



# Residential Swimming Pools, Hot Tubs and Spas

## CONDITIONS FOR SINGLE FAMILY RESIDENTIAL SWIMMING POOLS, HOT TUBS AND SPAS

Building permits are required for most residential pool installations. Prefabricated swimming pools accessory to a single-family residence, that are less than 24-inches deep, do not exceed 5,000 gallons, and are installed entirely above ground, are EXEMPT from permits.

### BARRIER REQUIREMENTS

These provisions shall apply to the design of barriers for pools and spas. These design controls are intended to provide protection against the potential drowning and near drowning by restricting access to such pools or spas. These requirements provide an integrated level of protection against potential drowning through the use of physical barriers and warning devices.

Exceptions:

1. Spas and hot tubs with a lockable safety cover that complies with ASTM F 1346.
2. Swimming pools with a powered safety cover that complies with ASTM F 1346.

### **A fence or wall with or without a gate(s) provides the barrier and shall be as follows:**

**P1.** The top of the barrier shall be not less than 48 inches above grade where measured on the side of the barrier that faces away from the pool or spa. Such height shall exist around the entire perimeter of the barrier and for a distance of 3 feet measured horizontally from the outside of the required barrier. The vertical clearance between grade and the bottom of the barrier shall not exceed 2 inches for grade surfaces that are not solid, such as grass or gravel, the vertical clearance between a surface below the barrier to a solid surface, such as concrete, or were the barrier is mounted on the top of the pool or spa, the vertical clearance between the top of the pool or spa and the bottom of the barrier shall not exceed 4 inches and the bottom of the required barrier shall not exceed 4 inches where measured on the side of the required barrier that faces away from the pool or spa.

**P2.** Openings in the barrier shall not allow passage of a 4-inch-diameter sphere.

**P3.** Solid barriers which do not have openings, such as a masonry or stone wall, shall not contain indentations or protrusions that form handholds and footholds, except for normal construction tolerances and tooled masonry joints.

**P4.** Where the barrier is composed of vertical and horizontal members and the distance between the tops of horizontal members is less than 45 inches the horizontal members shall be located on the swimming pool side of the fence. Spacing between vertical members shall not exceed 1 3/4 inches in

## Residential Swimming Pools, Hot Tubs and Spas, continued

width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 3/4 inches in width.

**P5.** Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches or more, spacing between vertical members shall not exceed 4 inches. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1 3/4 inches in width.

**P6.** Maximum opening formed by chain link fence shall be not more than 1 3/4 inches square unless the fence is provided with slats fastened at the top or the bottom which reduce the openings to not more than 1 3/4 inches.

Mesh fences shall be installed in accordance with the manufacturer's instructions and comply with the following:

1. The bottom of the mesh fence shall be not more than 1 inch above the deck or installed surface or grade.
2. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not permit the fence to be lifted more than 4 inches from grade or decking.
3. The fence shall be designed and constructed so that it does not allow passage of a 4-inch sphere under any mesh panel. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not be more than 4 inches from grade or decking.
4. An attachment device shall attach each barrier section at a height not lower than 45 inches above grade. Common attachment devices 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 such as a safety gate hook.
5. Where a hinged gate is used with a mesh fence, the gate shall comply with Section 305.3.
6. Patio deck sleeves such as vertical post receptacles that are placed inside the patio surface shall be of a nonconductive material.
7. Mesh fences shall not be installed on top of on-ground residential pools.

**P7.** Where the barrier is composed of diagonal members, such as a lattice fence, the maximum opening formed by the diagonal members shall not be more than 1 3/4 inches. The angle of diagonal members shall be not greater than 45 degrees from vertical.

**P8.** Access gates shall comply with the requirements of Items P1 through P7, and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the pool and shall be self-closing and have a self-latching device. Gates other than pedestrian access gates, such as utility or service gates, shall have a self-latching device and remained locked when not in use. Double gates or multiple gates shall have at least one leaf secured in place and the adjacent leaf shall be secured with a self-latching device. Where the release mechanism of the self-latching device is located less than 54 inches from the bottom of the gate the release mechanism and

