REQUIREMENTS FOR PERMITTING SWIMMING POOLS
(PUBLIC AND PRIVATE)

The Florida Building Codes – Residential requires all pools, meeting the definition of Private Swimming Pool and/or Public Swimming Pool, shall be permitted, inspected per the Florida codes and approved by the building department prior to use.

CHAPTER 45 PRIVATE SWIMMING POOLS
(Residential)

SECTION E4501 GENERAL

R4501.1 Definitions, general.

R4501.1.1 Tense, gender and number.
For the purpose of this code, certain abbreviations, terms, phrases, words, and their derivatives shall be construed as set forth in this section. Words used in the present tense include the future. Words in the masculine gender include the feminine and neuter. Words in the feminine and neuter gender include the masculine. The singular number includes the plural and the plural number includes the singular.

SWIMMING POOL, PRIVATE. Any structure, located in a residential area, that is intended for swimming or recreational bathing and contains water over 24 inches (610 mm) deep including but not limited to inground, above-ground, and onground swimming pools, hot tubs, and nonportable spas.

SWIMMING POOL, PUBLIC. A water-tight structure of concrete, masonry, fiberglass, stainless steel or plastic which is located either indoors or outdoors, used for bathing or swimming by humans, and filled with a filtered and disinfected water supply, together with buildings, appurtenances and equipment used in connection therewith. A public swimming pool or public pool shall mean a conventional pool, spa-type pool, wading pool, special purpose pool or water recreation attraction, to which admission may be gained with or without payment of a fee and includes, pools operated by or serving camps, churches, cities, counties, day care centers, group home facilities for eight or more clients, health spas, institutions, parks, state agencies, schools, subdivisions; or the cooperative living-type projects of five or more living units, such as apartments, boarding houses, hotels, mobile home parks, motels, recreational vehicle parks and townhouses.

Above-Ground Pools (typically purchased at mercantile stores, home centers or on-line) that have the capability of a water depth of greater than 24 inches are required to have a permit applied for by the owner of the property. If the property is a rental and the renter is installing the above-ground pool, the renter shall have a notarized letter from the owner or the owner’s agent of the property stating that the renter has permission to install this above-ground pool.

The following documents are required to be submitted at time of permit application:
1. Completed permit application (blank application attached)
2. A site plan showing the above-ground pool location with distances shown from pool to property lines and all structures on the property.

3. For rental properties - A notarized letter from the owner or owner’s agent granting permission to install this above-ground pool.

4. A written statement from the above-ground pool owner stating how this above-ground pool will comply with the Florida Building Code – Residential requirements for residential private swimming pools safety (copy attached)
• Submit to the office of the Building Official

PERMIT DATE PAID: RECEIPT #: 
FEE: 

• If Demolition, use separate city Demolition Permit Application
• If Manufactured Home, use separate city Manufactured Home Applications
• If a Driveway, use separate city Driveway Application
• A travel trailer shall not be used as a residence – no utilities may be extended to such, etc.
• Single-family homes shall not be converted into a duplex or multi-family without zoning approval.
• All new housing requires zoning review and approval prior to permit application.

**PERMIT TYPE (please check)**

- NEW ELECTRICAL SERVICE ELECTRICAL SERVICE
- UPGRADE ELECTRICAL ALTERATION / REWIRING
- MECHANICAL / HVAC
- PLUMBING
- ADA / HANDICAPPED RAMP
- ADDITION (LIVING SPACE) TO A RESIDENCE
- AWNING / PORCH / COVERED DECK ATTACHED TO A RESIDENCE
- INTERIOR ALTERATION / RENOVATION A SINGLE-FAMILY RESIDENCE
- UNCOVERED DECK, PATIO, SLAB
- DETACHED ACCESSORY BUILDING / SHED, GARAGE, CARPORT, ETC.
- POOL AND/OR POOL SCREEN ENCLOSURE
- FENCE (Subject to Ordinance #1255 requirements)
- MODULAR HOME
- NEW CONVENTIONAL STICK-BUILT HOME
- MOVING OF BUILDING OR STRUCTURE
- SLAB WITH FOOTERS
- WINDOWS
- DOORS
- SIDING
- RE-ROOF
- (TEAR-OFF)
- ROOF-OVER
- SHINGLES
- METAL ROOF
- UTILITY WORK OR CONNECTIONS
- IRRIGATION WELL
- OTHER (LIST)
**THIS SECTION TO BE COMPLETED BY APPLICANT**

1) **Title Holder/ Property Owner Information**
   Name:__________________________ Phone: ____________________
   Mailing Address: ____________________________

2) **Contractor / Hired Company**
   Name:__________________________ Phone: ____________________
   Mailing Address: ____________________________

3) **Property / Job Location and Use:**
   All / Part (Circle One) of Tax Parcel Number: ____________________
   Job Location Description / 911 Address: ____________________
   Legal Description (Please give Lot #, Block, Sub-division): Please also provide a Property Appraiser Print-out

   Type of Residence: ____________________
   (Single-Family, Duplex & Rental or Owner Occupied)

   Acreage/Size of Property (use fractions thereof if applies): ________________

   Building Size: ____________________

   Additional details if needed regarding nature of work: ____________________

   Valuation of Work: $______________

   I (we) do hereby certify that to the best of my (our) knowledge and belief, that all of the above statements and information, and the statements contained in any papers or plans submitted herewith, are true and correct. I authorize the Building Official, Fire Chief, Public Works Director or City Development Manager or his designee to enter and inspect the site and premises which is the subject of this application.

   Signature of Title Holder or Applicant ____________________ Date ________________

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<th>TO BE COMPLETED BY CITY STAFF</th>
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<tr>
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<td>Water  _______  Sewer Service  _______</td>
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<td>Zoning:  _______  Flood Zone: _______</td>
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APPLICANTS FOR RESIDENTIAL PERMITS
WILL BE REQUIRED TO FURNISH THE FOLLOWING:

✓

- Property owner name
- Current survey of the property
- Legal description of the property and property I.D. number
- Street address
- Zoning (see Development Manager)
- Plat plan with yard clearances (Show how structure will be located on lot)
- Size and location of off-street parking spaces
- Floor plan or blueprints drawn to scale, including electrical, plumbing and HVAC Specifications of materials
- Typical wall sections
  - Elevations of all walls
  - Location of shear wall
  - Floor diagrams
- Roof diagrams
- Nailing patterns (walls and roof)
- Connector locations and manufacturers number
- Statement that plans comply with the Florida Building Code and sealed by Florida licensed Engineer or Architect
- Grades of material being used
- Roof framing details
- Engineer cut sheets to be submitted for trusses prior to trusses being set
- All garage door openings must show construction details with required anchorage
- All windows and doors, including garage doors must be certified by manufactured to meet the wind load requirements of the Florida Building Code
- Contractors name and address
- Self-contracted work to be by owner and for their own personal use (Must be owner occupied)
- Florida energy form to be submitted
- Utility availability form to be completed
- Septic tank permits must be issued (If City sewer not existing in area and if allowed by City code – septic’s not allowed in many locations – you may have to pay to extend infrastructure)
- If Flood Hazard Zone: Elevation certificate is required and floor elevation is to be minimum of one foot above Base Flood Elevation (AE Zone), or two feet above highest adjacent grade around perimeter of structure (A Zone) – (Fill dirt may also be severely restricted)
- All plans must show a footing detail, typical wall section with anchorage requirements and must contain a statement by the contractor, architect or engineer that the plans meet the requirements of the Florida Building Code
- Notice of Commencement must be filed prior to any inspections and copy furnished to the building department
- Submit Florida Product Approval Forms
- Pay all impact fees and tap fees, and establish accounts with deposits

There may be other requirements, but the above are the minimum that will be accepted. Should you have any questions, please call the Building Department at 386-362-2276
CHAPTER 45 PRIVATE SWIMMING POOLS

SECTION E4501 GENERAL

R4501.1 Definitions, general.

R4501.1.1 Tense, gender and number.
For the purpose of this code, certain abbreviations, terms, phrases, words, and their derivatives shall be construed as set forth in this section. Words used in the present tense include the future. Words in the masculine gender include the feminine and neuter. Words in the feminine and neuter gender include the masculine. The singular number includes the plural and the plural number includes the singular.

R4501.1.2 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.

R4501.2 Definitions.

ABOVE-GROUND/ONGROUND POOL. See “Swimming pool.”

ADMINISTRATIVE AUTHORITY. The individual official, board, department or agency established and authorized by a state, county, city or other political subdivision created by law to administer and enforce the provisions of the swimming pool code as adopted or amended.

