Florida Building Code Advanced Training: Swimming Pools & Spas

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ADMINISTRATION CHAPTER1 RESIDENTIAL CODE

Chapter <u>45</u> of the Residential Code and Chapter 4, (<u>section 454</u>) 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.

R4501.1.2 Private Swimming Pools

- R4501.1.2 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 of the English Language Unabridged

R4<u>5</u>01.15 Gas Piping.

- Gas piping must comply with the Florida Building Code, Fuel Gas.
- R4<u>5</u>01.16 Electrical.
 - Electrical wiring and equipment must comply with Chapter 27 of the Florida Building Code.

R4501.3 Mechanical Requirements.

 All piping, equipment and materials used in the process piping of built-in-place swimming pools must conform to the Florida Building Code, Plumbing – unless otherwise specified.

R4501.4 Approvals

• R4<u>5</u>01.4.1 Compliance.

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

R4501.3 Approvals

R4501.4.2 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

R4101.4.3 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. R4<u>5</u>01.5 Alternate Materials and Methods of Construction

- R4501.5.1 Approval and authorization.
 - Provisions of this code are not intended to prevent the use of any alternate material, method of construction, appliance or equipment, <u>provided</u> any such alternate has been first approved and its use authorized by the administrative authority.

R4501.5 Alternate Materials and Methods of Construction

R4<u>5</u>01.5.2 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.

R4501.6 Engineering Design

R4501.6.1 Conformance standard.

- Design, construction and workmanship shall be in conformity with the most current adopted copy of
- ANSI/NSPI-3 1999 ("American National Standard for Permanently Installed Residential Spas")
 - ANSI/NSPI-4 1999 ("American National Standard for Aboveground/On ground Residential Swimming Pools")
 - ANSI/NSPI-5 2003 ("American National Standard for Residential Inground Swimming Pools")
 - ANSI/NSPI 6-99("American National Standard for Residential Portable Spas")
 - ANSI/APSP-7 2006 ("American National Standard for Suction Entrapment Avoidance in swimming pools, spas, hot tubs, and catch basins")

110.3 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
 - Safety Inspection (Alarms, Fence, Drains, etc.)
 - 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 454.2.17

Additional inspections

Set backs per zoning requirementsConstruction fence required by OSHA



Check the angle of repose

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





A.C.I. 318 <u>Appendix D</u>

Make sure steel is elevated with proper coverage and clearances concrete cast against and permanently exposed to earth has a minimum concrete coverage of <u>3 ¹/₂</u> inches.



Per plan:

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





NEC 680-23

- Top of the lighting fixture lens is at least 18 inches below the normal water level of the pool
 - Exception:
 - Unless the luminaire is listed and identified for use at a lesser depth.
 - <u>4" depth is the</u> <u>minimum.</u>







Equipotential Bonding 680.26

- At least one #8 AWG copper conductor.
- The conductor shall follow the contour of the perimeter surface
- Conductor shall be 18 to 24 inches from inside wall of the pool and buried 4 to 6 in.



