



NEW AQUATIC RECREATION FACILITY/POOL DESIGN CHECKLIST

Instructions: A Maine Licensed Professional Engineer may use this checklist to ensure that a new Aquatic Recreation Facility/Pool meets all of the “Class D” pool design criteria required by the Maine Rules Relating to Public Pools and Spas, 10-144 CMR, Chapter 202, Section 2.B. From these Rules, “Class D” pools include, but are not limited to, wave action pools, activity pools, catch pools, leisure rivers, and sand bottom pools.

Reference: ANSI/AIF-9 2005: American National Standard for Aquatic Recreational Facilities.

For questions, please contact the DHHS Environmental and Community Health Program, Engineering, at 207-287-2070.

NEW AQUATIC RECREATION FACILITY/POOL DESIGN CHECKLIST

Scope and Application

Scope. This checklist provides specifications for the design, equipment, operation, signs, installation, sanitation, new construction, and rehabilitation of public pools for aquatic play.

Because of their unique use and nature, pools covered by this checklist differ from those addressed in the checklist for public swimming pools. Pools covered by this checklist are designed for free-form aquatic play and recreation. To provide for such activity, they often employ high deck-to-water free-board, extensive area of shallow water, water moving at high velocities, bathers moved at speeds, surging and pulsating water, the use of transport or riding vehicles, sprays and streams of water or pressurized air, and the use of energy sources to produce special effects and recreation circumstances.

This checklist covers the following Class D pools (see Definitions)

- D-1, Wave action pools;
- D-2, Activity pools;
- D-3, Catch pools;
- D-4, Leisure rivers;
- D-5, Vortex pools;
- D-6, Interactive play attractions – water treatment and filtration only.

Application

This checklist covers public pools and water containment systems used for aquatic recreation and operated by an owner, licensee, or concessionaire, regardless of whether a fee is charged for use.

Class D-1 pools – D-6 pools are covered whether they are provided as stand-alone attractions or in various combinations in a composite attraction.

Class D-1 pools – D-6 pools are covered regardless of where they are located, including hotels and other lodging facilities.

When combinations of Class D-1– D-6 pools occur within a facility, the function of each element shall comply with the checklist applicable to the function as though the function is a freestanding pool of its functional Class D-1 – D-6.

Limitations. This checklist permits variations in equipment, materials, and design to accommodate special needs, access consideration, and advances in technology. These specifications are not intended to prevent the use of other designs provided that any variation from the specifications in this checklist provides the required quality, strength, durability, and safety for the intended use.

Pools not covered by this checklist. Any pool not classified as D-1 – D-6 is not covered by this standard.

The following pools or features are outside the scope of this standard:

- D-7, amusement park attractions;
- D-8, natural bodies of water; and
- waterslides of any type and waterslide-type attractions.

_____ Local and state codes. All pools covered by this checklist shall be constructed and operated to comply with all applicable local and state codes.

_____ Special environmental concerns. All pools covered by this checklist shall be constructed and operated to comply with all applicable local, state, and federal codes governing safety and environmental regulations as well as safe industry practices.

Normative References

The following checklist contain provisions that, through reference in this text, constitute provisions of the American National Standard referenced at the beginning of this checklist. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on American National Standards are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI Z21.56-2001/CSA 4.7-2001, Gas fired pool heaters

ANSI/ASHRAE 62-2001, Ventilation for acceptable indoor air quality, table 2, section 2.1

ANSI/ASME A112.19.8M-1987, Suction fittings for swimming and wading pools, spas, hot tubs, and whirlpool bathtub appliances

ANSI/ICC A117.1 (2003), Standard on accessible and useable buildings and facilities

ANSI/NEMA-MG1-1998, Motors and generators

ANSI/NSF 14 (2003), Plastics piping system components and related materials

ANSI/NSF 50 (2001), Circulation system components and related materials for swimming pools, spas/hot tubs