APPROVED. Accepted or acceptable under an applicable specification stated or cited in this code, or accepted as suitable for the proposed use under procedures and power of the administrative authority.

APPROVED SAFETY COVER. A manually or power-applied safety pool cover that meets all of the performance standards of the ASTM International in compliance with ASTM F 1346.

APPROVED TESTING AGENCY. An organization primarily established for the purpose of testing to approved standards and approved by the administrative authority.

BACKWASH PIPING. See “Filter waste discharge piping.”

BARRIER. A fence, dwelling wall or nondwelling wall or any combination thereof which completely surrounds the swimming pool and obstructs access to the swimming pool, especially access from the residence or from the yard outside the barrier.

BODY FEED. Filter aid fed into a diatomite-type filter throughout the filtering cycle.

CARTRIDGE FILTER. A filter using cartridge type filter elements.

CHEMICAL PIPING. Piping which conveys concentrated chemical solutions from a feeding apparatus to the circulation piping.

CIRCULATION PIPING SYSTEM. Piping between the pool structure and the mechanical equipment. Usually includes suction piping, face piping and return piping.

COMBINATION VALVE. A multipart valve intended to perform more than one function.

DESIGN HEAD. Total head requirement of the circulation system at the design rate of flow.

DIATOMITE (DIATOMACEOUS EARTH). A type of filter aid.

DIATOMITE TYPE FILTER. A filter designed to be used with filter aid.

DIRECT ACCESS FROM THE HOME. Means any opening which discharges into the “perimeter” of the pool or any opening in an exterior dwelling wall, or interior wall (for indoor pools) which faces the pool.
EXIT ALARM. A device that makes audible, continuous alarm sounds when any door or window which permits access from the residence to any pool that is without an intervening enclosure is opened or left ajar.

FACE PIPING. Piping, with all valves and fittings, which is used to connect the filter system together as a unit.

FILTER. Any apparatus by which water is clarified.

FILTER AID. A nonpermanent type of filter medium or aid such as diatomite, alum, etc.

FILTER CARTRIDGE. A disposable or renewable filter element which generally employs no filter aid.

FILTER ELEMENT. That part of a filter which retains the filter medium.

FILTER MEDIUM. Fine material which entraps the suspended particles and removes them from the water.

FILTER RATE. Average rate of flow per square foot of filter area.

FILTER ROCK. Specially graded rock and gravel used to support filter sand.

FILTER SAND. A specially graded type of permanent filter medium.

FILTER SEPTUM. That part of the filter element in a diatomite type filter upon which a cake of diatomite or other nonpermanent filter aid may be deposited.

FILTER WASTE DISCHARGE PIPING. Piping that conducts waste water from a filter to a drainage system. Connection to drainage system is made through an air gap or other approved methods.

FRESH WATER. Those waters having a specific conductivity less than a solution containing 6,000 ppm of sodium chloride.

HIGH RATE SAND FILTER. A sand filter designed for flows in excess of 5 gpm per square feet.

HOT TUB. See “Swimming pool.”

INGROUND POOL. See “Swimming pool.”

INLET FITTING. Fitting or fixture through which circulated water enters the pool.

MAIN SUCTION OUTLET. Outlet at the deep portion of the pool through which the main flow of water leaves the pool when being drained or circulated.

MEDICALLY FRAIL ELDERLY PERSON. Means any person who is at least 65 years of age and has a medical problem that affects balance, vision, or judgment, including but not limited to a heart condition, diabetes, or Alzheimer’s disease or any related disorder.

MESH SAFETY BARRIER. A combination of materials, including fabric, posts, and other hardware to form a barrier around a swimming pool.

POOL. See “Swimming pool.”

POOL DEPTHS. The distance between the floor of pool and the maximum operating water level.

POOL PERIMETER. A pool perimeter is defined by the limits of the pool deck, its surrounding area including yard area on same property, and any dwelling or nondwelling wall or any combination thereof which completely surrounds the pool.

POOL PLUMBING. All chemical, circulation, filter waste discharge piping, deck drainage and water filling system.

PORTABLE POOL. A prefabricated pool which may be erected at the point of intended use and which may be subsequently disassembled and reerected at a new location. Generally installed on the surface of the ground and without excavation.

PRECOAT. In a diatomite-type filter, the initial coating or filter aid placed on the filter septum at the start of the filter cycle.

RAPID SAND FILTER. A filter designed to be used with sand as the filter medium and for flows not to exceed 5 gpm per square foot.
RECEPTOR. An approved plumbing fixture or device of such material, shape and capacity as to adequately receive the discharge from indirect waste piping, so constructed and located as to be readily cleaned.

RESIDENTIAL. Means situated on the premises of a detached one-family or two-family dwelling or a one-family townhouse not more than three stories high.

RETURN PIPING. That portion of the circulation piping which extends from the outlet side of the filters to the pool.

SALINE WATER. Those waters having a specific conductivity in excess of a solution containing 6,000 ppm of sodium chloride.

SEPARATION TANK. A device used to clarify filter rinse or waste water. Sometimes called a reclamation tank.

SKIM FILTER. A surface skimmer combined with a vacuum diatomite filter.

SPA, NONPORTABLE. See “Swimming pool.”

SPA, PORTABLE. Nonpermanent structure intended for recreational bathing, in which all controls and water heating and water circulating equipment are an integral part of the product and which is cord-connected and not permanently electrically wired.

SUCTION PIPING. That portion of the circulation piping located between the pool structure and the inlet side of the pump and usually includes main outlet piping, skimmer piping, vacuum piping and surge tank piping.

SURFACE SKIMMER. A device generally located in the pool wall which skims the pool surface by drawing pool water over a self-adjusting weir.

SWIMMING POOL, PRIVATE. Any structure, located in a residential area, that is intended for swimming or recreational bathing and contains water over 24 inches (610 mm) deep including but not limited to inground, above-ground, and onground swimming pools, hot tubs, and nonportable spas.

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

SWIMMING POOL, OUTDOOR. Any swimming pool which is not an indoor pool.

SWIMMING POOL, PUBLIC. A water-tight structure of concrete, masonry, fiberglass, stainless steel or plastic which is located either indoors or outdoors, used for bathing or swimming by humans, and filled with a filtered and disinfected water supply, together with buildings, appurtenances and equipment used in connection therewith. A public swimming pool or public pool shall mean a conventional pool, spa-type pool, wading pool, special purpose pool or water recreation attraction, to which admission may be gained with or without payment of a fee and includes, pools operated by or serving camps, churches, cities, counties, day care centers, group home facilities for eight or more clients, health spas, institutions, parks, state agencies, schools, subdivisions; or the cooperative living-type projects of five or more living units, such as apartments, boarding houses, hotels, mobile home parks, motels, recreational vehicle parks and townhouses.

SWIMMING POOL, RESIDENTIAL. See “Swimming pool, private.”

TURNOVER TIME. The time in hours required for the circulation system to filter and recirculate a volume of water equal to the pool volume.

VACUUM FITTING. A fitting in the pool which is used as a convenient outlet for connecting the underwater suction cleaning equipment.

VACUUM PIPING. The piping from the suction side of a pump connected to a vacuum fitting located at the pool and below the water level.

WASTE PIPING. See “Filter waste discharge piping.”

WIDTH AND/OR LENGTH. Actual water dimension taken from wall to wall at the maximum operating water level.

YOUNG CHILD. Means any person under the age of six years.

R450.1.3 Mechanical requirements.
Unless otherwise specified in this code, all piping, equipment and materials used in the process piping system of swimming pools that are built in place shall conform to the Florida Building Code, Plumbing.
R4501.4 Approvals.

R4501.4.1 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.

R4501.4.2 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.

R4501.4.2.1 Flood hazard areas.
Pools installed in flood hazard areas established in Section R322 shall comply with Section R322.2.4 (A Zones) or R322.3.3.1 in coastal high-hazard areas (V Zones).

R4501.4.3 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.

R4501.5 Alternate materials and methods of construction.

R4501.5.1 Approval and authorization.
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.

R4501.5.2 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.

R4501.6 Engineering design.

R4501.6.1 Conformance standard.
Design, construction and workmanship shall be in conformity with the requirements of ANSI/NSPI 3; ANSI/APSP/ICC 4; ANSI/APSP/ICC 5; ANSI/APSP/ICC 6; and ANSI/APSP 7.

R4501.6.2 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.

R4501.6.3 Water velocity.
Pool piping shall be designed so the water velocity will not exceed 10 feet per second (3048 mm/s) for pressure piping and 8 feet per second (2438 mm/s) for suction piping, except that the water velocity shall not exceed 8 feet per second (2438 mm/s) in copper tubing.