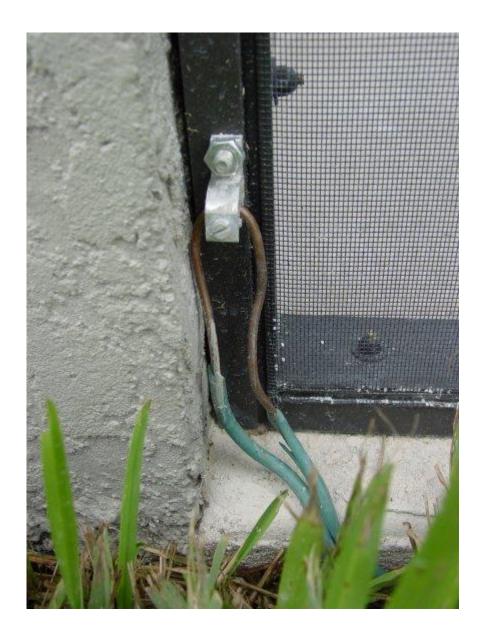




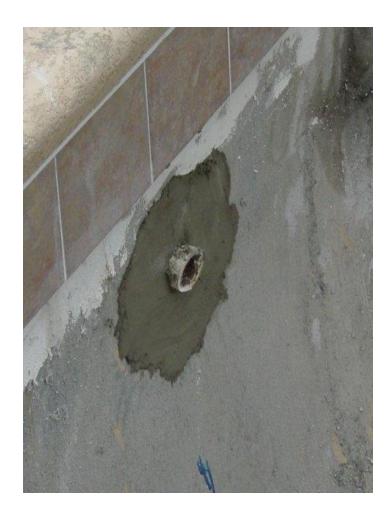
 Check for GFCI receptacle minimum of 10' and maximum of 20' from water's edge

NEC 680-6(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







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

R4501.6 Engineering Design

R4501.6.3 Water velocity.

- The water velocity cannot exceed 10 ft/s; in copper tubing the water velocity cannot exceed 8 ft/s(pool piping) Main Suction outlet velocity must comply with ANSI/APSP-7 Exception: Jet inlet fittings
- R4501.6.5 Piping installation.
 - All piping materials must be installed in strict accordance with the manufacturer's installation standards.



424.2.13.2 Joints and connections

At equipment clear glue can be used.

Deck Bond



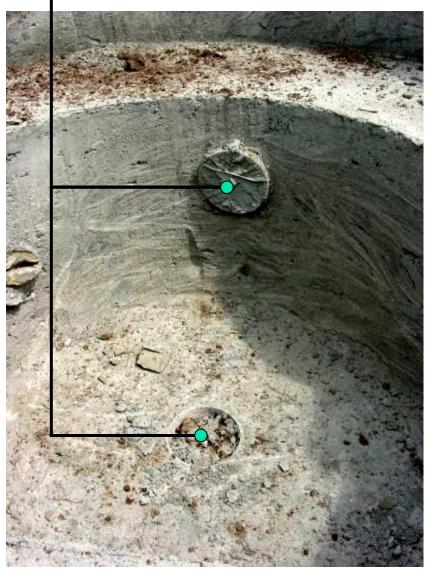
Entrapment Avoidance

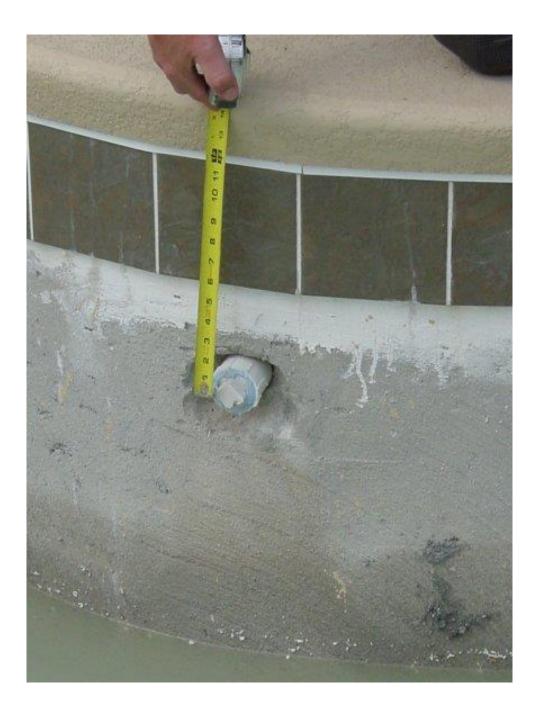
Danger: There is no back up for a missing or damaged suction outlet cover/grate. If any cover/grate is found to be damaged or missing, the pool or spa shall be immediately closed to bathers.