ANSI/NSPI-1-1991, Standard for public swimming pools

ACI 302.1R-96 (1996), Guide for concrete floor and slab construction

NFPA 54-2002, National fuel gas code

NFPA 70-2005, National electric code

UL 1995 (1999), Heating and cooling equipment

UL 1261 (2001) Standard for electric water heaters for pools and tubs

U.S. Code of federal regulations in 29 CFR 1910 (OSHA)

U.S. Code of federal regulations in 28 CFR 36 (Americans with Disabilities Act)

U.S. Code of federal regulations in 36 CFR 1191, Appendix A, Americans with Disabilities Act Accessibility Guidelines (56 CFR 35408/67 FR 56352, September 3, 2002)

_____ Facilities using diatomaceous earth as a filter media shall comply with provisions of 29 CFR 1910.134 (OSHA), which addresses respiratory protection.

_____ Facilities having filter tanks, sumps, surge tanks, or other areas defined by the regulation shall comply with provisions of 29 CFR 1910.146 dealing with working in confined spaces 40 CFR-1, Clean air act of 1990

_____ All energy sources provided the facility or attraction shall be in conformance with the Lockout-Tagout provisions of 29CFR 1910.147, OSHA.

_____ Safety procedures shall be in place for chemical handling, training, and record keeping in compliance with provisions of 29 CFR 1910.1200 addressing chemical safety and employee right-to-know.

_____ Provisions of 29 CFR 1910.1030 shall be met to provide safe conditions relative to blood-borne pathogens and prescribed responses to exposure.

_____ Facilities shall comply with the Clean Air Act of 1990 as currently revised and defined in 40 CFR 1 through end.

Definitions

Class D, other pool: Any pool operated for medical treatment, therapy, exercise, lap swimming, recreational play, and other special purposes, including, but not limited to, wave or surf action pools, activity pools, splashers pools, kiddie pools, and play areas.

Class D-1, wave action pools: Wave action pools include any pool designed to simulate breaking or cyclic waves for purposes of general play or surfing;

Class D-2, activity pools: Activity pools are those pools designed for casual water play ranging from simple splashing activity to the use of attractions placed in the pool for recreation;

Class D-3, catch pools: Catch pools are bodies of water located at the termination of a manufactured waterslide attraction provided for the purpose of terminating the slide action and providing a means for exit to a deck or walkway area.

Class D-4, leisure rivers: Manufactured streams of near-constant depth in which the water is moved by pumps or other means of propulsion to provide a river-like flow that transports bathers over a defined path that may include water features and play devices.

Class D-5, vortex pools: Circular pools equipped with a method of transporting water in the pool for the purpose of propelling riders at speeds dictated by the velocity of the moving stream.

Class D-6, interactive play attractions: Only water treatment and filtration for these attractions are within the scope of this standard. A manufactured water play device or a combination of water-based play devices in which water flow volumes, pressures, or patterns are intended to be varied by the bather without negatively influencing the hydraulic conditions of other connected devices. Class D-6 attractions may incorporate devices or activities such as slides, climbing and crawling structures, visual effects, user-actuated mechanical devices and other elements of bather-driven and bather-controlled play. Class D-6 attractions do not incorporate captured or standing water greater than 12 inches deep as part of the bather activity area.

Class D-7, amusement park attractions: Attractions or rides traditionally found in amusement parks that are designed to permit bather contact with water.

Class D-8, natural bodies of water: Those natural or man-made aquatic play areas normally regarded as oceans, lakes, ponds, streams, quarries, or bodies of water that the local jurisdiction has designated as natural bodies of water. The design or construction of these facilities is not included in the scope of ANSI/IAF standards.

Design

____ Permits and plan review. Prior to construction, rehabilitation, or alteration of a facility, plans and specifications shall be submitted to the authorities having jurisdiction for review, approval, and issuance of a permit.

_____ Materials. Pools and all appurtenances thereto shall be constructed of materials that in their finished state and application meet the following requirements:

- nontoxic to man and the environment;
- impervious and enduring;
- able to withstand design stresses;
- provide a watertight structure;
- provide easily cleaned surfaces; and
- in accordance with generally accepted industry practice.

