

COURSE SYLLABUS

Provider: Program for Resource Efficient Communities
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Provider #: 0001129

Course Name: Florida Building Code Advanced Training: Residential Swimming Pools

Classroom Hours: 2

Course Description:

This presentation reflects residential swimming pool related provisions of the *Florida Building Code, Residential* and the *Florida Building Code, Building* as of October 1, 2005. This presentation is arranged primarily from the viewpoint of the inspector. The course includes non-code recommendations for building a quality residential pool

Course Objectives:

As a result of this course, participants will have a basic understanding of what must be done to stay in compliance with the Florida Building Code when constructing / inspecting a residential swimming pool.

Course Outline/Timeline:

Introductions – 2 minutes

Administration and definitions – 4 minutes

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*.
- 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*
- R4101.15 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.

Approvals – 3 minutes

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.

R4101.3 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

- R4101.4.3 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.

Alternate materials and methods of construction – 2 minutes

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

- R4101.5.2 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.

Engineering design – 1 minute

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*)

Required inspections – 2 minutes

109.3 Required inspections

- 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

Additional inspections – 1 minute

Additional Inspections

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

Excavations – 2 minutes

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

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

Steel and inground concrete pools – 3 minutes

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
A.C.I. 318
- Make sure steel is elevated with proper coverage and clearances
Per plan:
 - Verify steel coverage in pool walls
 - Check steel size and grade
 - Make sure steel is spaced
- Look for reinforcement at drain skimmer and light niche
NEC 680-23
- Top of the lighting fixture lens is at least 18 inches below the normal water level of the pool
 - Exception
NEC 680-26
- Make sure light niche is bonded
NEC 680-22
- Check for GFCI receptacle 10–20' from water's edge
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
 - Cupping around piping
 - Later followed by placement of hydraulic concrete around cupped out pipes (before plastering) may result in fewer call-backs

Piping design and fittings – 3 minutes

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

Entrapment protection – 12 minutes

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.
- 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:
 - Surface skimmers

- Grate or grates having a minimum area of 144 square inches or greater
 - Important safety note
- 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.
- 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
- 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.

Tests – 2 minute

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

Slab – 3 minutes

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

R506.1 and plan

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

FBC 1803.5

- Check compaction – 90% Modified Proctor

R506.2.4 Joints

- Concrete slabs on ground should have joints unless they contain:
 - Synthetic fiber reinforcement (½ – 2" in length in dosage amounts of 0.75 to 1.5 lb/yd³) or 0.5 to 1.5 lb/yd³ (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

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.

Electrical disconnects and plug covers – 2 minutes

NEC 680-26 Pools and Spas

- Minimum #8 bond wire on pump

NEC 680-12

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

NEC 406.8

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

Swimming pool barriers (fences, walls, gates, alarms) – 20 minutes

R4101.17 Residential swimming barrier requirement

- Look for barrier
 - 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

- 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.
- 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.

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

R4101.17.1 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.

R4101.17.1 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.

R4101.17.1 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.

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.

R4101.17.1 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.
- 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)

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:

- 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 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.

Storable pools – 1 minute

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

Pool pumps – 4 minutes

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

- R4101.7.3 Capacity.
 - Pumps must have design capacity at the following heads:
 - Pressure Diatomaceous Earth – at least 60 ft.
 - Vacuum Diatomaceous Earth – 20 inch vacuum on the suction side and 40 ft total head
 - Rapid Sand – at least 45 ft.
 - 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

Pool valves – 4 minutes

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

- R4101.8.2 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.

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.

Ladders and steps – 1 minute

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.

Pool filters – 6 minutes

R4101.20 Filters

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

R4101.20.1 Sand filters

- R4101.20.1.1 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.

R4101.20.1 Sand filters

- R4101.20.1.2 Instructions.
 - Every filter system must have 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.

R4101.20.2 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/ft² 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.

R4101.21 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.

Pool fittings – 4 minutes

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

- R4101.21.4 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

- R4101.21.5 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.

Pool equipment foundations and enclosures – 1 minute

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

Equipment accessibility and clearances – 1 minute

R4101.23 Accessibility and clearances

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

Pool electrical – 1 minutes

NEC 680-3 and 680-23

- J (junction) box required for pool wire (aboveground and belowground pools)
- NEC 680.6

- 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

Engineering design mechanical – 2 minutes

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

- 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

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

Water supply - 1 minute

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.

Waste water disposal – 4 minutes

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.

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.
- 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.

R4101.10 Waste water disposal

- R4101.10.3 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.

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."

Water heating equipment – 4 minutes

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

- R4101.14.2 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

- R4101.14.3 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

- R4101.14.5 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 2406.3

- Check for safety glass issues

Final inspection – 1 minute

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

Evaluation – 3 minutes

Evaluation Method:

Students will be offered opportunity to provide oral and written questions and comments to facilitate course and instructional improvement.