Main suction outlet velocity must comply with ANSI/APSP 7.

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

R4501.6.4 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.
All piping materials shall be installed in strict accordance with the manufacturer’s installation standards.

Exception: Primer and glue on exposed above-ground piping not required to be colored.

R4501.6.6 Entrapment protection.
Entrapment protection for suction outlets shall be installed in accordance with requirements of ANSI/APSP 7.
R4501.7 Pumps.

R4501.7.1 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.

R4501.7.2 Installation.
Pumps shall be installed in accordance with manufacturer recommendations.

R4501.7.3 Capacity.
Pumps shall have design capacity at the following heads:

1. Pressure diatomaceous earth — At least 60 feet (18 288 mm).
2. Vacuum diatomaceous earth — 20-inch (508 mm) vacuum on the suction side and 40-foot (12 192 mm) total head.
3. Rapid sand — At least 45 feet (13 716 mm).
4. High rate sand — At least 60-feet (18 288 mm).

R4501.7.4 Materials.
Pump impellers, shafts, wear rings and other working parts shall be of corrosion-resistant materials.

R4501.8 Valves.

R4501.8.1 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 (254 mm) and fitted with a suitable cover. All valves shall be located where they will be readily accessible for maintenance and removal.

R4501.8.2 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.

R4501.8.3 Check valves.
Where check valves are installed they shall be of the swing, spring or vertical check patterns.

R4501.8.4 Combination valves.
Combination valves shall be installed per manufacturer’s installation instructions.

R4501.9 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.

R4501.10 Waste water disposal.

R4501.10.1 Connection limitations.
Direct or indirect connections shall not be made between any storm drain, sewer, drainage system, seepage pit underground leaching pit, or subsoil drainage line, and any line connected to a swimming pool unless approved by the administrative authority.

R4501.10.2 Disposal through public sewer.
When the waste water from a swimming pool is to be disposed of through a public sewer, a 3-inch (76 mm) P-trap shall be installed on the lower terminus of the building drain and the fall piece from the trap shall extend a minimum of 3- inches (76 mm) 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 shall be made by means of an indirect connection.

R4501.10.3 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.
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.

R4501.12 Tests.

R4501.12.1 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 pounds per square inch (psi) (241 kPa) for 15 minutes.
Exception: Circulating pumps need not be tested as required in this section.

R4501.12.2 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.

R4501.13 Drain piping.

R4501.13.1 Slope to discharge.
Drain piping serving gravity overflow gutter drains and deck drains shall be installed to provide continuous grade to point of discharge.

R4501.13.2 Joints and connections.
Joints and connections shall be made as required by the Florida Building Code, Plumbing.

R4501.14 Water heating equipment.

R4501.14.1 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.

R4501.14.2 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.

R4501.14.3 Pit drainage.
When the heater is installed in a pit, the pit shall be provided with approved drainage facilities.

R4501.14.4 Connections.
All water heating equipment shall be installed with flanges or union connection adjacent to the heater.

R4501.14.5 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.

R4501.15 Gas piping.
Gas piping shall comply with the Florida Building Code, Fuel Gas.

R4501.16 Electrical.
Electrical wiring and equipment shall comply with the Florida Building Code.

R4501.17 Residential swimming barrier requirement.
Residential swimming pools shall comply with Sections R4501.17.1 through R4501.17.3.
Exception: A swimming pool with an approved safety pool cover complying with ASTM F 1346.

R4502.17.1 Outdoor swimming pools.
Outdoor swimming pools shall be provided with a barrier complying with Sections R4501.17.1.1 through R4501.17.1.14.
R4501.17.1.1
The top of the barrier shall be at least 48 inches (1219 mm) above grade, measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches (51 mm) measured on the side of the barrier which faces away from the swimming pool. Where the top of the pool structure is above grade, 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 (102 mm).

R4501.17.1.2
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 (102 mm) sphere.

R4501.17.1.3
Solid barriers which do not have openings shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.

R4501.17.1.4
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 (1143 mm), the horizontal members shall be located on the swimming pool side of the fence. Spacing between vertical members shall not exceed 1 3/4 inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 3/4 inches (44 mm) in width.

R4501.17.1.5
Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 3/4 inches (44 mm) in width.

R4501.17.1.6
Maximum mesh size for chain link fences shall be a 2 1/4 inch square (57 mm) unless the fence is provided with slats fastened at the top or bottom which reduce the openings to no more than 1 3/4 inches (44 mm).

R4501.17.1.7
Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be no more than 1 3/4 inches (44 mm).

R4501.17.1.8
Access gates, when provided, shall be self-closing and shall comply with the requirements of Sections R4501.17.1.1 through R4501.17.1.7 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 (1372 mm) 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. 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 1/2 inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

R4501.17.1.9
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 dBA at 10 feet (3048 mm). Any deactivation switch shall be located at least 54 inches (1372 mm) above the threshold 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.

Exceptions:

a. Screened or protected windows having a bottom sill height of 48 inches (1219 mm) 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 (1067 mm) or higher with a counter beneath.

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 (1372 mm) above the threshold, which is approved by the authority having jurisdiction.
R4501.17.1.10
Where an above-ground pool structure is used as a barrier or where the barrier is mounted on top of the pool structure, and the means of access is a ladder or steps, 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 R4501.17.1.1 through R4501.17.1.9 and Sections R4501.17.1.12 through R4501.17.1.14. When the ladder or steps are secured, locked or removed, any opening created shall not allow the passage of a 4-inch-diameter (102 mm) sphere.

R4501.17.1.11
Standard screen enclosures which meet the requirements of Section R4501.17 may be utilized as part, or all, of the “barrier” and shall be considered a “nondwelling” wall. Removable child barriers shall have one end of the barrier nonremovable without the aid of tools.

R4501.17.1.12
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.

R4501.17.1.13
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 (508 mm) from the barrier to the water’s edge. Dwelling or nondwelling 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.

R4501.17.1.14
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.

R4501.17.1.14.1 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.

R4501.17.1.15
A mesh safety barrier meeting the requirements of Section R4501.17 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 pounds per foot (149 kg/m), and a minimum ball burst strength according to ASTM D 3787 of 150 pounds per foot (223 kg/m). The mesh shall not be capable of deformation such that a 1/4-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 1/2-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 a nonconductive material.

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).

R4501.17.2 Indoor swimming pools.
All walls surrounding indoor swimming pools shall comply with Section R4501.17.1.9.

R4501.17.3 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.

R4501.18 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 (610 mm). In private pools where water depth exceeds 5 feet (1524 mm), 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.

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.

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.

R4501.20 Filters.
Components shall have sufficient capacity to provide a complete turnover of pool water in 12 hours or less.

R4501.20.1 Sand filters.

R4501.20.1.1 Approved types.
Rapid sand filters (flow up to 5 gpm per square foot) shall be constructed in accordance with approved standards. Where high rate sand filters (flow in excess of 5 gpm per square foot) 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 per square foot for rapid sand filters or 15 gpm per square foot for high rate sand filters.

R4501.20.1.2 Instructions.
Every filter system shall be provided with written operating instructions.

R4501.20.1.3 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.

R4501.20.2 Diatomite-type filters.

R4501.20.2.1 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 per square foot of effective filter area.

R4501.20.2.2 Filter aid.
Provision shall be made to introduce filter aid into the filter in such a way as to evenly precoat the filter septum.

R4501.21 Pool fittings.

R4501.21.1 Approved type.
Pool fittings shall be of an approved type and design as to be appropriate for the specific application.

R4501.21.2 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 square feet (74 m²) of surface area or fraction thereof, and shall be designed for a flow rate of at least 25 gallons per minute (gpm) (1.6 L/s) per skimmer.

R4501.21.3 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.
R4501.21.4 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).

R4501.21.5 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 square feet (28 m²) 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 feet (3048 mm).

R4501.22 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.

R4501.23 Accessibility and clearances.
Equipment shall be so installed as to provide ready accessibility for cleaning, operating, maintenance and servicing.

CHAPTER 42 SWIMMING POOLS [ELECTRICAL PROVISIONS]

SECTION E4201 GENERAL E4201.1 Scope.
The provisions of this chapter shall apply to the construction and installation of electric wiring and equipment associated with all swimming pools, wading pools, decorative pools, fountains, hot tubs and spas, and hydromassage bathtubs, whether permanently installed or storable, and shall apply to metallic auxiliary equipment, such as pumps, filters and similar equipment. Sections E4202 through E4206 provide general rules for permanent pools, spas and hot tubs. Section E4207 provides specific rules for storable pools. Section E4208 provides specific rules for spas and hot tubs. Section E4209 provides specific rules for hydromassage bathtubs.