_____ Structural design. The structural design shall be in accordance with generally accepted industry practice.

_____ Freeze protection. In climates subject to freezing temperatures, the pool shell and appurtenances, piping, filter system, pump and motor, and other components shall be designed and constructed to facilitate protection from damage due to freezing.

NOTE – Elements inside a pump room may need additional freeze protection if the facility is located in cooler climates.

_____ Ventilation. All pools and their related components that are installed in an indoor environment shall comply with the ventilation requirements of ANSI/ASHRAE 62-2001, Ventilation for acceptable indoor air quality, table 2, section 2.1.

_____ Slip resisting. The surfaces intended to provide bather footing within pools shall have a slip-resisting surface.

_____ Diving. Pools or areas of pools designed for diving shall conform to the standards of the diving sanctioning organization and the regulations of any agency having jurisdiction.

_____ Dimensional tolerances. Construction deviation from design dimensions shall conform to table 1 unless otherwise specified by the designer.

_____ Perimeter shape. This standard is not intended to regulate the perimeter shape of pools. It is the designer's responsibility to take into account the effect a given shape will have on the safety of the occupants. It is the designer's responsibility to take into account the minimum required circulation to maintain uniform sanitation.

_____ Functional elements. Functional protrusions, extensions, and other functional elements shall be designed and installed to minimize the entrapment of, or hazard to, the bather.

_____ Where their function requires that they project into the pool, other floor and wall fittings shall be configured so as not to present a hazard to the bather.

_____ When the function or nature of a recreational pool incorporates protrusions or obstacles, these shall be marked with an identifying feature, such as contrasting colors, to warn the bather(s) of their presence.

_____ Colors and finishes

_____ Observation. The colors, patterns, or finishes of the pool interior shall permit the visual observation of bathers or surfaces within the pool.

_____ Sand. Clean sand shall be permitted as an interior finish over an impervious surface in a pool that has been provided with a filtration and treatment system designed to perform in such an environment.

Table 1 – Construction tolerances

Design requirement	Construction tolerance allowed
Length – Overall	±3” (76 mm)
Width – Overall	±3” (76 mm)
Depth – Deep area (greater than 5’ (152 cm) depth) (as measured at a location from the wall that is equal to 60% of the nominal pool depth and at the location of the depth marking)	± 3” (76 mm)
Depth – Shallow area (less than 5’ depth) (as measured 3’ (91 cm) from the wall at the location of the depth marking)	± 2” (51 mm)
Floor nozzle flushness	± 1/8” (3 mm)
Step treads and risers	±½” (13 mm)
Waterline – Pools with adjustable weir skimmers	± ¼” (6 mm)
Waterline – Pools with non-adjustable skimming systems (gutters and zero depth overflow trenches)	± 1/8” (3 mm)
Walls	± 3°
All other dimensions unless otherwise specified in this standard	± 2” (51 mm)

Floor slopes

_____ Maximum slope. Maximum floor slopes shall be in compliance with these elements under “Floor slopes”, except they shall be allowed to vary in areas where access for persons with disabilities has been provided.

_____ Measurements. Slope measurements shall be measured as the average over the designated plane, as specified by the designer, or as dictated by the function of the pool and attraction.

_____ Steepness. Floor slopes shall not be steeper than 1:12 in water depths less than 5 feet (152 cm) deep, except where the function of the attraction requires greater slopes in limited areas.

_____ The slope of the floor from the point of the first slope change to the deep end shall not exceed 1 foot in 3 feet (1:3) (30 cm/91 cm), except where function of the pool or attraction dictates a greater slope.

_____ The slope of the floor in D-3, catch pools, shall be a maximum of 1:7.

Pool walls

_____ Tangent radius. Pool walls may be joined to the floor with a tangent radius.

_____ Transitional radius. For areas of the swimming pool between 3 feet (91 cm) and 5 feet (152 cm) deep, this transitional radius shall vary progressively from 6 inches (15 cm) at the 3 foot (91 cm) depth to a maximum of 36 inches (91 cm) at the 5 foot (152 cm) depth.