## Residential Swimming Pools, Hot Tubs and Spas, continued

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

### **A dwelling unit provides all or part of the barrier and shall be provided as follows:**

**P9.** Operable windows having a sill height of less than 48 inches above the indoor finished floor and doors in a wall that provide direct access to the pool shall be equipped with an alarm which produces an audible warning when the door and its screen, if present, are opened. The alarm shall be listed in accordance with UL 2017. The audible alarm shall activate within 7 seconds and sound continuously for a minimum of 30 seconds after the door and/or its screen, if present, is opened and shall be capable of being heard throughout the house during normal house-hold activities. The alarm shall automatically reset under all conditions. The alarm system shall be equipped with a manual means, such as a touchpad or switch, to temporarily deactivate the alarm for a single opening. Such deactivation shall last not more than 15 seconds. The deactivation switch or switches shall be located at least 54 inches above the threshold of the door; **OR**

**P10.** The pool shall be equipped with a powered safety cover in compliance with ASTM F1346, **OR**

**P11.** Other means of protection, such as self-closing doors with self-latching devices, which are approved by the building official, shall be acceptable so long as the degree of protection afforded is not less than the protection afforded by items P9 – P10 described above.

### **An above ground pool over two feet deep, provides the barrier or the barrier is mounted on top of the pool's structure and the means of access is a ladder or steps they shall be provided as follows:**

**P12.** Where only the pool wall serves as the barrier, the bottom of the wall is on grade, the top of the wall is not less than 48 inches above grade for the entire perimeter of the pool, or where a barrier is mounted on top of the pool wall, the top of the barrier is not less than 48 inches above grade for the entire perimeter of the pool, and the wall and the barrier on top of the wall comply with the requirements of Section 305.2 (Items P3 through P8) and the pool manufacturer allows the wall to serve as a barrier. ALSO, the ladder or steps 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 Items P1 through P11. When the ladder or steps are secured, locked or removed, any opening created shall not allow the passage of a 4-inch diameter sphere;

Barriers that are mounted on top of on ground residential pool walls are installed in accordance with the pool manufacturer's instructions and comply with Items P1 through P8.

**P13.** There shall be a clear zone of not less than 36 inches between the exterior of the barrier and any permanent structures or equipment such as pumps, filters and heaters that can be used to climb the barrier. The pool or spa side of the required barrier shall be not less than 20 inches from the water's edge.

**P14.** Natural barriers: In the case where the pool or spa area abuts the edge of a lake or other natural body of water, public access is not permitted or allowed along the shoreline, and required

## Residential Swimming Pools, Hot Tubs and Spas, continued

barriers extend to and beyond the water's edge not less than 18 inches, a barrier is not required between the natural body of water shoreline and the pool or spa.

### **Entrapment protection for swimming pools, hot tubs, and spa suction outlets**

**P15.** General: Suction outlets shall be designed to produce circulation throughout the pool or spa. Single outlet systems, such as automatic vacuum cleaner systems, or other such multiple suction outlets whether isolated by valves or otherwise shall be protected against user entrapment.

**P16.** Suction fittings: All Pool and Spa suction outlets shall be provided with a cover that conforms with ANSI/ASME A112.19.8M, or a 18" x 23" drain grate or larger, or an approved channel drain system.

Exception: Surface skimmers

**P17.** Atmospheric vacuum relief system required: All pool and spa single or multiple outlet circulation systems shall be equipped with atmospheric vacuum relief should grate covers located therein become missing or broken. Such vacuum relief systems shall include at least one approved or engineered method of the type specified herein, as follows:

**P17.1** Safety vacuum release system conforming to ASME A112.19.17, or

**P17.2.** An approved gravity drainage system

**P18.** Dual drain separation. Single or multiple pump circulation systems shall be provided with a minimum of two (2) suction outlets of the approved type. A minimum horizontal or vertical distance of three (3) feet shall separate such outlets. These suction outlets shall be piped so that water is drawn through them simultaneously through a vacuum relief-protected line to the pump or pumps.

**P19.** Pool cleaner fittings: Where provided, vacuum or pressure cleaner fitting(s) shall be located in an accessible position(s) at least six (6) inches and not greater than twelve (12) inches below the minimum operational water level or as an attachment to the skimmer(s).