R4201.2 Definitions.
CORD-AND-PLUG-CONNECTED LIGHTING ASSEMBLY. A lighting assembly consisting of a cord-and-plug-connected transformer and a luminaire intended for installation in the wall of a spa, hot tub, or storable pool.

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

FORMING SHELL. A structure designed to support a wetniche luminaire assembly and intended for mounting in a pool or fountain structure.

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

HYDROMASSAGE BATHTUB. A permanently installed bathtub equipped with a recirculating piping system, pump, and associated equipment. It is designed so it can accept, circulate and discharge water upon each use.

LOW VOLTAGE CONTACT LIMIT. A voltage not exceeding the following values:

1. 15 volts (RMS) for sinusoidal AC
2. 21.2 volts peak for nonsinusoidal AC
3. 30 volts for continuous DC
4. 12.4 volts peak for DC that is interrupted at a rate of 10 to 200 Hz

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

NO-NICHE LUMINAIRE. A luminaire intended for installation above or below the water without a niche.

PACKAGED SPA OR HOT TUB EQUIPMENT ASSEMBLY. A factory-fabricated unit consisting of watercirculating, heating and control equipment mounted on a common base, intended to operate a spa or hot tub. Equipment may include pumps, air blowers, heaters, luminaires, controls and sanitizer generators.
**PERMANENTLY INSTALLED SWIMMING, WADING, IMMERSION AND THERAPEUTIC POOLS.** Those that are constructed in the ground or partially in the ground, and all others capable of holding water with a depth greater than 42 inches (1067 mm), and all pools installed inside of a building, regardless of water depth, whether or not served by electrical circuits of any nature.

**POOL.** Manufactured or field-constructed equipment designed to contain water on a permanent or semipermanent basis and used for swimming, wading, immersion, or therapeutic purposes.

**POOL COVER, ELECTRICALLY OPERATED.** Motordriven equipment designed to cover and uncover the water surface of a pool by means of a flexible sheet or rigid frame.

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

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

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

**THROUGH-WALL LIGHTING ASSEMBLY.** A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall.

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

**SECTION E4202 WIRING METHODS FOR POOLS, SPAS, HOT TUBS AND HYDROMASSAGE BATHTUBS**

**E4202.1 General.**
Wiring methods used in conjunction with permanently installed swimming pools, spas, hot tubs or hydromassage bathtubs shall be installed in accordance with Table E4202.1 and Chapter 38 except as otherwise stated in this section. Storable swimming pools shall comply with Section E4207.

**TABLE E4202.1 ALLOWABLE APPLICATIONS FOR WIRING METHODS**

<table>
<thead>
<tr>
<th>WIRING LOCATION OR PURPOSE (Application allowed where marked with an “A”)</th>
<th>AC, FMC, NM, SR, SE</th>
<th>EMT</th>
<th>ENT</th>
<th>IMC, RMC</th>
<th>LFMC</th>
<th>LFNMC</th>
<th>UF</th>
<th>MC</th>
<th>FLEX CORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panelboard(s) that supply pool equipment: from service equipment to panelboard:</td>
<td>AC&lt;sup&gt;a&lt;/sup&gt;</td>
<td>A&lt;sup&gt;b&lt;/sup&gt;</td>
<td>A&lt;sup&gt;c&lt;/sup&gt;</td>
<td>A&lt;sup&gt;d&lt;/sup&gt;</td>
<td>A&lt;sup&gt;e&lt;/sup&gt;</td>
<td>A&lt;sup&gt;f&lt;/sup&gt;</td>
<td>A&lt;sup&gt;g&lt;/sup&gt;</td>
<td>A&lt;sup&gt;h&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
</tr>
<tr>
<td>Wet-niche and no-niche luminaires: from branch circuit OCPD to deck or junction box</td>
<td>AC&lt;sup&gt;e&lt;/sup&gt; only</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;k&lt;/sup&gt;</td>
<td>A&lt;sup&gt;e&lt;/sup&gt;</td>
<td>A&lt;sup&gt;k&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;k&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;k&lt;/sup&gt;</td>
</tr>
<tr>
<td>Wet-niche and no-niche luminaires: from deck or junction box to forming shell</td>
<td>AC&lt;sup&gt;h&lt;/sup&gt; only</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>Dry niche: from branch circuit OCPD to luminaires</td>
<td>AC&lt;sup&gt;h&lt;/sup&gt; only</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pool-associated motors: from branch circuit OCPD to motor</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
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<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
</tr>
<tr>
<td>Packaged or self-contained outdoor spas and hot tubs with underwater luminaire: from branch circuit OCPD to spa or hot tub</td>
<td>AC&lt;sup&gt;h&lt;/sup&gt; only</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>Packaged or self-contained outdoor spas and hot tubs without underwater luminaire: from branch circuit OCPD to spa or hot tub</td>
<td>AC&lt;sup&gt;h&lt;/sup&gt; only</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
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<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>Indoor spas and hot tubs, hydromassage bathtubs, and other pool, spa or hot tub associated equipment: from branch circuit OCPD to equipment</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
</tr>
<tr>
<td>Connection at pool lighting transformers or power supplies</td>
<td>AC&lt;sup&gt;h&lt;/sup&gt; only</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
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<td>A&lt;sup&gt;i&lt;/sup&gt;</td>
<td>A&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
For SI: 1 foot = 304.8 mm.

a. For all wiring methods, see Section E4205 for equipment grounding conductor requirements.
b. Limited to use within buildings.
c. Limited to use on or within buildings.
d. Metal conduit shall be constructed of brass or other approved corrosion-resistant metal.
e. Permitted only for existing installations in accordance with the exception to Section E4205.6.
f. Limited to where necessary to employ flexible connections at or adjacent to a pool motor.
g. Sections installed external to spa or hot tub enclosure limited to individual lengths not to exceed 6 feet. Length not limited inside spa or hot tub enclosure.
h. Flexible cord shall be installed in accordance with Section E4202.2.
i. Nonmetallic conduit shall be rigid polyvinyl chloride conduit Type PVC or reinforced thermosetting resin conduit Type RTRC.
j. Aluminum conduits shall not be permitted in the pool area where subject to corrosion.
k. Where installed as direct burial cable or in wet locations, Type MC cable shall be listed and identified for the location.
l. See Section E4202.3 for listed, double-insulated pool pump motors.
m. Limited to use in individual lengths not to exceed 6 feet. The total length of all individual runs of LFMC shall not exceed 10 feet.

**E4202.2 Flexible cords.**

Flexible cords used in conjunction with a pool, spa, hot tub or hydromassage bathtub shall be installed in accordance with the following:

1. For other than underwater luminaires, fixed or stationary equipment shall be permitted to be connected with a flexible cord to facilitate removal or disconnection for maintenance or repair. For other than storable pools, the flexible cord shall not exceed 3 feet (914 mm) in length. Cords that supply swimming pool equipment shall have a copper equipment grounding conductor not smaller than 12 AWG and shall terminate in a grounding-type attachment plug.

2. Other than listed low-voltage lighting systems not requiring grounding, wet-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. Such grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure and shall be not smaller than the supply conductors and not smaller than 16 AWG.

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

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

5. For other than underwater and storable pool lighting luminaire, the requirements of Item 1 shall apply to any cord-equipped luminaire that is located within 16 feet (4877 mm) radially from any point on the water surface.

**E4202.3 Double insulated pool pumps.**

A listed cord and plug-connected pool pump incorporating an approved system of double insulation that provides a means for grounding only the internal and nonaccessible, noncurrent-carrying metal parts of the pump shall be connected to any wiring method recognized in Chapter 38 that is suitable for the location. Where the bonding grid is connected to the equipment grounding conductor of the motor circuit in accordance with Section E4204.2, Item 6.1, the branch circuit wiring shall comply with Sections E4202.1 and E4205.5.

**SECTION E4203 EQUIPMENT LOCATION AND CLEARANCES**

**E4203.1 Receptacle outlets.**

Receptacles outlets shall be installed and located in accordance with Sections E4203.1.1 through E4203.1.5. Distances shall be measured as the shortest path that an appliance supply cord connected to the receptacle would follow without penetrating a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

**E4203.1.1 Location.**

Receptacles that provide power for water-pump motors or other loads directly related to the circulation and sanitation system shall be permitted to be located between 6 feet and 10 feet (1829 mm and 3048 mm) from the inside walls of pools and outdoor spas and hot tubs, where the receptacle is single and of the locking and grounding type and protected by ground-fault circuit interrupters.
Other receptacles on the property shall be located not less than 6 feet (1829 mm) from the inside walls of pools and outdoor spas and hot tubs.

