capacity.
  - Pumps must have design capacity at the following heads:
    1. Pressure Diatomaceous Earth – at least 60 ft.
    2. Vacuum Diatomaceous Earth – 20 inch vacuum on the suction side and 40 ft total head
    3. Rapid Sand – at least 45 ft.
    4. High Rate Sand – at least 60 ft.
- R4101.7.4 Materials.
  - Pump impellers, shafts, wear rings and other working parts must be made of corrosion-resistant materials.

### **R4101.7 Pumps.**

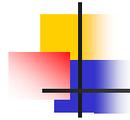
#### **R4101.7.3 Capacity.**

Pumps shall have design capacity at the following heads.

1. Pressure Diatomaceous Earth – at least 60 ft.
2. Vacuum Diatomaceous Earth – 20 inch vacuum on the suction side and 40 ft total head
3. Rapid Sand – at least 45 ft.
4. High Rate Sand – at least 60 ft.

#### **R4101.7.4 Materials.**

Pump impellers, shafts, wear rings and other working parts shall be of corrosion-resistant materials.



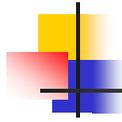
## R4101.8 Valves

- R4101.8.1 General.
  - Valves must be made of materials that are approved in the *Florida Building Code, Plumbing*.
  - Valves located under concrete slabs must be set in a pit:
    - Having a least dimension of five pipe diameters
    - With a minimum of at least 10 inches
    - Fitted with a suitable cover
  - All valves must be readily accessible for maintenance and removal.

### **R4101.8 Valves.**

#### **R4101.8.1 General.**

Valves shall be made of materials that are approved in the *Florida Building Code, Plumbing*. Valves located under concrete slabs shall be set in a pit having a least dimension of five pipe diameters with a minimum of at least 10 inches and fitted with a suitable cover. All valves shall be located where they will be readily accessible for maintenance and removal.



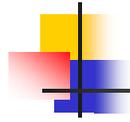
## R4101.8 Valves

- R4101.8.2 Full-way (gate) valves.
  - Full-way valves must be installed to insure proper functioning of the filtration and piping system.
  - When the pump is located below the overflow rim of the pool, a valve must be installed on the discharge outlet and the suction line.

### 424.2.8 Valves

#### 424.2.8.2 Full-way (gate) valves.

Full-way valves shall be installed to insure proper functioning of the filtration and piping system. When the pump is located below the overflow rim of the pool, a valve shall be installed on the discharge outlet and the suction line.



## R4101.8 Valves

- R4101.8.3 Check valves.
  - Where check valves are installed they must be of the swing, spring or vertical check patterns.
- R4101.8.4 Combination valves.
  - Combination valves must be approved by the administrative authority before they are installed.

### **R4101.8 Valves**

#### **R4101.8.3 Check valves.**

Where check valves are installed they shall be of the swing, spring or vertical check patterns.

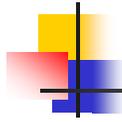
#### **R4101.8.4 Combination valves.**

Combination valves shall require approval of the administrative authority prior to their installation.

This change became effective October 1, 2005.



Installed Jandy valves, allowed in some jurisdictions.



## R4101.18 Ladders and steps

- All pools—whether public or private—must be provided with a ladder or steps in the shallow end where water depth exceeds 24 inches.
- In private pools where water depth exceeds 5 feet, there must be ladders, stairs or underwater benches/swimouts in the deep end.
- Where manufactured diving equipment is to be used, benches or swimouts shall be recessed or located in a corner.

### **R4101.18 Ladders and steps.**

All pools whether public or private shall be provided with a ladder or steps in the shallow end where water depth exceeds 24 inches. In private pools where water depth exceeds 5 ft., there shall be ladders, stairs or underwater benches/swimouts in the deep end. Where manufactured diving equipment is to be used, benches or swimouts shall be recessed or located in a corner.

The code also provides an exception:

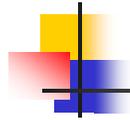
**Exception:** In private pools having more than one shallow end, only one set of steps are required. A bench swim-out or ladder may be used at all additional shallow ends in lieu of an additional set of steps.

This change became effective October 1, 2005.

Also, check for bonding of the ladder if used.



Bullnose that could serve as a handrail but not required.  
Swimout in the deep end.



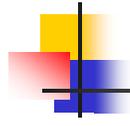
## R4101.20 Filters

---

- The entire design of matched components must have sufficient capacity to provide a complete turnover of pool water within 12 hours.

### **424.2.20 Filters.**

The entire design of matched components shall have sufficient capacity to provide a complete turnover of pool water in 12 hours or less.



