

Section 5: Aquatic Play Features and Other Pool Types



Aquatic Play Features, Water Parks, Wading Pool, and Hot Tub/Therapeutic/Spa Pools

Rationale:

Diving boards, slides, Tarzan ropes, climbing walls, wave action, continuous surfing pools, vortex pools, and spray features are a few examples of aquatic play features and pools that are becoming increasingly common at recreational aquatic venues. Water parks' and splash pads' primary offerings are water play features. They are a popular attraction for children and families, and can add to a great aquatic experience. But they all pose risks to patrons if they are not properly designed, installed, maintained, and supervised. Risks can include, but are not limited to, bather collisions, impact fall injuries, entrapment, evisceration, drowning, poor air quality, and microbial contamination. Due to their size, shape, and unique design, play features tend to be more difficult to effectively circulate, filter, and chemically treat.

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5.1 Aquatic Play Feature General Recommendations^{47,48}

- Play features shall be designed and installed according to manufacturer's instructions, appropriate Canadian Standards Association standards, ASTM standards, all municipal and provincial codes (Nova Scotia Labour and Advanced Education, Amusement Devices Safety Act), and, when required, engineering plans.
- Operating procedures, operational manuals and directives, risk assessments, and all required training shall be incorporated in the Aquatic Safety Plan for each aquatic feature.
- Staff training shall be regularly conducted and training records kept on file. Training shall include, but not be limited to
 - safe operation of the feature
 - safe supervision (which may include the use of aquatic feature attendants (assistant lifeguards) in combination with qualified lifeguards)
 - emergency procedures
 - preventative maintenance and cleaning including biofilm prevention and removal
- Aquatic features shall be maintained in good repair to prevent slips, falls, and pinch hazards when appropriate.
- Each facility shall perform a risk assessment for each feature to determine enhanced supervision and use requirements.
- Surfaces shall be made of non-slip material where appropriate.
- Play features shall be inspected daily and routinely audited for
 - structural integrity, cracks, loose bolts, and any other identified risk
 - cleanliness and biofilm development
 - suction and entrapment risk
- A plan shall be in place for emergency closure, including how to safely bring a queue of children/bathers down a ladder or off a play feature.
- Water level shall be maintained.
 - Some water features, such as slide receiving pools, require a specified water level to ensure bathers are provided with safe entry into the receiving pool or with enough resistance upon entrance into the receiving pool to slow down. Water levels that are too high or too low can be hazardous.
 - It must be ensured that a water replacement policy is in place, and that water quantity is monitored and logged because of water loss due to splash-out and increased evaporation.
- Signage shall be clearly posted and shall include
 - emergency procedures, warning signage, and use requirements including height, swim ability, and age restrictions (See Appendix 8, Example: Public Pool and Spa Signage)
 - universally accepted pictograms when possible
- Water quality parameters shall be maintained and recorded as required to ensure effective water quality. These include
 - appropriate water testing and maintaining required records
 - continuous disinfection and maintaining pH levels as described in these guidelines and the venue's specific Aquatic Safety Plan to eliminate bacteria inside the spray features is key to preventing air endotoxin levels and symptoms⁴⁹

⁴⁷ NSPF, Aquatic Play Feature Handbook

⁴⁸ ANSI/NSPF-9 2005 Aquatic Recreation Facilities

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- Emergency stop button(s) shall be installed on play features, such as continuous surfing pools and slides or as determined by manufacturer.
- Audible and visual warning device that are tested daily may be necessary for play features that alert bathers of the beginning of the play feature.

Play feature specific information

Consult feature specific manufacturer's installation and operational instructions.

5.1.1 Rope swings⁵⁰

The design, location, and maintenance of rope swings shall take into consideration both safety and structural concerns.

Recommendations:

- Any installation of a rope swing shall be certified by a structural engineer. When a rope swing is in use, it can create considerable torsional stress on beams above, and the effect of the swing shall be considered on the structure of the building.
- Injuries occur when the rope swing is not placed over an area of the water sufficient to prevent adult-sized individuals from striking the bottom of the swimming pool. Design of these swings shall consider trajectory, pool slope, and potential impact with side of the pool, walls, and deck.
- Rope swings shall not conflict with other pool activities (e.g., diving).
- Sufficient lateral clearance shall be provided between the rope swing and the dive area in the deep end.
- Sufficient water depth is required.