**E4203.1.2 Where required.**
At least one 125-volt, 15- or 20-ampere receptacle supplied by a general-purpose branch circuit shall be located a minimum of 6 feet (1829 mm) from and not more than 20 feet (6096 mm) from the inside wall of pools and outdoor spas and hot tubs. This receptacle shall be located not more than 6 feet, 6 inches (1981 mm) above the floor, platform or grade level serving the pool, spa or hot tub.

**E4203.1.3 GFCI protection.**
All 15- and 20-ampere, single phase, 125-volt receptacles located within 20 feet (6096 mm) of the inside walls of pools and outdoor spas and hot tubs shall be protected by a ground-fault circuit-interrupter. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, 125 volts through 240 volts, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.

**E4203.1.4 Indoor locations.**
Receptacles shall be located not less than 6 feet (1829 mm) from the inside walls of indoor spas and hot tubs. A minimum of one 125-volt receptacle shall be located between 6 feet (1829 mm) and 10 feet (3048 mm) from the inside walls of indoor spas or hot tubs.

**E4203.1.5 Indoor GFCI protection.**
All 125-volt receptacles rated 30 amperes or less and located within 10 feet (3048 mm) of the inside walls of spas and hot tubs installed indoors, shall be protected by ground-fault circuit-interrupters.

**E4203.2 Switching devices.**
Switching devices shall be located not less than 5 feet (1524 mm) horizontally from the inside walls of pools, spas and hot tubs except where separated from the pool, spa or hot tub by a solid fence, wall, or other permanent barrier or the switches are listed for use within 5 feet (1524 mm). Switching devices located in a room or area containing a hydromassage bathtub shall be located in accordance with the general requirements of this code.

**E4203.3 Disconnecting means.**
One or more means to simultaneously disconnect all ungrounded conductors for all utilization equipment, other than lighting, shall be provided. Each of such means shall be readily accessible and within sight from the equipment it serves and shall be located at least 5 feet (1524 mm) horizontally from the inside walls of a pool, spa, or hot tub unless separated from the open water by a permanently installed barrier that provides a 5-foot (1524 mm) or greater reach path. This horizontal distance shall be measured from the water’s edge along the shortest path required to reach the disconnect.

**E4203.4 Luminaires and ceiling fans.**
Lighting outlets, luminaires, and ceiling-suspended paddle fans shall be installed and located in accordance with Sections E4203.4.1 through E4203.4.5.

**E4203.4.1 Outdoor location.**
In outdoor pool, outdoor spas and outdoor hot tubs areas, luminaires, lighting outlets, and ceiling-suspended paddle fans shall not be installed over the pool or over the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool except where no part of the luminaire or ceiling-suspended paddle fan is less than 12 feet (3658 mm) above the maximum water level.

**E4203.4.2 Indoor locations.**
In indoor pool areas, the limitations of Section E4203.4.1 shall apply except where the luminaires, lighting outlets and ceiling-suspended paddle fans comply with all of the following conditions:

1. The luminaires are of a totally enclosed type;

2. A ground-fault circuit interrupter is installed in the branch circuit supplying the luminaires or ceilingsuspended (paddle) fans; and

3. The distance from the bottom of the luminaire or ceiling-suspended (paddle) fan to the maximum water level is not less than 7 feet, 6 inches (2286 mm).

**E4203.4.3 Existing lighting outlets and luminaires.**
Existing lighting outlets and luminaires that are located within 5 feet (1524 mm) horizontally from the inside walls of pools and outdoor spas and hot tubs shall be permitted to be located not less than 5 feet (1524 mm) vertically above the maximum water level, provided that such luminaires and outlets are rigidly attached to the existing structure and are protected by a ground-fault circuit-interrupter.
E4203.4.4 Indoor spas and hot tubs.

1. Luminaires, lighting outlets, and ceiling-suspended paddle fans located over the spa or hot tub or within 5 feet (1524 mm) from the inside walls of the spa or hot tub shall be a minimum of 7 feet, 6 inches (2286 mm) above the maximum water level and shall be protected by a ground-fault circuit interrupter. Luminaires, lighting outlets, and ceiling-suspended paddle fans that are located 12 feet (3658 mm) or more above the maximum water level shall not require ground-fault circuit interrupter protection.

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

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

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

E4203.4.5 GFCI protection in adjacent areas.

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

E4203.5 Other outlets.

Other outlets such as for remote control, signaling, fire alarm and communications shall be not less than 10 feet (3048 mm) from the inside walls of the pool. Measurements shall be determined in accordance with Section E4203.1.

TABLE E4203.5 OVERHEAD CONDUCTOR CLEARANCES

<table>
<thead>
<tr>
<th></th>
<th>INSULATED SUPPLY OR SERVICE DROP CABLES, 0-750 VOLTS TO GROUND, SUPPORTED ON AND CABLED TOGETHER WITH AN EFFECTIVELY GROUNDED BARE MESSENGER OR EFFECTIVELY GROUNDED NEUTRAL CONDUCTOR (feet)</th>
<th>ALL OTHER SUPPLY OR SERVICE DROP CONDUCTORS (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage to ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-15 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22.5</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Greater than 15 to 50 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.5</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

E4203.6 Overhead conductor clearances.

Except where installed with the clearances specified in Table E4203.5, the following parts of pools and outdoor spas and hot tubs shall not be placed under existing service-drop conductors or any other open overhead wiring; nor shall such wiring be installed above the following:

1. Pools and the areas extending 10 feet (3048 mm) horizontally from the inside of the walls of the pool;

2. Diving structures; or

3. Observation stands, towers, and platforms.

Overhead conductors of network-powered broadband communications systems shall comply with the provisions in Table E4203.5 for conductors operating at 0 to 750 volts to ground.

Utility-owned, -operated and -maintained communications conductors, community antenna system coaxial cables and the supporting messengers shall be permitted at a height of not less than 10 feet (3048 mm) above swimming and wading pools, diving structures, and observation stands, towers, and platforms.
**E4203.7 Underground wiring.**

Underground wiring shall not be installed under or within the area extending 5 feet (1524 mm) horizontally from the inside walls of pools and outdoor hot tubs and spas except where the wiring is installed to supply pool, spa or hot tub equipment or where space limitations prevent wiring from being routed 5 feet (1524 mm) or more horizontally from the inside walls. Where installed within 5 feet (1524 mm) of the inside walls, the wiring method shall be a complete raceway system of rigid metal conduit, intermediate metal conduit or a nonmetallic raceway system. Metal conduit shall be corrosion resistant and suitable for the location. The minimum cover depth shall be in accordance with Table E4203.7.

**TABLE E4203.7 MINIMUM BURIAL DEPTHS**

<table>
<thead>
<tr>
<th>WIRING METHOD</th>
<th>UNDERGROUND WIRING (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid metal conduit</td>
<td>6</td>
</tr>
<tr>
<td>Intermediate metal conduit</td>
<td>6</td>
</tr>
<tr>
<td>Nonmetallic raceways listed for direct burial and under concrete exterior slab not less than 4 inches in thickness and extending not less than 6 inches (162 mm) beyond the underground installation</td>
<td>6</td>
</tr>
<tr>
<td>Nonmetallic raceways listed for direct burial without concrete encasement</td>
<td>18</td>
</tr>
<tr>
<td>Other approved raceways*</td>
<td>18</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

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

**SECTION E4204 BONDING**

**E4204.1 Performance.**

The equipotential bonding required by this section shall be installed to reduce voltage gradients in the pool area as prescribed.

**E4204.2 Bonded parts.**

The parts of pools, spas, and hot tubs specified in Items 1 through 7 shall be bonded together using insulated, covered or bare solid copper conductors not smaller than 8 AWG or using rigid metal conduit of brass or other identified corrosion-resistant metal. An 8 AWG or larger solid copper bonding conductor provided to reduce voltage gradients in the pool, spa, or hot tub area shall not be required to be extended or attached to remote panelboards, service equipment, or electrodes. Connections shall be made by exothermic welding, by listed pressure connectors or clamps that are labeled as being suitable for the purpose and that are made of stainless steel, brass, copper or copper alloy, machine screw-type fasteners that engage not less than two threads or are secured with a nut, thread-forming machine screws that engage not less than two-threads, or terminal bars. Connection devices or fittings that depend solely on solder shall not be used. Sheet metal screws shall not be used to connect bonding conductors or connection devices:

1. Conductive pool shells. Bonding to conductive pool shells shall be provided as specified in Item 1.1 or 1.2. Poured concrete, pneumatically applied or sprayed concrete, and concrete block with painted or plastered coatings shall be considered to be conductive materials because of their water permeability and porosity. Vinyl liners and fiberglass composite shells shall be considered to be nonconductive materials.