## R4101.20.1 Sand filters

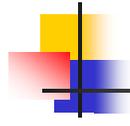
- R4101.20.1.1 Approved types.
  - Rapid sand filters (flow up to 5 gpm/ft<sup>2</sup>) must be constructed in accordance with approved standards.
  - Where high rate sand filters (flow in excess of 5 gpm/ft<sup>2</sup>) are used, they must be of an approved type.
  - The circulation system and backwash piping must be adequate for proper backwashing of the filter.
  - Backwash flow rates must be at least 12 gpm/ft<sup>2</sup> for rapid sand filters or 15 gpm/ft<sup>2</sup> for high rate sand filters.

### **R4101.20 Filters.**

#### **R4101.20.1 Sand filters.**

##### **R4101.20.1.1 Approved types.**

Rapid sand filters (flow up to 5 gpm/sq ft) shall be constructed in accordance with approved standards. Where high rate sand filters (flow in excess of 5 gpm/sq ft) are used, they shall be of an approved type. The circulation system and backwash piping shall be adequate for proper backwashing of said filter and shall provide backwash flow rates of at least 12 gpm/sq ft for rapid sand filters or 15 gpm/sq ft for high rate sand filters.



## R4101.20.1 Sand filters

---

- R4101.20.1.2 Instructions.
  - Every filter system must have written operating instructions.

### **R4101.20 Filters.**

#### **R4101.20.1 Sand filters.**

##### **R4101.20.1.2 Instructions.**

Every filter system shall be provided with written operating instructions.



## R4101.20.1 Sand filters

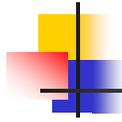
- R4101.20.1.3 Filter system equipment.
  - On pressure type filters, a means must be provided to permit the release of internal pressure.
  - A filter incorporating an automatic internal air release as its principal means of air release must have lids as part of its design which provide a slow and safe release of pressure.
  - A separation tank used in conjunction with a filter tank must have as part of its design a manual means of air release or a lid which provides a slow and safe release of pressure as it is opened.

### **R4101.20 Filters.**

#### **R4101.20.1 Sand filters.**

##### **R4101.20.1.3 Filter system equipment.**

On pressure type filters, a means shall be provided to permit the release of internal pressure. A filter incorporating an automatic internal air release as its principal means of air release shall have lids which provide a slow and safe release of pressure as part of its design. A separation tank used in conjunction with a filter tank shall have as part of its design a manual means of air release or a lid which provides a slow and safe release of pressure as it is opened.



## R4101.20.2 Diatomite type filters

- R4101.20.2.1 Design.
  - Diatomite-type filters shall be designed for operation under either pressure or vacuum.
  - The design capacity for both pressure and vacuum filters cannot exceed 2 gpm/ft<sup>2</sup> of effective filter area.
- R4101.20.2.2 Filter aid.
  - Provision must be made to introduce filter aid into the filter in such a way as to evenly precoat the filter septum.

### **R4101.20 Filters.**

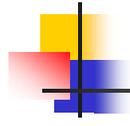
#### **R4101.20.2 Diatomite type filters**

##### **R4101.20.2.1 Design.**

Diatomite-type filters shall be designed for operation under either pressure or vacuum. The design capacity for both pressure and vacuum filters shall not exceed 2 gpm/sq ft of effective filter area.

##### **R4101.20.2.2 Filter aid.**

Provision shall be made to introduce filter aid into the filter in such a way as to evenly precoat the filter septum.



## R4101.21 Pool fittings

- R4101.21.1 Approved type.
  - Pool fittings must be both approved and appropriate for the specific application.
- R4101.21.2 Skimmers.
  - Approved surface skimmers are required and must be installed in strict accordance with the manufacturer's installation instructions.
  - There must be one skimmer per 800 sq ft of surface area or fraction thereof
  - The flow rate must be least 25 gpm per skimmer.

### **R4101.21 Pool fittings.**

#### **R4101.21.1 Approved type.**

Pool fittings shall be of an approved type and design as to be appropriate for the specific application.

#### **R4101.21.2 Skimmers.**

Approved surface skimmers are required and shall be installed in strict accordance with the manufacturer's installation instructions. Skimmers shall be installed on the basis of one per 800 sq ft of surface area or fraction thereof, and shall be designed for a flow rate of at least 25 gpm per skimmer.

The change from 1000 sq ft to 800 sq ft became effective on October 1, 2005.



Check skimmer. Distance to skimmer from back of beam depends on manufacturer. In this case, the distance to the water's edge from front of skimmer is 8" with a 9" opening and an approximate 20" flange.



## R4101.21 Pool fittings

- R4101.21.3 Main outlet.