Separated by 3⁴ on centers

Located on two different planes





R4501.12 Tests

• R4<u>5</u>01.12.1 Pressure test.

- All pool piping must be inspected 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.

R4501.12 Tests (cont.)

R4<u>5</u>01.12.2 Drain and waste piping.

- All drain and waste piping must be tested by filling to overflowing
- All joints must be tight

Conduit correct burial depth. Rigid metal conduit 6", Intermediate metal conduit 6", non-metalic rated for direct burial 6", and rigid conduit 18"

<u>Chapter 42 Swimming</u> <u>pool electrical, table</u> <u>E4203.7 minimum</u> <u>burial depths</u>





Pressure Rig **Pressure** test at 35#,s for 15 minutes. Or static test R4501.12 Tests section R4501.12.1





FBC 1816.1.6 & 1816.1.4

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



FBC 1907 and plan

1907.1Check
thickness of slab –
generally a
minimum of 3¹/₂"



FBC 1804.5 AND ASTM 1557

Check compaction – 90% modified proctor



ANSI/APSP/ICC-5 2011

7.3 Concrete Decks

7.3.3 Expansion or control joints shall be provided to help control cracks due to expansion, contraction and movement of the slab.



R4501.13 Drain piping

R4<u>5</u>01.13.1 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.



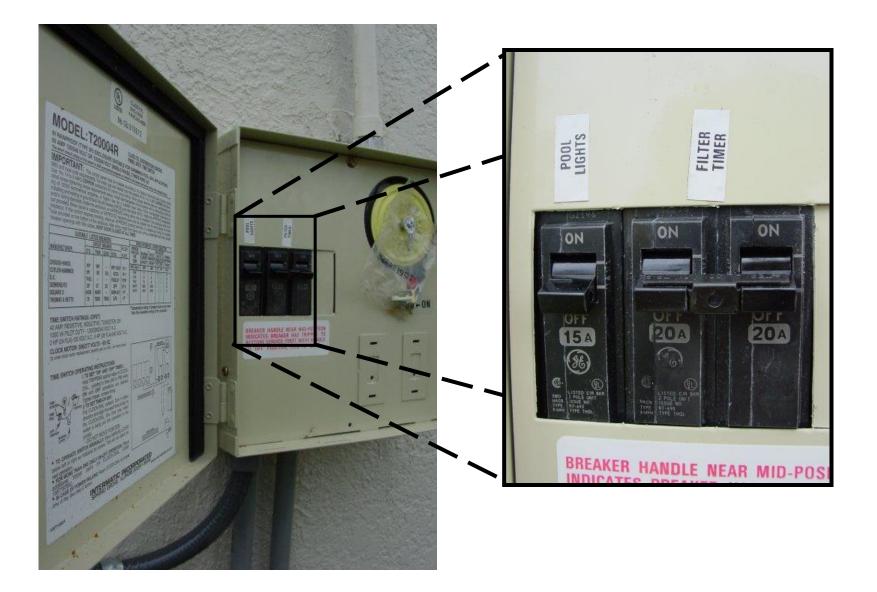
NEC 680-26 Pools and Spas

Minimum #8 bond wire on pump





" The disconnect for pool equipment must be located within site of the equipment









Look for waterproof-while-in-use plug covers





R4501.17 Residential Swimming Barrier Requirement

- Look for barrier
 - Exception: A swimming pool with an approved safety pool cover complying with ASTM F 1346-91