5.1.2 Diving Boards and Platforms

Recommendations:

- Pools where diving is permitted, instruction provided and competitions performed shall have adequate clearances and depth of water for safe diving. The Federation Internationale de Natation Amateur (FINA – www.fina.org/) standards shall be followed for clearances and water depths for springboards, diving platforms, and starter blocks.
- Each facility shall have in place a diving board use policy that specifically indicates user age, user ability, and required supervision. Consideration should be given to restricting use of diving boards that are above 3 metres to competitive/trained divers.
- Adequate guardrails around that portion of the diving board or platform, which is not above the water area, shall be maintained and assessed on all diving boards and platforms 1 metre (3 feet) or more above the water surface.
- Diving boards and steps leading to diving boards are to have slip-resistant surfaces.

⁴⁹NIOSH. 2008. Health Hazard Investigate Report: Investigation of Employee Symptoms at an Indoor Waterpark, Mason, OH. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institutes for Occupational Safety and Health, NIOSH HETA No. 2007-0163-3062 <http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0163-3062.pdf>

⁵⁰British Columbia Ministry of Health, Health Protection Branch Population Health and Wellness Division, B.C. Guidelines for Swimming Pool Design V1.0, 2011

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- When the diving board is 3 metres or higher above the water the operator shall ensure that⁵¹
 - the gate allowing access to the platform is locked, except during periods when the platform is in use for diving
 - when the platform is in use, the pool is used only for diving unless a rigid barrier or double safety lines 300 millimetres apart supported by buoys are in place, located from the wall under the platform
 - 11.6 metres in the case of a 5 metre platform
 - 12.5 metres in the case of a 7.5 metre platform
 - 15.25 metres in case of a 10 metre platform



5.1.3 Water Slides and Flumes

There are a variety of types of water slides including those designed for small children to large flume styles slides found in hotels and waterparks. They are being built bigger and are capable of more speed, and are one of the most popular features at swimming pools. In Sweden and Europe, 16% and 18%, respectively, of public pool injuries are related to water slides. Serious injuries and even deaths related to water slides⁵² have occurred in Canada.⁵³

Recommendations:

Slides shall be maintained and operated to manufacturer's/designer's specifications and the most recent Canadian Standards Association Standard Z267-00 Safety Code for Amusement Rides and Devices or its successor.

- Water slide lines susceptible to holding stagnant water shall maintain a disinfectant residual throughout the lines in accordance to these guidelines.
- Recirculation and filtration systems shall be in use during operating hours.
- Slime and biofilm layers shall be removed on all accessible slide surfaces.
- Before opening the venue, the slide water flow rates shall be inspected to ensure they are with in the designer or manufacturer's specifications. Daily inspections will look for:⁵⁴
 - loose railings
 - leaking seals at butt joints
 - rough patching of cracks or joints
 - absence of guards or loose guards on the turns
 - unusual movement of the flume bed when walked on
 - growth of algae on the support structure
 - sharp edges on the flume safety rails
 - projection of any portion of vegetation into the flume
 - clear view of the receiving pool at the exit of the flume



⁵¹ Adapted with permission from Toronto Public Health, Swimming Pool Operations Manual (2009). retrieved from the www at http://www.toronto.ca/health/hphe/pdf/swimming_pool_m2009.pdf

⁵² www.childsafetyeurope.org/publications/info/protecting-water-recreation.pdf

⁵³ Lifesaving Society, Yi Fan Wang Coroner's Inquest Recommendations, May 23, 2013 retrieved from the www at www.cdc.ca/news/canada/new-brunswick/coronor-s-jury-recommends-pool-safety-changes-1.1317228

⁵⁴ Saskatchewan Ministry of Health, Swimming Pool Design and Operational Standards p. 34

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- Warning signage shall be present and use requirements including height, swim ability, and age restrictions shall be provided (see example signage).



- Each facility shall perform a risk assessment to determine enhanced supervision requirements to be implemented when slides are in operation. This may require supervision at the bottom of the slide where the swimmer enters the water as well as at the slide entry.
- Emergency procedures specifically designed for the slide shall be clearly posted and training in these procedures shall be practiced, with records of the training maintained on file.