An approved main outlet, when provided, shall be located on a wall or floor at or near the deepest point in every pool for emptying or circulating (or both) the water.

- See Florida Building Commission Information Notice on Swimming Pool Drains Notice #3

### R4101.21 Pool fittings.

#### R4101.21.3 Main outlet.

An approved main outlet, when provided, shall be located on a wall or floor at or near the deepest point in the pool for emptying or circulation, or both, of the water in the pool.

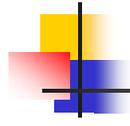
#### FLORIDA BUILDING COMMISSION INFORMATIONAL NOTICE ON SWIMMING POOL DRAINS NOTICE #3 - April 1, 2002

In consultation with the Plumbing Technical Advisory Committee (TAC) and its Pool and Spa Drain Safety Subcommittee, the Florida Building Commission staff developed information necessary to provide for an interim clarification to the intent of Section 424.2.21.3 of the Florida Building Code which states: “An approved main outlet shall be provided at the deepest point in every pool for emptying or circulation, or both, of the water in the pool.”

#### Background:

- Above ground swimming pools are not designed to have a bottom drain. A Petitioner at the March 25, 2002, meeting of the Plumbing Technical Advisory Committee and its Pool and Spa Drain Safety Subcommittee recently met on this issue: Are bottom drains required for above ground pools by section 424.2.21.3?
- The “main outlet” requirement falls under the “pool fittings” section. It applies to “every pool” . The definition of “Swimming Pool, Private” includes “any structure, located in a residential area, that is intended for swimming or recreational bathing and contains water over 24 inches deep including but not limited to inground, aboveground, and onground swimming pools, hot tubs, and non-portable spas”.
- The requirement for a “main outlet” in all pools does not specify that said outlet has to be an integral part of the pool, just that it shall be provided at the deepest point in the pool for emptying or circulation or both of the pool water. Should the pool need to be emptied, it could be fit with an appliance, a pump, which would be available to drain the pool.
- Section 424.2.21.3 requires the “main outlet” to be “approved”, which means it is subject to the judgment of the local building official. Section 424.2.5.1, Approval and authorization, states: “The provisions of this code are not intended to prevent the use of any alternate material, method of construction, appliance or equipment, provided any such alternate has been first approved and its use authorized by the administrative authority.”
- Above-ground swimming pool circulation requirements are covered under the 1999 ANSI/NSPI-4, Standard for Above-ground/On-ground Residential Swimming Pools. The 1999 ANSI/NSPI-4 is the code minimum engineering design standard for the above-ground swimming pool (see s. 424.2.6 and meeting the requirements of this standard will satisfy the requirements of s. 4124.2.21.3 with regard to circulation.
- At the March 25th Commission meeting, the Plumbing TAC and its Pool and Spa Drain Safety Subcommittee, recommended that the Florida Building Commission undertake the following clarification: **“The pool or auxiliary pump could be used to drain the pool and meet the requirements of section 424.2.21.3”.**

**Staff provide the following guidance in consultation with the Plumbing TAC and its Pool and Spa Drain Safety Subcommittee:** Under the provisions of section 424.2.5.1, the pool or an auxiliary pump could be used to drain the pool and meet the requirements of section 424.2.21.3.



## R4101.21 Pool fittings

- R4101.21.4 Hydrostatic relief device.
  - In areas of anticipated water table an approved hydrostatic relief device must be installed.
    - Exception: Plastic liner pools (where there is no structural bottom to the pool)

### **R4101.21 Pool fittings**

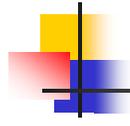
#### **R4101.21.4 Hydrostatic relief device.**

In areas of anticipated water table an approved hydrostatic relief device shall be installed.

**Exception:** Plastic liner pools (where there is no structural bottom to the pool).



Dead line pipe.



## R4101.21 Pool fittings

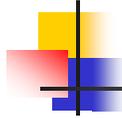
- R4101.21.5 Inlet fittings.
  - There must be least one approved manufactured inlet fitting per 300 SQ FT of surface area for the return of recirculated pool water.
  - The fittings must insure an adequate seal to the pool structure
  - They must incorporate a convenient means of sealing for pressure testing the pool circulation piping.
  - Where more than one inlet is required, the shortest distance between any two required inlets shall be at least 10 ft.

### **R4101.21 Pool fittings**

#### **R4101.21.5 Inlet fittings.**

Approved manufactured inlet fittings for the return of recirculated pool water shall be provided on the basis of at least one per 300 sq ft of surface area. Such inlet fittings shall be designed and constructed to insure an adequate seal to the pool structure and shall incorporate a convenient means of sealing for pressure testing of the pool circulation piping. Where more than one inlet is required, the shortest distance between any two required inlets shall be at least 10 ft.