1.1. Structural reinforcing steel. Unencapsulated structural reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where structural reinforcing steel is encapsulated in a nonconductive compound, a copper conductor grid shall be installed in accordance with Item 1.2. 1.2. Copper conductor grid. A copper conductor grid shall be provided and shall comply with Items 1.2.1 through 1.2.4:

1.2.1. It shall be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing.

1.2.2. It shall conform to the contour of the pool and the pool deck.

1.2.3. It shall be arranged in a 12-inch (305 mm) by 12-inch (305 mm) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 4 inches (102 mm).

1.2.4. It shall be secured within or under the pool not more than 6 inches (152 mm) from the outer contour of the pool shell.
2. Perimeter surfaces. The perimeter surface shall extend for 3 feet (914 mm) horizontally beyond the inside walls of the pool and shall include unpaved surfaces, poured concrete surfaces and other types of paving. Perimeter surfaces that extend less than 3 feet (914 mm) beyond the inside wall of the pool and that are separated from the pool by a permanent wall or building 5 feet (1524 mm) or more in height shall require equipotential bonding on the pool side of the permanent wall or building. Bonding to perimeter surfaces shall be provided as specified in Item 2.1 or 2.2 and shall be attached to the pool, spa, or hot tub reinforcing steel or copper conductor grid at a minimum of four points uniformly spaced around the perimeter of the pool, spa, or hot tub. For nonconductive pool shells, bonding at four points shall not be required.

**Exception:** The equipotential bonding requirements for perimeter surfaces shall not apply to a listed self-contained spa or hot tub located indoors and installed above a finished floor.

2.1. Structural reinforcing steel. Structural reinforcing steel shall be bonded in accordance with Item 1.1.

2.2. Alternate means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) shall be used in accordance with Items 2.2.1 through 2.2.5:

2.2.1. At least one minimum 8 AWG bare solid copper conductor shall be provided.

2.2.2. The conductors shall follow the contour of the perimeter surface.

2.2.3. Splices shall be listed.

2.2.4. The required conductor shall be 18 to 24 inches (457 to 610 mm) from the inside walls of the pool.

2.2.5. The required conductor shall be secured within or under the perimeter surface 4 to 6 inches (102 mm to 152 mm) below the subgrade.

3. Metallic components. All metallic parts of the pool structure, including reinforcing metal not addressed in Item 1.1, shall be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, the reinforcing steel shall not be required to be bonded.

4. Underwater lighting. All metal forming shells and mounting brackets of no-niche luminaires shall be bonded.

**Exception:** Listed low-voltage lighting systems with nonmetallic forming shells shall not require bonding.

5. Metal fittings. All metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 4 inches (102 mm) in any dimension and do not penetrate into the pool structure more than 1 inch (25.4 mm) shall not require bonding.

6. 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.

**Exception:** Metal parts of listed equipment incorporating an approved system of double insulation shall not be bonded.

6.1. Double-insulated water pump motors. Where a double-insulated water pump motor is installed under the provisions of this item, a solid 8 AWG copper conductor 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 vicinity of the pool pump motor. 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.

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

7. All fixed metal parts including, but not limited to, metal-sheathed cables and raceways, metal piping, metal awnings, metal fences and metal door and window frames.

**Exceptions:**

1. Those separated from the pool by a permanent barrier that prevents contact by a person shall not be required to be bonded.

2. Those greater than 5 feet (1524 mm) horizontally from the inside walls of the pool shall not be required to be bonded.

3. Those greater than 12 feet (3658 mm) measured vertically above the maximum water level of the pool, or as measured vertically above any observation stands, towers, or platforms, or any diving structures, shall not be required to be bonded.
E4204.3 Pool water.
The pool water shall be intentionally bonded by means of a conductive surface area not less than 9 square inches (5806 mm²) installed in contact with the pool water. This bond shall be permitted to consist of parts that are required to be bonded in Section E4204.2.

E4204.4 Bonding of outdoor hot tubs and spas.
Outdoor hot tubs and spas shall comply with the bonding requirements of Sections E4204.1 through E4204.3. Bonding by metal-to-metal mounting on a common frame or base shall be permitted. The metal bands or hoops used to secure wooden staves shall not be required to be bonded as required in Section E4204.2.

E4204.5 Bonding of indoor hot tubs and spas.
The following parts of indoor hot tubs and spas shall be bonded together:

1. All metal fittings within or attached to the hot tub or spa structure.

2. Metal parts of electrical equipment associated with the hot tub or spa water circulating system, including pump motors unless part of a listed self-contained spa or hot tub.

3. Metal raceway and metal piping that are within 5 feet (1524 mm) of the inside walls of the hot tub or spa and that are not separated from the spa or hot tub by a permanent barrier.

4. All metal surfaces that are within 5 feet (1524 mm) of the inside walls of the hot tub or spa and that are not separated from the hot tub or spa area by a permanent barrier.

Exception: Small conductive surfaces not likely to become energized, such as air and water jets and drain fittings, where not connected to metallic piping, towel bars, mirror frames, and similar nonelectrical equipment, shall not be required to be bonded.

5. Electrical devices and controls that are not associated with the hot tubs or spas and that are located less than 5 feet (1524 mm) from such units.

E4204.5.1 Methods.
All metal parts associated with the hot tub or spa shall be bonded by any of the following methods:

1. The interconnection of threaded metal piping and fittings.

2. Metal-to-metal mounting on a common frame or base.

3. The provision of an insulated, covered or bare solid copper bonding jumper not smaller than 8 AWG. It shall not be the intent to require that the 8 AWG or larger solid copper bonding conductor be extended or attached to any remote panelboard, service equipment, or any electrode, but only that it shall be employed to eliminate voltage gradients in the hot tub or spa area as prescribed.

E4204.5.2 Connections.
Connections shall be made by exothermic welding or by listed pressure connectors or clamps that are labeled as being suitable for the purpose and that are made of stainless steel, brass, copper or copper alloy. Connection devices or fittings that depend solely on solder shall not be used. Sheet metal screws shall not be used to connect bonding conductors or connection devices.

SECTION E4205 GROUNDING

E4205.1 Equipment to be grounded.
The following equipment shall be grounded:

1. Through-wall lighting assemblies and underwater luminaires other than those low-voltage lighting products listed for the application without a grounding conductor.

2. All electrical equipment located within 5 feet (1524 mm) of the inside wall of the pool, spa or hot tub.

3. All electrical equipment associated with the recirculating system of the pool, spa or hot tub.


5. Transformer and power supply enclosures.

7. Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the pool, spa or hot tub.

**E4205.2 Luminaires and related equipment.**

Other than listed low-voltage luminaires not requiring grounding, all through-wall lighting assemblies, wet-niche, dry-niche, or no-niche luminaires shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table E3908.12 but not smaller than 12 AWG. The equipment grounding conductor between the wiring chamber of the secondary winding of a transformer and a junction box shall be sized in accordance with the overcurrent device in such circuit. The junction box, transformer enclosure, or other enclosure in the supply circuit to a wet-niche or no-niche luminaire and the field-wiring chamber of a dry-niche luminaire shall be grounded to the equipment grounding terminal of the panelboard. The equipment grounding terminal shall be directly connected to the panelboard enclosure. The equipment grounding conductor shall be installed without joint or splice.

**Exceptions:**

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

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

**E4205.3 Nonmetallic conduit.**

Where a nonmetallic conduit is installed between a forming shell and a junction box, transformer enclosure, or other enclosure, a 8 AWG insulated copper bonding jumper shall be installed in this conduit except where a listed low-voltage lighting system not requiring grounding is used. The bonding jumper shall be terminated in the forming shell, junction box or transformer enclosure, or ground-fault circuit-interrupter enclosure. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a listed potting compound to protect such connection from the possible deteriorating effect of pool water.

**E4205.4 Flexible cords.**

Other than listed low-voltage lighting systems not requiring grounding, wet-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG.

**E4205.5 Motors.**

Pool-associated motors shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table E3908.12, but not smaller than 12 AWG. Where the branch circuit supplying the motor is installed in the interior of a one-family dwelling or in the interior of accessory buildings associated with a one-family dwelling, using a cable wiring method permitted by Table E4202.1, an uninsulated equipment grounding conductor shall be permitted provided that it is enclosed within the outer sheath of the cable assembly.

**E4205.6 Feeders.**

An equipment grounding conductor shall be installed with the feeder conductors between the grounding terminal of the pool equipment panelboard and the grounding terminal of the applicable service equipment or source of a separately derived system. The equipment grounding conductor shall be insulated, shall be sized in accordance with Table E3908.12, and shall be not smaller than 12 AWG.