### **Surrounding DECKS and PATIO**

#### **P20.**

1. Decks shall be designed and installed in accordance with the International Residential Code or the International Building Code, as applicable in accordance with Section 102.7.1, except as provided in this section.
2. Decks, ramps, coping, and similar step surfaces shall be slip resistant and cleanable. Special features in or on decks such as markers, brand insignias, and similar materials shall be slip resistant.
3. Step risers for decks of residential pools and spas shall be uniform and shall have a height not exceeding 7 1/2 inches. The tread distance from front to back shall be not less than 10 inches.

## Residential Swimming Pools, Hot Tubs and Spas, continued

4. The minimum slope of decks shall be in accordance with Table 306.5 except where an alternative drainage method is provided that prevents the accumulation or pooling of water. The slope for decks, other than wood decks, shall be not greater than 1/2 inch per 1 foot except for ramps. The slope for wood and wood/plastic composite decks shall be not greater than 1/4 inch per 1 foot. Decks shall be sloped so that standing water will not be deeper than 1/8 inch, 20 minutes after the cessation of the addition of water to the deck.
5. Gaps shall be provided between deck boards in wood and wood/plastic composite decks. Gaps shall be consistent with approved engineering methods with respect to the type of wood used and shall not cause a tripping hazard. The open gap between pool decks and adjoining decks or walkways, including joint material, shall be not greater than 3/4 inch. The difference in vertical elevation between the pool deck and the adjoining sidewalk shall be not greater than 1/4 inch.
6. The edges of decks shall be radiused, tapered, or otherwise designed to eliminate sharp corners.
7. Valves installed in or under decks shall be accessible for operation, service, and maintenance. Where access through the deck walking surface is required, an access cover shall be provided for the opening in the deck. Such access covers shall be slip resistant and secured.

### **POOL DESIGN PARAMETERS**

#### **P21.A. POOL FLOORS**

The slope of the floor from the point of the first slope change to the deep area shall not exceed one unit vertical in three units horizontal (33-percent slope).

##### Shallow end.

The slope of the floor from the beginning of the shallow end to the deep area floor slope transition point shall not exceed 1 unit vertical in 7 units horizontal.

##### Shallow to deep transition.

The shallow to deep area floor slope transition point shall occur at a depth not less than 33 inches below the design waterline and at a point not less than 6 feet from the beginning of the shallow end.

##### Deep end.

The slope of the floor in the deep end shall not exceed a slope of 1 unit vertical in 3 units horizontal (33 %slope).

##### Shallow end water depths.

The design water depth as measured at the shallowest point in the shallow area shall be not less than 33 inches and not greater than 4 feet. Shallow areas designed in accordance with Sections 809.6, 809.7 and 809.8 shall be exempt from the minimum depth requirement.

# Residential Swimming Pools, Hot Tubs and Spas, continued

## P21.B. WALLS

Walls shall intersect with the floor at an angle or a transition profile. Where a transitional profile is provided at water depths of 3 feet (914 mm) or less, a transitional radius shall not exceed 6 inches (152 mm) and shall be tangent to the wall and is permitted to be tangent to or intersect the floor. Walls in the shallow area and deep area of the pool shall have a wall-to-floor transition point that is not less than 33 inches below the design waterline. Above the transition point, the walls shall be within 11 degrees of vertical.

Offset ledges shall be not greater than 8 inches in width, except where an offset ledge is located less than 42 inches below the design waterline, the width of such ledge shall be proportionately less than 8 inches in width so as to fall within 11 degrees of vertical as measured from the top of the design waterline.

## P22. Entry and exit.

Pools shall have a means of entry and exit in all shallow areas where the design water depth of the shallow area at the shallowest point exceeds 24 inches. Entries and exits shall consist of one or a combination of the following: steps, stairs, ladders, treads, ramps, beach entries, underwater seats, benches, swim-outs and other approved designs. The means of entry and exit shall be located on the shallow side of the first slope change.

Secondary entries and exits.

Where water depth in the deep area of a pool exceeds 5 feet, a means of entry and exit shall be provided in the deep area of the pool. Pools over 30 feet in width at the deep area shall have an entry and exit on both sides of the deep area of the pool.

## P23. Pool stairs.

Treads shall have a minimum unobstructed horizontal depth of 10 inches and a minimum unobstructed surface area of 240 square inches.

Risers, other than the top and bottom riser, shall have a uniform height of not greater than 12 inches. The top riser height shall be any dimension not exceeding 12 inches. The bottom riser height shall be any dimension not exceeding 12 inches. The top and bottom riser heights shall not be required to be equal to each other or equal to the uniform riser height. Riser heights shall be measured at the horizontal centerline of the stairs.