The change from 1500 sq ft to 300 sq ft became effective on October 1, 2005.



## R4101.22 Equipment foundations and enclosures

- All mechanical equipment shall be installed as per manufacturer recommendations.
- All heating and electrical equipment—unless approved for outdoor installation—must either be
  - adequately protected against the weather or
  - installed within a building

### **R4101.22 Equipment foundations and enclosures.**

All pool motors and equipment shall be installed in compliance with the manufacturer's recommendations. All heating and electrical equipment, unless approved for outdoor installation, shall be adequately protected against the weather or installed within a building.

This change became effective on October 1, 2005.





## R4101.23 Accessibility and clearances

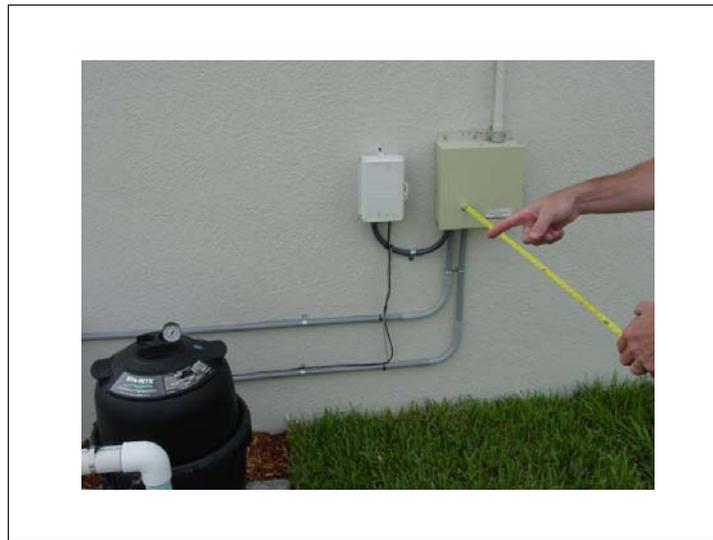
- Equipment must be accessible for cleaning, operating, maintenance and servicing.

### **R4101.23 Accessibility and clearances.**

Equipment shall be so installed as to provide ready accessibility for cleaning, operating, maintenance and servicing.



Check to see there is no service panel behind electrical stub out for pool. Also, that there is a clear area for working on the equipment.



**NATIONAL ELECTRICAL CODE HANDBOOK (2002)**

**II. 600 Volts, Nominal, or Less**

**110-26. Spaces About Electrical Equipment.**

**110-26(f)(2) Outdoor.**

Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.

**110-26(A) Working Space.**

Working space for equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of (1), (2), and (3) or as required or permitted elsewhere in this Code.

**110-26(A)(1) Depth of Working Space.**

The depth of the working space in the direction of access to live parts shall not be less than indicated in Table 110-26(a). Distances shall be measured from the live parts if such are exposed or from the enclosure front or opening if such are enclosed.

**TABLE 110.26(A)(1)  
WORKING SPACES**

NOMINAL VOLTAGE TO GROUND	MINIMUM CLEAR DISTANCE (ft)		
	CONDITION 1	CONDITION 2	CONDITION 3
0-150	3	3	3
151-600	3	3 ½	4

**Notes:**

1. For SI units, 1 ft = 0.3048 m.
2. Where the conditions are as follows:
  - Condition 1 – Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated bus bars operating at not over 300 volts to ground shall not be considered live parts.
  - Condition 2 – Exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded.
  - Condition 3 – Exposed live parts on both sides of the work space (not guarded as provided in Condition 1) with the operator between.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



**NATIONAL ELECTRICAL CODE HANDBOOK (2002)**

**110-26(A)(2) Width of Working Space.**

The width of the working space in front of the electric equipment shall be the width of the equipment or 30 in (762 mm), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

The Commentary states:

Regardless of the width of the electrical equipment, the working space cannot be less than 30 in wide. Also, according to Section 110-26(e), the working space must be clear from the floor up to a height of 6½ ft or the height of the equipment, whichever is greater. This allows an individual to have at least shoulder-width space when in front of the equipment. This 30-in. measurement can be made from either the left or the right edge of the equipment and can overlap other electrical equipment, provided the other equipment does not extend beyond the clearance required by Table 110-26(a). If the equipment is greater than 30 in. wide, the left-to-right space must be equal to the width of the equipment.

In addition to the width requirements, sufficient depth in the working space must also be provided to allow a panel or door to open at least 90 degrees. If doors or hinged panels are larger than 3 ft, more than a 3-ft-deep working space must be provided to allow a full 90 degree opening.