R4501.17 Residential Swimming Barrier Requirement

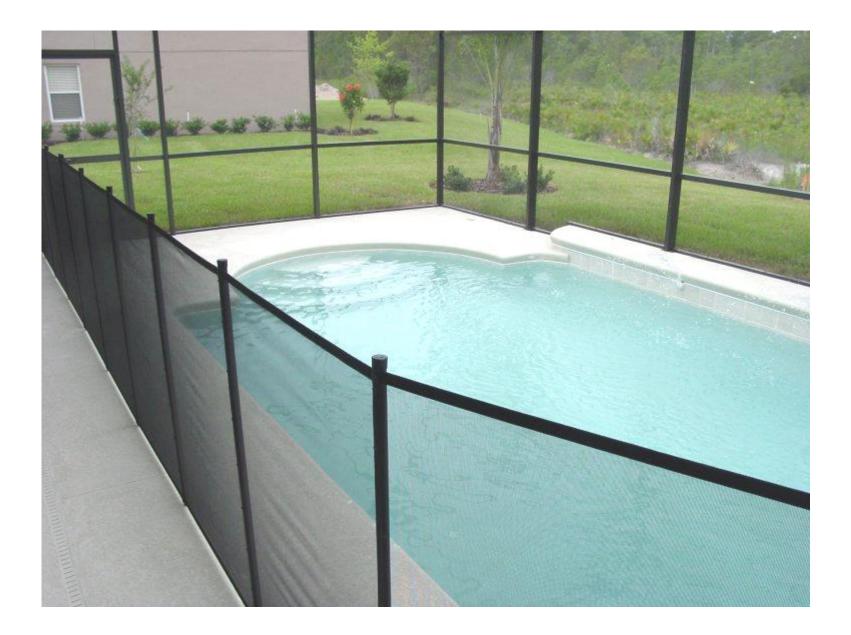
- R4502.17.1 Outdoor Swimming Pools.
 - Outdoor swimming pools must be provided with a barrier complying with R4501.17.1.1 through R4501.17.1.14

R4501.17.1 Outdoor Swimming Pools

• R4<u>5</u>01.17.1.1

- 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.

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R4501.17.1.1 (cont'd)

- Where the top of the pool structure is above grade, the barrier may be:
 - at ground level <u>or</u>
 - 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.

R4501.17.1 Outdoor Swimming Pools

• R4<u>5</u>01.17.1.2

- 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

R4<u>5</u>01.17.1 Outdoor Swimming Pool R4<u>5</u>01.17.1.3

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

R4501.17.1 Outdoor Swimming Pools

• R4<u>5</u>01.17.1.4

- Where the barrier is composed of horizontal and vertical members—and the distance between the tops of the horizontal members is <u>less</u> than 45 inches—the horizontal members must be located on the swimming pool side of the fence.
- Spacing between vertical members cannot exceed 1³/₄ inches in width.
- Where there are decorative cutouts within vertical members, spacing within the cutouts cannot exceed 1³/₄ inches in width.

R4501.17.1 Outdoor Swimming Pools

R4<u>5</u>01.17.1.5

- 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 1³/₄ inches in width.

R4501.17 Outdoor Swimming Pools

• R4<u>5</u>01.17.1.6

- Maximum mesh size for chain link fences must be a 2¹/₄-inch square <u>unless</u>
 - the fence is provided with slats fastened at the top or bottom which reduce the openings to no more than 1³/₄ inches.

R4<u>5</u>01.17.1.7

 Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members must be no more than 1³/₄ inches.

R4<u>5</u>01.17.1 Outdoor Swimming Pools R4<u>5</u>01.17.1.8

- When access gates are provided they must comply with the requirements of R4501.17.1.1 through R4501.17.1.7
 - 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.