In design water depths exceeding 48 inches, additional steps shall not be required.

## P24. Ladders and recessed treads

Ladder treads shall have a uniform horizontal depth of not less than 2 inches. There shall be a uniform distance between ladder treads, with a distance of not less than 7 inches and not greater than 12 inches. The top tread of a ladder shall be located not greater than 12 inches below the top of the deck or coping. Ladder treads shall have slip-resistant surfaces. There shall be a clearance of not less than 3 inches and not greater than 6 inches between the pool wall and the ladder.

## Residential Swimming Pools, Hot Tubs and Spas, continued

Ladders shall be provided with two handholds or two handrails. The clear distance between ladder handrails shall be not less than 17 inches and not greater than 24 inches.

Recessed treads shall have a minimum depth of not less than 5 inches and a width of not less than 12 inches. The vertical distance between the pool coping edge, deck, or step surface and the uppermost recessed tread shall be not greater than 12 inches. Recessed treads shall have slip-resistant surfaces.

Recessed treads at the centerline shall have a uniform vertical spacing of not less than 7 inches and not greater than 12 inches. Recessed treads shall drain into the pool. Recessed treads shall be provided with a handrail or grab rail on each side of the treads. The clear distance between handrails and grab rails shall be not less than 17 inches and not greater than 24 inches.

### **P25.** Beach and sloping entries.

The slope of beach and sloping entries used as a pool entrance shall not exceed 1 unit vertical in 7 units horizontal (14-percent slope). Where steps and benches are used in conjunction with sloping entries, the vertical riser distance shall not exceed 12 inches. For steps used in conjunction with sloping entries, the vertical riser distance shall not exceed 1 unit vertical in 7 units horizontal (14-percent slope).

Surfaces of architectural features shall not be required to comply with the 1 unit vertical in 7 units horizontal (14-percent slope) slope limitation. The horizontal surface of underwater seats, benches and swim outs shall be not greater than 20 inches below the design waterline.

### **P26.** SAFETY FEATURES: Handholds

Where the depth below the design waterline of a pool or spa exceeds 42 inches, handholds along the perimeter shall be provided. Handholds shall be located at the top of deck or coping, and shall be located not more than 12 inches above the design waterline.

Exceptions:

1. Handholds shall not be required where an underwater bench, seat or swim out is installed.
2. Handholds shall not be required for wave action pools and action rivers.

Handholds shall be one or more of the following, and spaced not greater than 4 feet apart:

1. Top of pool deck or coping.
2. Secured rope.
3. Rail.
4. Rock.
5. Ledge.

## Residential Swimming Pools, Hot Tubs and Spas, continued

6. Ladder.
7. Stair step.
8. Any design that allows holding on with one hand while at the side of the pool.

### **P27. SAFETY FEATURES: Handrails**

The top of the gripping surface of handrails for residential pools and residential spas shall be 30 inches to 38 inches above the ramp or step surface as measured at the nosing of the step or finished surface of the slope.

Handrails shall be made of corrosion resistant materials and installed so that they cannot be removed without the use of tools.

The leading edge of handrails for stairs, pool entries and exits shall be located not greater than 18 inches from the vertical face of the bottom riser.

The outside diameter or width of handrails shall be not less than 1 1/4 inches and not greater than 2 inches.

**PF1. Grades and footing depths:** Where the grade lines shown on the reviewed permit drawings do not reflect the actual grade lines on site, **submit revised elevations** with corrected proposed grade for review and for authorization before proceeding with construction of the foundation. **Show existing and proposed grades on the site plans and footing depths on all exterior elevations.**

**Soil Bearing Capacity:** In lieu of a geotechnical evaluation, the following load-bearing values shall be assumed.

**TABLE R401.4.1 PRESUMPTIVE LOAD-BEARING VALUES OF FOUNDATION MATERIALS**

<b>CLASS OF MATERIAL</b>	<b>LOAD-BEARING PRESSURE</b>
Crystalline bedrock	12,000
Sedimentary and foliated rock	4,000
Sandy gravel and/or gravel (GW and GP)	3,000
Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM)	2,000
Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH and CH)	1,500



## Residential Swimming Pools, Hot Tubs and Spas, continued

**PF2. Special Inspection of Compacted Fill Materials:** Foundations bearing on compacted fill material less than 12 inches in depth need not comply with a geotechnical report investigation per IBC section 1803.2 but shall be compacted to a minimum of 90 percent Modified Proctor in accordance with ASTM D 1557. The compaction shall be verified by a qualified inspector approved by the building official in accordance with section 1705.6 I.B.C

**Foundations bearing on compacted fill** material greater than 12 inches in depth require Special Inspections be provided as required by the approved soils report and/or geotechnical engineer's recommendations. Continuous inspection shall be provided to verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.