Also... Caption for Figure 110.9. The 30-in-wide front working space is not required to be directly centered on the electrical equipment if it can be ensured that the space is sufficient for safe operation and maintenance of such equipment.

**110-26(A)(3) Height of Working Space.**

The work space shall be clear and extend from the grade, floor, or platform to the height required by Section 110-26(e). Within the height requirements of this section, other equipment associated with the electrical installation located above or below the electrical equipment shall be permitted to extend not more than 6 in (153 mm) beyond the front of the electrical equipment.

**110-26(E) Headroom.**

The minimum headroom of working spaces about service equipment, switchboards, panel boards, or motor control centers shall be 6½ ft (1.98 m). Where the electrical equipment exceeds 6½ ft (1.98 m) in height, the minimum headroom shall not be less than the height of the equipment.

**Exception:**

Service equipment or panel boards, in existing dwelling units, that do not exceed 200 amperes.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.

## NEC 680-3 and 680-23

- J (junction) box required for pool wire (aboveground and belowground pools)



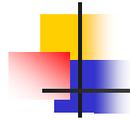
### **NATIONAL ELECTRICAL CODE HANDBOOK (2002)**

#### **680-3. Other articles.**

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

See Section 680-23 Junction Boxes and Enclosures for Transformers or Ground-Fault Circuit Interrupters for more information on junction boxes.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



## NEC 680.6

- Check for grounding of all of the metal equipment and accessories

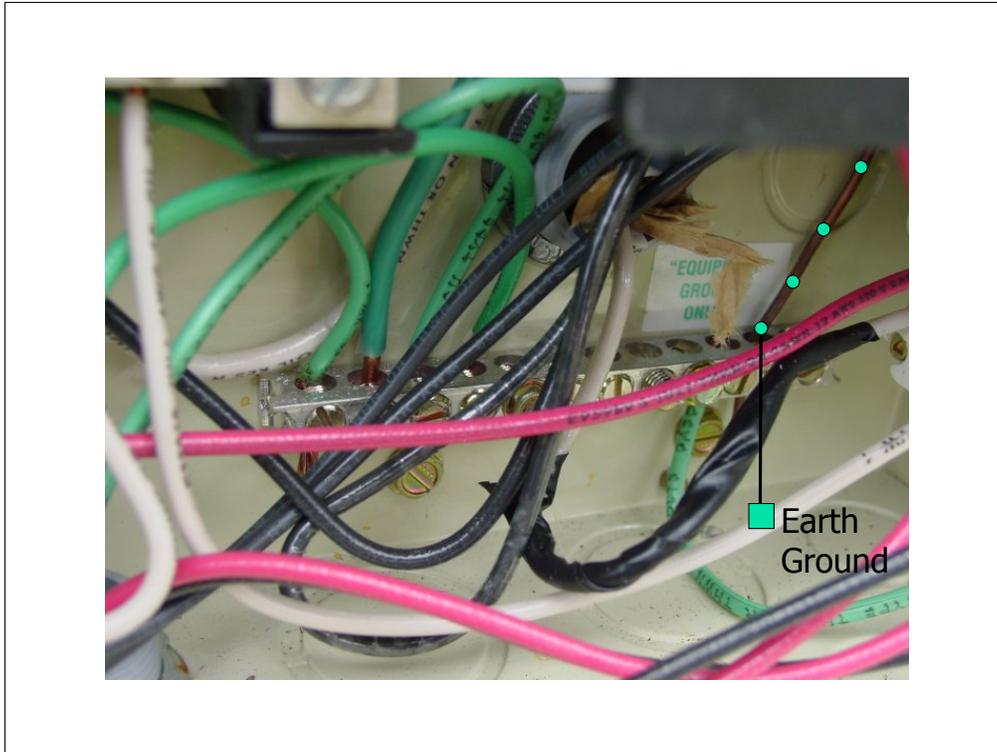
### **NATIONAL ELECTRICAL CODE HANDBOOK (2002)**

#### **680-6. Grounding.**

The following equipment shall be grounded:

- (1) Through-wall lighting assemblies and underwater luminaires (lighting fixtures), other than those low-voltage systems listed for the application without a grounding conductor
- (2) All electrical equipment located within 5 ft (1.52 m) of the inside wall of the pool
- (3) All electrical equipment associated with the recirculating system of the pool
- (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 specified body of water.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



Shows grounding arrangement. Various equipment comes into the bus and then connected to a common earth ground. (Note: Electrical tape, in this case, is used for color coding.)