_____ Point at which radius meets wall. The radius shall be tangent at the point where it meets the wall.

Water depths

_____ Function of pool. Water depth of a pool shall be established by the designer/ manufacturer in consideration of the function of the pool.

_____ Markings. Markings of deep-water areas shall comply with 4.14.2 and 16.4 unless the function of the pool dictates otherwise.

_____ Class D-2, activity pools. Class D-2 activity pools having a bather-accessible depth greater than 4.5 feet (137 cm) shall have a distinctive floor marking at the 4.5 foot (137 cm) water depth.

_____ In pools that are deeper than 5 feet (152 cm), life lines shall be located 1 foot (30 cm) toward the shallow end of the pool.

_____ Pools having non-flush propulsion nozzles in the floor shall have a distinctive marking at the location of the floor nozzles.

_____ Turnover times. The maximum pool turnover times for pools subject to this standard shall be as listed in table 2.

Decks

_____ Placement at entry/exit. Deck surfaces shall be provided at perimeter areas of pools where the designer has specified entries or exits.

_____ Man-made/natural materials. Bather surfaces adjacent to pools shall be allowed to be made of natural or man-made materials that do not constitute a sanitary contaminant to the pool water.

Table 2 – Turnover times

Pool	Turnover time (Hours) ^{1) 2)}
D-1 Wave	2
D-2 Activity – less than 24 inches ¹	1
D-2 Activity – 24 inches or greater	2
D-3 Catch	1
D-4 Leisure river	2
D-5 Vortex	1
D-6 Interactive play attractions	1
<p>1) Based on flow with a clean filter condition</p> <p>2) When a pool employs sand in the pool area, the turnover time shall be one hour</p>	

_____ Local authority. Deck(s) shall be designed and installed in accordance with the engineering practices required by the authority having jurisdiction.

_____ Slip resisting. Decks, ramps, coping, walking, and step surfaces shall be slip resisting and easy to clean.

NOTE – Special features in or on deck(s) such as markers and brand insignias shall be slip resisting.

_____ Soil. Soils supporting decks shall have load-bearing capacities to support all superimposed live loads in addition to the dead load.

Dimensions

_____ Width. The minimum usable deck width shall be 4 feet (122 cm) except when it is the top landing of a slope entry. In conformance with ADAAG, when a deck is the top landing of a slope entry the minimum space shall be 60 inches (152 cm) long.

NOTE: this does not apply to walkways or access ways for lifeguards or other staff.

_____ Gaps between decks

_____ The maximum gaps between pool decks and other decks or walkways, including joint material, shall be 3/16 inch (4.8 mm) of horizontal clearance with a maximum difference in vertical elevation of ¼ inch (6.4 mm).

_____ Gaps wider than those defined in 5.6.2.1 shall be filled with suitable caulking or filler material in accordance with the material supplier's specifications.

_____ Deck edges. The edges of deck(s) that may be contacted by pool bathers shall be radiused, tapered, or otherwise relieved to minimize sharpness.

Slope

Minimum slope

_____ Textured concrete decks. The minimum slope of the deck(s) shall be $\frac{1}{8}$ inch per foot (1:96) (3 mm/304.8 mm) for textured, handfinished concrete decks.

_____ Aggregate concrete decks. The minimum slope of the deck(s) shall be $\frac{1}{4}$ inch per foot (1:48) (6.4 mm/304.8 mm) for exposed aggregate concrete decks.

_____ Carpeted decks. The minimum slope of the deck(s) shall be $\frac{1}{2}$ inch per foot (1:24) (12.7 mm/304.8 mm) for indoor/outdoor carpeted decks, unless an alternate drainage method is provided that prevents the accumulation or pooling of water.

_____ Maximum slope

_____ Wood decks. The maximum slope for wood decks shall be $\frac{1}{8}$ inch per foot (1:96) (3 mm per 304.8 mm). Gaps shall be required between deck boards consistent with approved engineering practices with respect to the type of wood used.