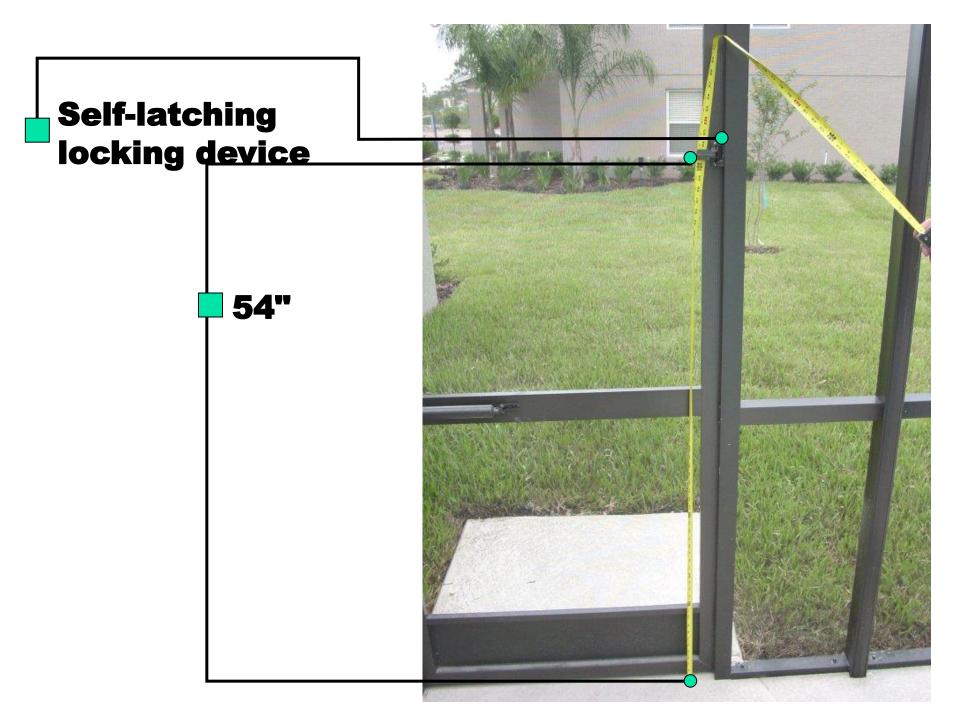
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R4501.17.1.8 (cont'd)

- 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)







R4501.17.1 Outdoor Swimming Pools

R4<u>5</u>01.17.1.9

- Where a wall of a dwelling serves as part of the barrier, <u>one</u> 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.

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R4501.17.1.9 (cont'd)

- Any deactivation switch shall be located at least 54 inches (1372 mm) above the thresh hold of the access.
- 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.

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R4501.17.1.9 (cont'd)

Exceptions:

- A screened or protected window having a bottom sill height of 48 inches (1219mm) or more measured from the interior finished floor at the pool access level.
- Windows facing the pool on floor above the first story.
- Screened or protected pass-through kitchen windows 42 inches (1067mm) or higher with a counter beneath.

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R4501.17.1.9 (cont'd)

All doors providing direct access from the home to the pool must be equipped with a self-closing, selflatching device with positive mechanical latching/locking installed a minimum of 54 inches (1372 mm) above the threshold, which is approved by the authority having jurisdiction.

Window alarm inspections

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



R4501.17.1.9 (cont'd)

- 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.

R4<u>5</u>01.17.1 Outdoor Swimming Pools

- R4<u>5</u>01.17.1.10
 - Where an aboveground pool structure is used as a barrier <u>or</u>
 - 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 <u>either</u>

- Be capable of being secured, locked or removed to prevent access, or
- Be surrounded by a barrier which meets the requirements of R4501.17.1.1 through R4501.17.1.9 and R4501.17.1.12 through R4501.17.1.14

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R4<u>5</u>01.17.1.10 (cont'd)