**NATIONAL ELECTRICAL CODE HANDBOOK (2002)**

**250-4(A) 1 Grounding of Electrical Systems.** Electrical systems that are required to be grounded shall be connected to earth in a manner that will limit the voltage imposed by lightning, line surges, or unintentional contact with higher voltage lines and that will stabilize the voltage to earth during normal operation.

**250-4(A) 3** Non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

The Commentary states in part:

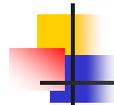
Grounding can be divided into two areas: system grounding and equipment grounding. These two areas are kept separate from each other except at the point where they receive their source of power, such as at the service equipment or at a separately derived system.

Grounding is the intentional connection of a current-carrying conductor to ground or something that serves in place of ground. In most instances, this connection is made at the supply source, such as a transformer, and at the main service disconnecting means of the premises using the energy.

There are three basic reasons for grounding. They are as follows:

1. To limit the voltages caused by lightning or by accidental contact of the supply conductors with conductors of higher voltage.
2. To stabilize the voltage under normal operating conditions (This maintains the voltage at one level relative to ground, so that any equipment connected to the system will be subject only to that potential difference.)
3. To facilitate the operation of overcurrent devices, such as fuses, circuit breakers, or relays, under ground-fault conditions.

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



## NEC 680-3 and 680-8

- Check pool distance from overhead and underground electrical service entrances

### NATIONAL ELECTRICAL CODE HANDBOOK (2002)

#### 680-3

Except as modified by this article, wiring and equipment in or adjacent to pools and fountains shall comply with other applicable provisions of this Code, including those provisions identified in Table 680-3.

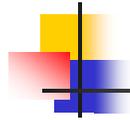
#### 680-8. Overhead Conductor Clearances.

[A] POWER. With respect to service drop conductors and open overhead wiring, swimming pool and similar installations shall comply with the minimum clearances given in Table 680-3 and illustrated in Figure 680-8.

		INSULATED SUPPLY OR SERVICE DROP CABLES...*	ALL OTHER SUPPLY OR SERVICE DROP CONDUCTORS VOLTAGE TO GROUND	
			0-15 kV	Greater than 15-50 kV
A.	Clearance in any direction to the water level, edge of water surface, base of diving platform, or permanently anchored raft	22.5 ft (6.7 m)	25 ft (7.5 m)	27 ft (8 m)
B.	Clearance in any direction to the diving platform or tower	14.5 ft (4.4 m)	17 ft (5.2 m)	18 ft (5.5 m)
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 (A) and (B) but not less than 10 ft (3 m).		

*Fine Print Note: open overhead wiring as used in this article typically refers to conductors not in an enclosed raceway.*

Reprinted with permission from NFPA 70-2002, the *National Electrical Code*® Copyright © 2002, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the referenced subject which is represented only by the standard in its entirety.



## R4101.6 Engineering design

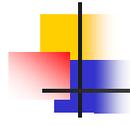
- R4101.6.2 Required equipment.
  - All swimming pools must have approved mechanical equipment consisting of filter, pump, piping valves and component parts
    - Exception: Pools having a supply of fresh water equivalent to the volume of the pool in the specified turnover time will be allowed.

### **R4101.6 Engineering design.**

#### **R4101.6.2 Required equipment.**

Every swimming pool shall be equipped complete with approved mechanical equipment consisting of filter, pump, piping valves and component parts.

**Exception:** Pools with a supply of fresh water equivalent to the volume of the pool in the specified turnover time will be allowed.



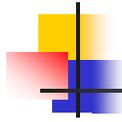
## R4101.6 Engineering design

- 424.2.6.4 Piping to heater.
  - Manufacturer's recommendations should be followed for
    - water flow through the heater
    - any bypass plumbing installed
    - any back-siphoning protection
    - the use of heat sinks

### **R4101.6 Engineering design.**

#### **R4101.6.4 Piping to heater.**

Water flow through the heater, any bypass plumbing installed, any back-siphoning protection, and the use of heat sinks shall be done in accordance with the manufacturer's recommendations.



## R4101.6 Engineering design

- R4101.6.5 Piping installation.
  - Piping materials must be installed in strict accordance with the manufacturer's installation standards.

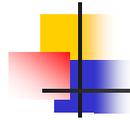
### **424.2.6 Engineering design.**

#### **424.2.6.5 Piping installation.**

All piping materials shall be installed in strict accordance with the manufacturer's installation standards.

**Exception:** Primer and glue on exposed aboveground piping not required to be colored.

The Exception was added on October 1, 2005.

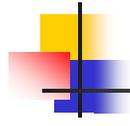


## R4101.9 Water supply

- Unless an approved type of filling system is installed, any water supply which in the judgment of the administrative authority may be used to fill the pool, must be equipped with backflow protection.
- No over the rim fill spout will be accepted unless located under a diving board, or properly guarded.