Periodically during the task listed the inspector shall:

- Verify materials below footings are adequate to achieve the design bearing capacity.
- Verify excavations are extended to proper depth and have reached proper material.
- Perform classification and testing of compacted fill materials.
- Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly. Observe placement of fill materials, lift depths, and compaction of fill materials. **Section 1803.5.2 IBC**

**PF3. Strength of Concrete shall be specified by the engineered design or as follows:**

1. Strength of concrete shall be 2500 psi for concrete not exposed to weather.
2. Strength of concrete shall be 3000 psi for concrete basement, foundation, exterior walls, and other vertical work exposed to weather.

**PF4. Construction shall be in strict accordance with the engineered design details.** Any deviation from the approved engineered design requires the approval from the engineer-of-record and re-submittal of revised design details and plans for review and approval by the Building Official / King County Department of Local Services, Permitting Division.

**PF5.** Construction shall be in strict accordance with the manufacturer's approved ICC Evaluation Report: Any deviation from the approved engineered design requires the approval from the engineer-of-record and re-submittal of revised design details and plans for review and approval by the Building Official / King County Department of Local Services, Permitting Division.

### **Swimming Pool Equipment**

**EP1.** Performance Efficiency: All storage water heaters shall meet the requirements of the National Appliance Energy Conservation Act and be so labeled. All electric water heaters in unheated spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10. WSEC R403.4.3

**EP2.** Installation: Pool and spa heaters shall be installed in accordance with the manufacturer's installation instructions. Oil-fired pool heaters shall comply with UL 726. Electric pool and spa heaters

## Residential Swimming Pools, Hot Tubs and Spas, continued

shall comply with UL 1261. Thermal solar water heaters shall comply with Chapter 23 and UL 174. Solid-fuel-fired water heaters shall comply with UL 2523. Pool heaters shall have temperature-relief valves. IRC M2006 and IRC M2005.1

**EP3. Shutdown:** 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 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 or greater reach path. This horizontal distance shall be measured from the water's edge along the shortest path required to reach the disconnect. IRC E4203.3

**EP4. Pipe Insulation:** For recirculating and non-recirculating systems, piping shall be thermally insulated in accordance with Section 503.11 and Table 5-12. SEC. 504.7

**EP5. Controls:** The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet of the heater.

Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater.

Gas-fired heaters shall not be equipped with continuously burning ignition pilots.

Time switches or other control method that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on all heaters and pumps. Heaters, pumps and motors that have built in timers shall be deemed in compliance with this requirement. Controls shall be provided to allow the water temperature to be regulated from the maximum design temperature down to 65°F. WSEC R403.9.1, R403.9.2

**EP6. Pool Covers:** Heated swimming pools and in-ground permanently installed spas shall be equipped with a vapor-retardant pool cover. WSEC R403.9.3

**EP7. Residential Pool Pumps:** WSEC R403.9.4

Motor Efficiency: Pool pump motors may not be split-phase or capacitor start-induction run type. Two-speed Capability:

1. Pool pump motors with a capacity of 1 hp or more shall have the capability of operating at two or more speeds with low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate.
2. Pool pump motor controls shall have the capability of operating the pool pump with at least two speeds. The default circulation speed shall be the lowest, with a high speed override capability being for a temporary period not to exceed one normal cycle.

## Residential Swimming Pools, Hot Tubs and Spas, continued

Portable Electric Spas: The standby power of a portable electric spa in watts shall not be greater than the value derived from five times two-thirds of the volume in gallons  $5(V^{2/3})$  where V= the total volume, in gallons.

Pump Operation: Circulating hot water systems shall be controlled so that the circulation pump(s) can be conveniently turned off, automatically or manually, when the hot water system is not in operation.