**Exception:** An existing feeder between an existing remote panelboard and service equipment shall be permitted to run in flexible metal conduit or an approved cable assembly that includes an equipment grounding conductor within its outer sheath. The equipment grounding conductor shall not be connected to the grounded conductor in the remote panelboard.

**E4205.6.1 Separate buildings.**

A feeder to a separate building or structure shall be permitted to supply swimming pool equipment branch circuits, or feeders supplying swimming pool equipment branch circuits, provided that the grounding arrangements in the separate building meet the requirements of Section E3607.3. Where installed in other than existing feeders covered in the exception to Section E4205.6, a separate equipment grounding conductor shall be an insulated conductor.
E4205.7 Cord-connected equipment.
Where fixed or stationary equipment is connected with a flexible cord to facilitate removal or disconnection for maintenance, repair, or storage, as provided in Section E4202.2, the equipment grounding conductors shall be connected to a fixed metal part of the assembly. The removable part shall be mounted on or bonded to the fixed metal part.

E4205.8 Other equipment.
Other electrical equipment shall be grounded in accordance with Section E3908.

SECTION E4206 EQUIPMENT INSTALLATION

E4206.1 Transformers and power supplies.
Transformers and power supplies used for the supply of underwater luminaires, together with the transformer or power supply enclosure, shall be listed for swimming pool and spa use. The transformer or power supply shall incorporate either a transformer of the isolated-winding type with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings, or a transformer that incorporates an approved system of double insulation between the primary and secondary windings.

E4206.2 Ground-fault circuit-interrupters.
Ground-fault circuit-interrupters shall be self-contained units, circuitbreaker types, receptacle types or other approved types.

E4206.3 Wiring on load side of ground-fault circuit-interrupters and transformers.
For other than grounding conductors, conductors installed on the load side of a groundfault circuit-interrupter or transformer used to comply with the provisions of Section E4206.4, shall not occupy raceways, boxes, or enclosures containing other conductors except where the other conductors are protected by groundfault circuit interrupters or are grounding conductors. Supply conductors to a feed-through type ground-fault circuit interrupter shall be permitted in the same enclosure. Ground-fault circuit interrupters shall be permitted in a panelboard that contains circuits protected by other than ground-fault circuit interrupters.

E4206.4 Underwater luminaires.
The design of an underwater luminaire supplied from a branch circuit either directly or by way of a transformer or power supply meeting the requirements of Section E4206.1, shall be such that, where the fixture is properly installed without a ground-fault circuitinterrupter, there is no shock hazard with any likely combination of fault conditions during normal use (not relamping). In addition, a ground-fault circuit-interrupter shall be installed in the branch circuit supplying luminaires operating at more than the low-voltage contact limit, such that there is no shock hazard during relamping. The installation of the ground-fault circuit-interrupter shall be such that there is no shock hazard with any likely fault-condition combination that involves a person in a conductive path from any ungrounded part of the branch circuit or the luminaire to ground. Compliance with this requirement shall be obtained by the use of a listed underwater luminaire and by installation of a listed groundfault circuit-interrupter in the branch circuit or a listed transformer or power supply for luminaires operating at more than the low-voltage contact limit. Luminaires that depend on submersion for safe operation shall be inherently protected against the hazards of overheating when not submerged.

E4206.4.1 Maximum voltage.
Luminaires shall not be installed for operation on supply circuits over 150 volts between conductors.

E4206.4.2 Luminaire location.
Luminaires mounted in walls shall be installed with the top of the fixture lens not less than 18 inches (457 mm) below the normal water level of the pool, except where the luminaire is listed and identified for use at a depth of not less than 4 inches (102 mm) below the normal water level of the pool. A luminaire facing upward shall have the lens adequately guarded to prevent contact by any person or shall be listed for use without a guard.

E4206.5 Wet-niche luminaires.
Forming shells shall be installed for the mounting of all wet-niche underwater luminaires and shall be equipped with provisions for conduit entries. Conduit shall extend from the forming shell to a suitable junction box or other enclosure located as provided in Section E4206.9. Metal parts of the luminaire and forming shell in contact with the pool water shall be of brass or other approved corrosion-resistant metal.

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

Luminaires shall be bonded to and secured to the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to remove the luminaire from the forming shell.
E4206.1 Servicing.
All wet-niche luminaires shall be removable from the water for inspection, relamping, or other maintenance. The forming shell location and length of cord in the forming shell shall permit personnel to place the removed luminaire on the deck or other dry location for such maintenance. The luminaire maintenance location shall be accessible without entering or going into the pool water.

E4206.6 Dry-niche luminaires.
Dry-niche luminaires shall have provisions for drainage of water. Other than listed lowvoltage luminaires not requiring grounding, a dry-niche luminaire shall have means for accommodating one equipment grounding conductor for each conduit entry. Junction boxes shall not be required but, if used, shall not be required to be elevated or located as specified in Section E4206.9 if the luminaire is specifically identified for the purpose.

E4206.7 No-niche luminaires.
No-niche luminaires shall be listed for the purpose and shall be installed in accordance with the requirements of Section E4206.5 Where connection to a forming shell is specified, the connection shall be to the mounting bracket.

E4206.8 Through-wall lighting assembly.
A through-wall lighting assembly shall be equipped with a threaded entry or hub, or a nonmetallic hub, for the purpose of accommodating the termination of the supply conduit. A through-wall lighting assembly shall meet the construction requirements of Section E4205.4 and be installed in accordance with the requirements of Section E4206.5 Where connection to a forming shell is specified, the connection shall be to the conduit termination point.

E4206.9 Junction boxes and enclosures for transformers or ground-fault circuit interrupters.
Junction boxes for underwater luminaires and enclosures for transformers and ground-fault circuit-interrupters that supply underwater luminaires shall comply with the following:

E4206.9.1 Junction boxes. A junction box connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be:
1. Listed as a swimming pool junction box;
2. Equipped with threaded entries or hubs or a nonmetallic hub;
3. Constructed of copper, brass, suitable plastic, or other approved corrosion-resistant material;
4. Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass, or other approved corrosion-resistant metal that is integral with the box; and
5. Located not less than 4 inches (102 mm), measured from the inside of the bottom of the box, above the ground level, or pool deck, or not less than 8 inches (203 mm) above the maximum pool water level, whichever provides the greatest elevation, and shall be located not less than 4 feet (1219 mm) from the inside wall of the pool, unless separated from the pool by a solid fence, wall or other permanent barrier. Where used on a lighting system operating at the low-voltage contact limit or less, a flush deck box shall be permitted provided that an approved potting compound is used to fill the box to prevent the entrance of moisture; and the flush deck box is located not less than 4 feet (1219 mm) from the inside wall of the pool.

E4206.9.2 Other enclosures.
An enclosure for a transformer, ground-fault circuit-interrupter or a similar device connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be:
1. Listed and labeled for the purpose, comprised of copper, brass, suitable plastic, or other approved corrosion-resistant material;
2. Equipped with threaded entries or hubs or a nonmetallic hub;
3. Provided with an approved seal, such as duct seal at the conduit connection, that prevents circulation of air between the conduit and the enclosures;
4. Provided with electrical continuity between every connected metal conduit and the grounding terminals by means of copper, brass or other approved corrosion-resistant metal that is integral with the enclosures; and
5. Located not less than 4 inches (102 mm), measured from the inside bottom of the enclosure, above the ground level or pool deck, or not less than 8 inches (203 mm) above the maximum pool water level, whichever provides the greater elevation, and shall be located not less than 4 feet (1219 mm) from the inside wall of the pool, except where separated from the pool by a solid fence, wall or other permanent barrier.

E4206.9.3 Protection of junction boxes and enclosures.  
Junction boxes and enclosures mounted above the grade of the finished walkway around the pool shall not be located in the walkway unless afforded additional protection, such as by location under diving boards or adjacent to fixed structures.

E4206.9.4 Grounding terminals.  
Junction boxes, transformer and power supply enclosures, and ground-fault circuit-interrupter enclosures connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be provided with grounding terminals in a quantity not less than the number of conduit entries plus one.

E4206.9.5 Strain relief.  
The termination of a flexible cord of an underwater luminaire within a junction box, transformer or power supply enclosure, ground-fault circuit-interrupter, or other enclosure shall be provided with a strain relief.

E4206.10 Underwater audio equipment.  
Underwater audio equipment shall be identified for the purpose.

E4206.10.1 Speakers.  
Each speaker shall be mounted in an approved metal forming shell, the front of which is enclosed by a captive metal screen, or equivalent, that is bonded to and secured to the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to open for installation or servicing of the speaker. The forming shell shall be installed in a recess in the wall or floor of the pool.