5.1.4 Wave feature

Rationale:

The production of a wave can create an unsafe environment for a non-swimmer or a swimmer caught off-guard. The mechanical devices used to create the wave may present an entrapment risk to bathers and workers. The wave action also increases the water surface area; for outdoor pools this may increase a loss of disinfection due to ultraviolet rays. Due to size, shape, and wave action, these pools require special care to maintain good circulation, filtration, and chlorine residual throughout the entire pool.

Maintenance Recommendations⁵⁵

- Wave chamber bars: A wave chamber in a pool basin shall be equipped with wave chamber bars constructed of stainless steel or similar acceptable material, which are intended to act as a notice to bathers that the area is restricted, with the goal of preventing entrapment of patrons. The wave chamber including the bars should be marked off with a rope, lane line, or other measures to discourage public access near the wave chamber bars.
- Deck guard rails shall be maintained at the deep end around the wave chamber walls to prevent public access to this part of the pool when necessary.
- The wave chamber bars and deck guard rails shall be regularly inspected for structural integrity. Inspections shall be documented and the inspection records retained.

⁵⁵ British Columbia Ministry of Health, Health Protection Branch Population Health and Wellness Division, B.C. Guidelines for Swimming Pool Design V1.0, 2011

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- The air blowers of the wave chamber shall be contained in a separate room that is not accessible by the general public, will be designed to operate at acceptable noise levels, and will be regularly assessed for their occupational health and safety risk.
- The wave amplitude shall be designed for the specific pool.
- Emergency stop button, protective railings/barriers, and the audible and visual warning devices shall be tested daily and maintained as required.

Wave Pool Use Recommendations

- Life jackets shall be provided free for patrons who request them.
 - Children less than 48 inches in height, shall wear a properly fitting life vest as a requirement to gain access to a wave pool.
 - A child less than 42 inches in height should be accompanied by an adult and be “within arm’s reach” of this adult to be granted entry into the park by the wave pool operator.⁵⁶
- The wave pool operator shall ensure that there are a sufficient number of lifeguards on duty to recognize, respond, and provide care to swimmers in distress or passive or active drowning persons within, but no longer than, 30 seconds of the onset of their peril.
- A lifeguard shall have an unobstructed view of, and be able to completely observe, in its entirety, his/her defined zone of protection in the wave pool.
- A wave pool operator shall ensure that conditions in a wave pool are continually reevaluated for safety and shall adjust lifeguard staffing accordingly.
- An emergency stop button (see section 4.12) for the wave equipment shall be easily accessible to the lifeguards and other pool officials.
- A wave pool operator shall ensure that the wave pool has regular periods without breaking waves being produced, by ensuring that continuous breaking wave cycles in a wave pool shall not exceed 15 minutes.
- Appropriate signage detailing warnings and restricted use conditions shall be located in plain view of pool patrons.

Audible and Visual Warning Device

- Every wave pool shall be equipped with a warning device like a buzzer and light that is to be sounded and displayed to alert swimmers of the commencement of operation of the wave generator.

⁵⁶ California Public Health, Wave Safety Act (2008), <http://www.cdph.ca.gov/HealthInfo/environhealth/water/Documents/RecHealth/HEALTH%20AND%20SAFETY%20CODE%20Sections%20115950%20-%20115952.pdf>

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5.1.5 Spray Grounds/Spray Feature

Rationale:

Special considerations for these facilities are advisable because of the population served. Air quality is often as good as the water quality in these types of pools due to the aeration (via spraying) of water. Spray pools that collect water for recirculation and that have no treatment have been associated with communicable disease outbreaks and are therefore not recommended.

Recommendations:

Spray grounds/feature shall be

- subject to all sections of these guidelines including water quality, filtration, and recirculation
- made of durable material impervious to moisture and retaining a slip-resistant texture that is comfortable to bare wet feet
- free of obstructions
- repaired of any cracks that have the potential to
 - cause leakage
 - create a tripping hazard
 - cause lacerations
 - impede cleaning and maintenance of the spray ground area
- free of slime and biofilm layers on all accessible surface
- cleaned, scrubbed, and flushed with disinfectant (e.g., 5 mg/L hypochlorite solution) each day for the appropriate contact time
- cleared of contaminants, such as by washing to the sanitary sewer or to the nearest deck drain, or removal in a manner that prevents contamination of the spray ground
- not used for drinking; water fountains should be located in the vicinity of the spray park to discourage patrons from drinking water from the spray features
- designed to use a continuous supply of fresh treated potable disinfected water for spraying, which would then drain to waste or,
- in the absence of continuous fresh potable water, shall use full water treatment including filtration and chemical treatment.