_____ Decks other than wood decks. The maximum slope of all decks, other than wood decks, shall be $\frac{1}{2}$ inch per foot (1:24) (12.7 mm/304.8 mm) except for ramps.

Drainage

_____ Slope on decks. Deck(s) shall be sloped to effectively drain either to perimeter areas or to deck drains.

_____ Standing water. Drainage shall remove pool splash water, deck cleaning water, and rain water without leaving standing water.

_____ Surfaces dependent on slope for drainage and removal of water should be designed so that slope is away from deck areas, pools, and existing structures.

Step risers

_____ Uniformity. Risers for steps shall be uniform and have a minimum height of 4 inches (10 cm) and a maximum height of 7 inches (17.8 cm).

_____ Handrails. A handrail shall be provided for stairs having three or more risers including the riser to the deck.

_____ Tread depth. The minimum tread depth shall be 11 inches (28 cm).

Concrete. The following standards shall apply to decks made of concrete.

_____ Local jurisdiction requirements. Deck(s) shall be designed and installed in accordance with the engineering practices required by the authority having jurisdiction. This includes the design and quality of sub-base when required, concrete mix design, reinforcing, joints, etc.

_____ American Concrete Association requirements. If a concrete deck is selected, in the absence of specific local engineering practices, the work shall be performed in accordance with the recommended practices of the most recent edition of the American Concrete Institute (ACI) Standard 302.1R-80, Guide for concrete floor and slab construction, or in accordance with the requirements of the local authority having jurisdiction or both.

_____ Watertight joints. Construction joints where pool coping meets concrete deck(s) shall be watertight.

_____ Protection from movement. Construction joints where pool coping meets concrete deck(s) shall be installed to protect the coping and its mortar bed from damage as a result of the anticipated movement of adjoining deck(s).

_____ Control joints to cracks. Control joints in deck(s) shall be provided to minimize the potential for cracks due to a change in elevations, separation of surfaces, or movement of the slab.

_____ Expansion joint. The area where deck(s) join existing concrete work shall be protected by an expansion joint to protect the pool from the pressures of relative movements.

Deck equipment

_____ System piping. The system piping shall be tested before deck construction.

_____ Access to valves. Valves installed in or under any deck(s) shall have access provided for operation, service, and maintenance. Access covers and drainage shall be provided from the valve pit.

Hose bibs

_____ Cleaning. Hose bibs, equipped with a provision to prevent backflow, shall be provided to enable the entire deck to be adequately cleaned.

_____ Dedicated hose bibs. Water-powered devices shall be installed in a manner that minimizes guest and staff exposure to injury and shall have a dedicated hose bib.

Circulation systems

_____ General. A circulation system consisting of pumps, piping, return inlets and suction outlets, filters, and other necessary equipment shall be provided for complete circulation of water.

Turnover

_____ 100% Turnover. Circulation system equipment shall be designed to turn over 100 percent of the nominal pool water volume as specified in table 2.

_____ Turnover time. The system shall be designed to give the proper turnover time based on the manufacturer's recommended maximum pressure and flow of the filter in clean media condition.

_____ Pools shall circulate treated filtered water 24 hours a day.

NOTE – The circulation rate shall be allowed to be reduced during periods the pool is closed for use provided acceptable water clarity conditions are met prior to reopening the pool for public use. At no time shall the circulation rate be zero.

Water clarity

_____ The circulation system shall be capable of maintaining water clarity and chemical distribution requirements.

_____ Water clarity in all pool types shall be maintained such that the main drain is clearly visible and sharply defined or a 6-inch disc of color that is contrasting with the pool floor is clearly visible while resting on the pool floor at the deepest part.

Inspection and repair

_____ Accessibility for service. Circulation system components that require replacement or servicing shall be accessible for inspection, repair, or replacement.

_____ Manufacturer's specifications. Circulation system components that require replacement or servicing shall be installed and maintained in accordance with the manufacturer's specifications.

Code and standards compliance

_____ Codes. Circulation system components shall be installed in compliance with all local codes and laws having jurisdiction.