E4206.10.2 Wiring methods.  
Rigid metal conduit of brass or other identified corrosion-resistant metal, rigid polyvinyl chloride conduit, rigid thermosetting resin conduit or liquid-tight flexible nonmetallic conduit (LFNC-B) shall extend from the forming shell to a suitable junction box or other enclosure as provided in Section E4206.9. Where rigid nonmetallic conduit or liquid-tight flexible nonmetallic conduit is used, an 8 AWG solid or stranded insulated copper bonding jumper shall be installed in this conduit with provisions for terminating in the forming shell and the junction box. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a suitable potting compound to protect such connection from the possible deteriorating effect of pool water.

E4206.10.3 Forming shell and metal screen.  
The forming shell and metal screen shall be of brass or other approved corrosion-resistant metal. All forming shells shall include provisions for terminating an 8 AWG copper conductor.

E4206.11 Electrically operated pool covers.  
The electric motors, controllers, and wiring for pool covers shall be located not less than 5 feet (1524 mm) from the inside wall of the pool except where separated from the pool by a wall, cover, or other permanent barrier. Electric motors installed below grade level shall be of the totally enclosed type. The electric motor and controller shall be connected to a circuit protected by a ground-fault circuit-interrupter. The device that controls the operation of the motor for an electrically operated pool cover shall be located so that the operator has full view of the pool.

E4206.12 Electric pool water heaters.  
All electric pool water heaters shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not more than 60 amperes. The ampacity of the branch-circuit conductors and the rating or setting of overcurrent protective devices shall be not less than 125 percent of the total nameplate load rating.

E4206.13 Pool area heating.  
The provisions of Sections E4206.13.1 through 4206.13.3 shall apply to all pool deck areas, including a covered pool, where electrically operated comfort heating units are installed within 20 feet (6096 mm) of the inside wall of the pool.

E4206.13.1 Unit heaters.  
Unit heaters shall be rigidly mounted to the structure and shall be of the totally enclosed or guarded types. Unit heaters shall not be mounted over the pool or within the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool.

E4206.13.2 Permanently wired radiant heaters.  
Electric radiant heaters shall be suitably guarded and securely fastened to their mounting devices. Heaters shall not be installed over a pool or within the area extending 5 feet (1524 mm) horizontally from the inside walls of the pool and shall be mounted not less than 12 feet (3658 mm) vertically above the pool deck.
E4206.13.3 Radiant heating cables prohibited.
Radiant heating cables embedded in or below the deck shall be prohibited.

SECTION E4207 STORABLE SWIMMING POOLS

E4207.1 Pumps.
A cord and plug-connected pool filter pump for use with storable pools shall incorporate an approved system of double insulation or its equivalent and shall be provided with means for grounding only the internal and nonaccessible noncurrent-carrying metal parts of the appliance.

The means for grounding shall be an equipment grounding conductor run with the power-supply conductors in a flexible cord that is properly terminated in a grounding-type attachment plug having a fixed grounding contact. Cord and plug-connected pool filter pumps shall be provided with a groundfault circuit interrupter that is an integral part of the attachment plug or located in the power supply cord within 12 inches (305 mm) of the attachment plug.

E4207.2 Ground-fault circuit-interrupters required.
Electrical equipment, including power-supply cords, used with storable pools shall be protected by ground-fault circuit-interrupters. All 125-volt, 15- and 20-ampere receptacles located within 20 feet (6096 mm) of the inside walls of a storable pool shall be protected by a ground-fault circuit interrupter. In determining these dimensions, the distance to be measured shall be the shortest path that the supply cord of an appliance connected to the receptacle would follow without passing through a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

E4207.3 Luminaires.
Luminaires for storable pools shall not have exposed metal parts and shall be listed for the purpose as an assembly. In addition, luminaires for storable pools shall comply with the requirements of Section E4207.3.1 or E4207.3.2.

E4207.3.1 Within the low-voltage contact limit.
A luminaire installed in or on the wall of a storable pool shall be part of a cord and plug-connected lighting assembly. The assembly shall:

1. Have a luminaire lamp that is suitable for the use at the supplied voltage;
2. Have an impact-resistant polymeric lens, luminaire body, and transformer enclosure;
3. Have a transformer meeting the requirements of section E4206.1 with a primary rating not over 150 volts; and
4. Have no exposed metal parts.

E4207.3.2 Over the low-voltage contact limit but not over 150 volts.
A lighting assembly without a transformer or power supply, and with the luminaire lamp(s) operating at over the low-voltage contact limit, but not over 150 volts, shall be permitted to be cord and plug-connected where the assembly is listed as an assembly for the purpose and complies with all of the following:

1. It has an impact-resistant polymeric lens and luminaire body.
2. A ground-fault circuit interrupter with open neutral conductor protection is provided as an integral part of the assembly.
3. The luminaire lamp is permanently connected to the ground-fault circuit interrupter with open-neutral protection.
4. It complies with the requirements of Section E4206.4.
5. It has no exposed metal parts.

E4207.4 Receptacle locations.
Receptacles shall be located not less than 6 feet (1829 mm) from the inside walls of a pool. In determining these dimensions, the distance to be measured shall be the shortest path that the supply cord of an appliance connected to the receptacle would follow without passing through a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

SECTION E4208 SPAS AND HOT TUBS

E4208.1 Ground-fault circuit-interrupters.
The outlet(s) that supplies a self-contained spa or hot tub, or a packaged spa or hot tub equipment assembly, or a field-assembled spa or hot tub with a heater load of 50 amperes or less, shall be protected by a ground-fault circuit-interrupter.
A listed self-contained unit or listed packaged equipment assembly marked to indicate that integral ground-fault circuit-interrupter protection is provided for all electrical parts within the unit or assembly, including pumps, air blowers, heaters, lights, controls, sanitizer generators and wiring, shall not require that the outlet supply be protected by a groundfault circuit interrupter.

**E4208.2 Electric water heaters.**
Electric spa and hot tub water heaters shall be listed and shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not more than 60 amperes. The ampacity of the branch-circuit conductors, and the rating or setting of overcurrent protective devices, shall be not less than 125 percent of the total nameplate load rating.

**E4208.3 Underwater audio equipment.**
Underwater audio equipment used with spas and hot tubs shall comply with the provisions of Section E4206.10.

**E4208.4 Emergency switch for spas and hot tubs.**
A clearly labeled emergency shutoff or control switch for the purpose of stopping the motor(s) that provides power to the recirculation system and jet system shall be installed at a point that is readily accessible to the users, adjacent to and within sight of the spa or hot tub and not less than 5 feet (1524 mm) away from the spa or hot tub. This requirement shall not apply to single-family dwellings.

**SECTION E4209 HYDROMASSAGE BATHTUBS**

**E4209.1 Ground-fault circuit-interrupters.**
Hydromassage bathtubs and their associated electrical components shall be supplied by an individual branch circuit(s) and protected by a readily accessible ground-fault circuit-interrupter. All 125-volt, single-phase receptacles not exceeding 30 amperes and located within 6 feet (1829 mm) measured horizontally of the inside walls of a hydromassage tub shall be protected by a ground-fault circuit interrupter(s).

**E4209.2 Other electric equipment.**
Luminaires, switches, receptacles, and other electrical equipment located in the same room, and not directly associated with a hydromassage bathtub, shall be installed in accordance with the requirements of this code relative to the installation of electrical equipment in bathrooms.

**E4209.3 Accessibility.**
Hydromassage bathtub electrical equipment shall be accessible without damaging the building structure or building finish. Where the hydromassage bathtub is cord- and plug-connected with the supply receptacle accessible only through a service access opening, the receptacle shall be installed so that its face is within direct view and not more than 12 inches (305 mm) from the plane of the opening.

**E4209.4 Bonding.**
All metal piping systems and all grounded metal parts in contact with the circulating water shall be bonded together using an insulated, covered or bare solid copper bonding jumper not smaller than 8 AWG. The bonding jumper shall be connected to the terminal on the circulating pump motor that is intended for this purpose. The bonding jumper shall not be required to be connected to a double insulated circulating pump motor. The 8 AWG or larger solid copper bonding jumper shall be required for equipotential bonding in the area of the hydromassage bathtub and shall not be required to be extended or attached to any remote panelboard, service equipment, or any electrode. Where a double-insulated circulating pump motor is used, the 8 AWG or larger solid copper bonding jumper shall be long enough to terminate on a replacement nondouble-insulated pump motor and shall be terminated to the equipment grounding conductor of the branch circuit for the motor.