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5.2 Wading and Spa/Therapeutic/Hot Tub Pools

Rationale:

As noted in Section 1.2, microbial recreational water illness risks increase in venues with higher water temperatures and when there is a lower ratio of water volume to bather load. These types of venues shall be considered increased risk venues and pool type specific operational strategies shall be developed and implemented to reduce the risk of illness and injury.

5.2.1 Wading pools

Wading pools are less than 2 feet in depth, are maintained at a warmer temperature, and are designed for a younger patron who may or may not be toilet trained. Swim diapers are not fool-proof and, therefore, there is an increased risk of an accidental fecal release and an overall increased risk of contamination.



Wading Pool with Recirculated and Filtered Water⁵⁷

These pools are not typically emptied daily and should be the standard when developing a new wading pool.

Recommendations:

- All sections of this guideline shall be utilized including water quality, filtration, and recirculation sections.
- These pools shall be classified as an increased risk aquatic venue in the Aquatic Safety Plan.
- A dedicated filtration and circulation system shall be in place, with the entire volume of the wading pool capable of being recirculated through an approved filter in 2 hours or less.
- An automatic feed control system shall be in place to maintain consistent disinfection and pH.
- A recirculating wading pool may be drained and left empty overnight.
- A secondary disinfection system is recommended
- Due to the potential use by diaper-aged children educating parents, guardians and staff on the proper use of swim diapers (they do not prevent fecal contamination)
- Due to the age of patrons the wading pool area shall have signage regarding required parent or guardian supervision at a minimum (See also Sections 5.1.5, Spray Grounds/Spray Feature and 7.3, Preventing Suction Hazards in Pools and Spas)

⁵⁷ NSPF, Aquatic Play Feature Handbook

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Wading Pool Fill and Dump

These pools are filled and emptied daily. There is no standing water when the pool is not in use.

Recommendations:

- The pool shall be completely drained after the last period of use each day.
- The main drain valve of the pool shall remain open during non-fill time.
- All debris, glass, leaves, or other material that could pollute the water or that could be hazardous to the pool users shall be removed from the pool bottom and area surrounding the wading pool and properly disposed of.
- The pool shall use water from a potable supply or treated swimming pool water.
- Treated water shall be used and all water monitoring tests are required.

5.2.2 Spas, Hot Tubs, Therapeutic Tubs

Rationale:

These pools have higher water temperatures, lower water volumes, and high bather load. This increases the potential for biofilm formation, which increases the demand of the primary disinfectant and adds to the operational challenges. The close proximity of the head to the water level provides unique opportunities for microbial inhalation risks if poor operation occurs. These types of pools have also been associated with entrapment injuries and deaths.

Recommendations:

- All sections of this guideline shall be utilized.
- There shall be no persistent foam including after the jets are turned off.
- There shall be no visible sign of algae.
- Spa surfaces shall be maintained free of biofilm.
- This type of pool shall be classified as an increased risk venue in the Aquatic Safety Plan.
- Signage shall be maintained and indicate
 - maximum bather capacity
 - caution and health warnings including restrictions
 - location of emergency stop buttonsee also Section 2.3.7, Patron Education
see also Appendix 8, Example: Public Pool and Spa Signage
- Each spa shall have a dedicated and separate filtration and circulation system
see also Section 7, Recirculation and Filtration
see also Section 6.2.1, Spa water replacement
see also Section 7.3, Preventing Suction Hazards in Pools and Spas
- An emergency stop button shall be available (see also Section 4.12, Emergency Stop Button).
- A timing device shall be installed and operational, and located so that a patron must exit the spa to reset the device (see also Section 5.2.3, Timing device).



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5.2.3 Timing device

Rationale:

Prolonged exposure to warm water temperatures can have detrimental health effects including but not limited to

- inability to exit the spa
- failure to recognize the hot temperature of the water and the need to leave
- unconsciousness and drowning

The timing device controls the period of operation of the jet pump reducing the health risk to bathers.

Recommendation:

- Required maintenance of the timing device shall be done to ensure it can only be set to a maximum of 15 minutes and is placed in a location that requires bathers to exit the spa to reset.



Wave Chamber and
Guard Railing



Emergency
Stop Button



Timing Device