### **R4101.9 Water supply.**

Unless an approved type of filling system is installed, any water supply which in the judgment of the administrative authority may be used to fill the pool, shall be equipped with backflow protection. No over the rim fill spout shall be accepted unless located under a diving board, or properly guarded.



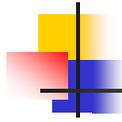
## R4101.10 Waste water disposal

- R4101.10.1 Connection limitations.
  - Direct or indirect connections must not be made between any
    - Storm drain
    - Sewer
    - Drainage system
    - Seepage pit
    - Underground leaching pit
    - Sub-soil drainage lineand any line connected to a swimming pool unless approved by the administrative authority.

### **R4101.10 Waste water disposal.**

#### **R4101.10.1 Connection limitations.**

Direct or indirect connections shall not be made between any storm drain, sewer, drainage system, seepage pit underground leaching pit, or sub-soil drainage line, and any line connected to a swimming pool unless approved by the administrative authority.



## R4101.10 Waste water disposal

- R4101.10.2 Disposal through public sewer.
  - When the waste water from a swimming pool is to be disposed of through a public sewer
    - A 3 inch P-trap shall be installed on the lower terminus of the building drain
    - The tall piece from the trap shall extend a minimum of 3 inches above finished grade and below finished floor grade.

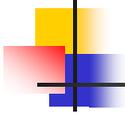
*...continued*

### **R4101.10 Waste water disposal.**

#### **R4101.10.2 Disposal through public sewer.**

When the waste water from a swimming pool is to be disposed of through a public sewer, a 3 inch P-trap shall be installed on the lower terminus of the building drain and the tall piece from the trap shall extend a minimum of 3 inches above finished grade and below finished floor grade...

*...continued*



## R4101.10.2 Disposal through public sewer

---

*...continued*

- This trap need not be vented.
- The connection between the filter waste discharge piping and the P-trap must be made by means of an indirect connection.

*...continued*

### **424.2.10 Waste water disposal.**

**424.2.10.2 Disposal through public sewer...** This trap need not be vented. The connection between the filter waste discharge piping and the P-trap shall be made by means of an indirect connection.



## R4101.10 Waste water disposal

- R410110.3 Deviations.
  - Plans and specifications for any deviation from the above manner of installation must be approved by the administrative authority before any portion of the system is installed.
  - When waste water disposal is to seepage pit installation, it must be installed in accordance with the approval granted by the administrative authority.

### **R4101.10 Waste water disposal.**

#### **R4101.10.3 Deviations.**

Plans and specifications for any deviation from the above manner of installation shall first be approved by the administrative authority before any portion of any such system is installed. When waste water disposal is to seepage pit installation, it shall be installed in accordance with the approval granted by the administrative authority.

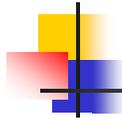


## R4101.11 Separation tank

- "A separation tank of an approved type may be used in lieu of the aforementioned means of waste water disposal when connected as a reclamation system."

### **424.2.11 Separation tank.**

A separation tank of an approved type may be used in lieu of the aforementioned means of waste water disposal when connected as a reclamation system.



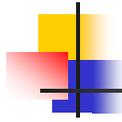
## R4101.14 Water heating equipment

- R4101.14.1 Labels.
  - Swimming pool water heating equipment must conform to accepted engineering practices, and must
    - Bear the label of a recognized testing agency
    - Include a consideration of combustion air, venting and gas supply requirements for water heaters.

### **R4101.14 Water heating equipment.**

#### **R4101.14.1 Labels.**

Swimming pool water heating equipment shall conform to the design, construction and installation requirements in accordance with accepted engineering practices and shall bear the label of a recognized testing agency, and shall include a consideration of combustion air, venting and gas supply requirements for water heaters.



## R4101.14 Water heating equipment

- R4101.14.2 Water retention.
  - If a heater is not equipped or designed for an approved permanent bypass or antisiphon device, an approved permanent bypass or antisiphon device must be installed to provide a positive means of retaining water in the heater when the pump is not in operation.

### **R4101.14 Water heating equipment.**

#### **R4101.14.2 Water retention.**

If a heater is not equipped or designed for an approved permanent bypass or antisiphon device, an approved permanent bypass or antisiphon device shall be installed to provide a positive means of retaining water in the heater when the pump is not in operation.



## R4101.14 Water heating equipment

- R4101.14.3 Pit drainage.
  - When the heater is installed in a pit, the pit must be provided with approved drainage facilities.
- R4101.14.4 Connections.
  - All water heating equipment must be installed with flanges or union connection adjacent to the heater.