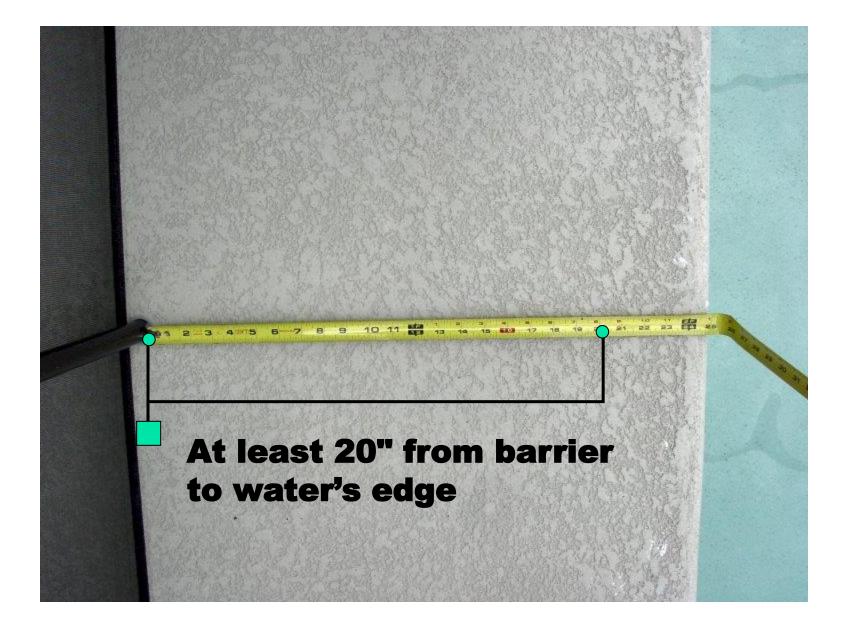
 When the ladder or steps are secured, locked or removed, any opening created must not allow the passage of a 4 inch diameter sphere.

- 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.



- 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.

- 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" <u>and</u> meeting the other barrier requirements—may be as close to the water's edge as permitted by this code.



- A wall of a dwelling may serve as part of the barrier <u>if</u> it does not contain any door or window that opens directly from the home to the swimming pool.
- R4<u>5</u>07.17.1.14.1 Adjacent permanent natural features such as bulkheads, canals, lakes, etc. may be permitted as a barrier.

R4<u>5</u>01.17 Residential Swimming Barrier Requirement

- R4<u>5</u>01.17.2 Indoor swimming pools.
 - All walls surrounding indoor swimming pools must comply with R4101.17.1.9.
- R4501.17.3 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.

NEC 680-32 GFCI

Regarding storable pools:

 All electrical equipment, including powersupply cords, used with storable pools must have a ground-fault circuit interrupter



R4<u>5</u>01.7 Pumps

- R4<u>5</u>01.7.1 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
- R4<u>5</u>01.7.2 Mounting.
 - Pumps SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMENDATIONS

R4501.7 Pumps

- R4<u>5</u>01.7.3 Capacity.
 - Pumps must have design capacity at the following heads:
 - 1. Pressure Diatomaceous Earth at least 60 ft.
 - 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.
- R4<u>5</u>01.7.4 Materials.
 - Pump impellers, shafts, wear rings and other working parts must be made of corrosionresistant materials.

R4501.8 Valves

- R4<u>5</u>01.8.1 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.

R4501.8 Valves

R4<u>5</u>01.8.2 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.

R4501.8 Valves

- R4<u>5</u>01.8.3 Check valves.
 - Where check valves are installed they must be of the swing, spring or vertical check patterns.
- R4501.8.4 Combination valves.
 - Combination valves shall be installed per manufacturer's installation instructions.



R4501.18 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.





R4501.20 Filters

 Components must have sufficient capacity to provide a complete turnover of pool water within 12 hours.

R4501.20.1 Sand Filters

R4<u>5</u>01.20.1.1 Approved types.

- Rapid sand filters (flow up to 5 gpm/ft²) must be constructed in accordance with approved standards.
- Where high rate sand filters (flow in excess of 5 gpm/ft²) 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/ft² for rapid sand filters or 15 gpm/ft² for high rate sand filters.

R4501.20.1 Sand Filters

R4<u>5</u>01.20.1.2 Instructions.

 Every filter system must have written operating instructions.

R4501.20.1 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.

R4<u>5</u>01.20.2 Diatomite Type Filters

R4<u>5</u>01.20.2.1 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/ft² of effective filter area.
- R4<u>5</u>01.20.2.2 Filter aid.
 - Provision must be made to introduce filter aid into the filter in such a way as to evenly precoat the filter septum.