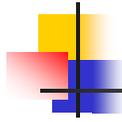
### **R4101.14 Water heating equipment.**

#### **R4101.14.3 Pit drainage.**

When the heater is installed in a pit, the pit shall be provided with approved drainage facilities.

#### **R4101.14.4 Connections.**

All water heating equipment shall be installed with flanges or union connection adjacent to the heater.



## R4101.14 Water heating equipment

- R4101.14.5 Relief valve.
  - When water heating equipment which is installed in a closed system has a valve between the appliance and the pool, a pressure relief valve must be installed on the discharge side of the water heating equipment.
  - For units up to and including 200,000 Btu/hour input, the relief valve must be rated by the American Gas Association.

### **R4101.14 Water heating equipment.**

#### **R4101.14.5 Relief valve.**

When water heating equipment which is installed in a closed system has a valve between the appliance and the pool, a pressure relief valve shall be installed on the discharge side of the water heating equipment. For units up to and including 200,000 Btu/hour input, the relief valve shall be rated by the American Gas Association.

## FBC 2406.3

- Check for safety glass issues



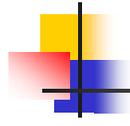
### CHAPTER 24: GLASS AND GLAZING

#### 2406 SAFETY GLAZING

##### 2406.3 Hazardous locations.

The following shall be considered specific hazardous locations requiring safety glazing materials:

1. Glazing in swinging doors except jalousies (see Section 2406.3.1)
9. Glazing in walls and fences enclosing indoor and outdoor swimming pools, hot tubs and spas where all of the following conditions are present:
  - 9.1 The bottom edge of the glazing on the pool or spa is less than 60 inches (1525 mm) above a walking surface on the pool or spa side of the glazing; and
  - 9.2 The glazing is within 60 inches (1524 mm) horizontally of the water's edge of a swimming pool or spa.



## R4101.19 Final inspection

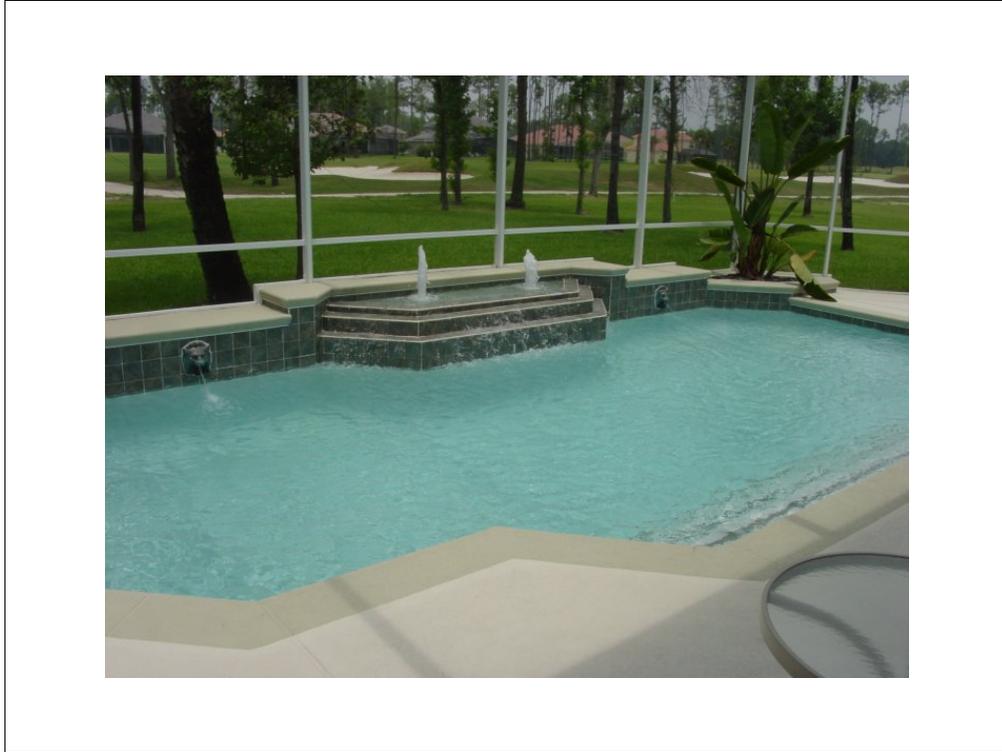
- All swimming pool installations must be completed. The pool must be:
  - completely filled with water and
  - in operationbefore the final inspection

### **R4101.19 Final inspection.**

All swimming pool installations must be completed. The pool shall be completely filled with water and in operation before final inspection.



A completed inground fiber glass pool ready for final inspection.



A completed inground concrete pool ready for final inspection.