R4501.21 Pool Fittings

- R4<u>5</u>01.21.1 Approved type.
 - Pool fittings must be both approved and appropriate for the specific application.
- R4<u>5</u>01.21.2 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.



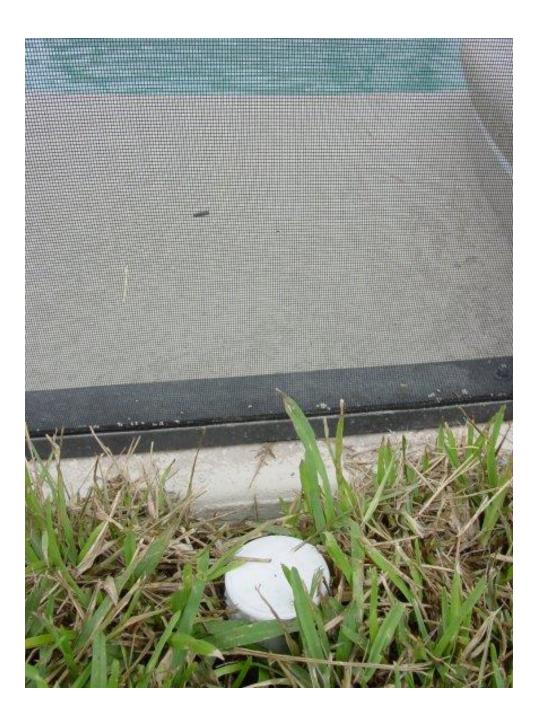
R4501.21.3 Main Outlets

R4<u>5</u>01.21.3 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) of the water in the pool.

R4501.21 Pool Fittings

- R4<u>5</u>01.21.4 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)



R4501.21 Pool Inlet Fittings

R4<u>5</u>01.21.5 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.

R4501.22 Equipment Foundations and Enclosures

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





R4<u>5</u>01.23 Accessibility and Clearances

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









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





Check for grounding of all of the metal equipment and accessories



NEC 680-3 and 680-8

 Check pool distance from overhead and underground electrical service entrances

R4501.6 Engineering Design

R4<u>5</u>01.6.2 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.

R4501.6 Engineering Design

4<u>5</u>4.2.6.4 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.

R4501.6.5 Piping Installation

R4501.6.5 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.

PVC Glue <u>454.2.6.5</u>

 Piping materials must 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 1 Oct 2005.

R4501.9 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.





R4101.10 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 line

and any line connected to a swimming pool unless approved by the administrative authority.

R4<u>5</u>01.10 Waste water disposal

R4<u>5</u>01.10.2 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.

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R4<u>5</u>01.10.2 Disposal through public sewer (cont'd)

- 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.

R4<u>5</u>01.10 Waste water disposal

R4<u>5</u>01.10.3 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.

R4501.11 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."

R4501.14 Water Heating Equipment

R4<u>5</u>01.14.1 Labels.

- Swimming pool water heating equipment must conform to accepted engineering practices, and must
 - Bear the label of a recognized testing agency

R4501.14 Water Heating Equipment

- R4<u>5</u>01.14.3 Pit Drainage.
 - When the heater is installed in a pit, the pit must be provided with approved drainage facilities.
- R4<u>5</u>01.14.4 Connections.
 - All water heating equipment must be installed with flanges or union connection adjacent to the heater.

R4501.14 Water Heating Equipment

R4<u>5</u>01.14.5 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.

FBC 2406.4.5

- Check for safety glass issues
- All doors and windows less than 60" measured vertically above any standing or walking surface shall be considered a hazardous location.



R4501.19 Final Inspection

Final Electrical, and barrier code, inspection shall be completed prior to filling the pool with water. Exception: Vinyl liner and fiberglass pools are required to be filled with water upon installation