_____ NSF 50. Circulation systems and equipment that are within the scope of ANSI/NSF 50, Circulation system components and related materials for swimming pools, spas/hot tubs, shall comply with the most recent edition of ANSI/NSF 50.

Prevention of damage from settlement and debris

_____ Pool equipment and related plumbing shall be supported to prevent damage from misalignment and settlement.

_____ Equipment shall be mounted to minimize the potential for the accumulation of debris and moisture, following manufacturer's specifications.

Water velocity.

_____ The water velocity in the pool piping shall not exceed 10 feet per second (305 cm/sec) for discharge piping, 6 feet per second (182.9 cm/sec) for suction piping, and 1-½ feet per second (45.7 cm/sec) flow through the suction grates.

_____ Where copper pipe is used for discharge, the velocity shall not exceed 8 feet per second (243.8 cm/sec).

_____ Pool piping shall be sized to permit the rated flows for filtering and cleaning without exceeding the maximum design head of the pump.

_____ Piping and fittings. The circulation system pipe and related fittings shall meet the following requirements:

- nontoxic;
- shall be considered to be process piping;
- made of material able to withstand operating temperatures, pressures, and operating conditions; and- in accordance with the most recent edition of ANSI/NSF 14, Plastics piping components and related materials.

_____ Pool piping subject to damage by freezing shall be sloped toward drainage valves and be equipped to allow for winterization.

_____ Equipment shall be designed and fabricated to drain the pool water from the equipment, together with exposed face piping, by removal of drain plugs and manipulating valves, or by other methods. The circulation system piping shall be designed to comply with the manufacturer's specifications on draining the equipment and the system.

Gauges

_____ All filtration and treatment systems shall be equipped with a pump suction (vacuum) gauge, pump discharge, filter influent (inlet) gauge, filter effluent gauge, and a flow meter capable of reading flow during filtration and during backwash (if applicable).

_____ Where multiple pools are serviced by a single/central filtration system, suction and pressure gauges and flow meters shall be provided in the supply piping as required at locations to permit monitoring of the flow characteristics to each pool.

_____ Pools shall be provided with an indicator measuring the rate of flow through the filter system with an appropriate range readable in gallons per minute and accurate within 10 percent actual flow.

System testing.

_____ Circulation system piping, other than that integrally included in the manufacture of the pool, shall be subject to an induced static hydraulic pressure test (sealed system) at 25 pounds per square inch (psi) (172.37 kPa) for 24 hours. The test shall be performed before the deck is poured, and the pressure shall be maintained through the deck pour. Compressed air shall not be used for pressure testing.

Filters

Design

_____ Filters shall be sized so that, when operated and maintained according to manufacturer's instructions, the system provides the water clarity noted in the "Water Clarity" section above.

_____ The filter shall be designed so that filtration surfaces can be inspected and serviced.

Standards

_____ Filters shall comply with the most recent edition of ANSI/NSF 50.

_____ Maximum flow rate for types of filters shall not exceed the requirements of the most recent edition of ANSI/NSF 50.

Internal pressure. Pressure-type filters shall be provided a means to permit the release of internal pressure.

_____ Any filter incorporating an automatic air vent as its principal means of air release shall have a lid(s) that provide(s) a slow and safe release of pressure as a part of this design and have manual air releases in addition to automatic releases.

_____ Any separation tank used in conjunction with any filter tank shall have a manual means of air release or a lid that provides a slow and safe release of pressure as it is opened as a part of this design.

_____ The following statement shall be clearly visible and noticeable within the area of the air release: "WARNING, DO NOT START UP THE SYSTEM AFTER MAINTENANCE WITHOUT FIRST OPENING THE AIR RELEASE AND PROPER REASSEMBLY OF THE FILTER AND SEPARATION TANK."

Piping

_____ Piping shall meet the requirements of the most recent edition of ANSI/NSF 50.

_____ Piping furnished with the filter shall be of suitable material and capable of withstanding a pressure 50 percent greater than the maximum pressure the system will be subjected to, typically the shut off head of the pump. The suction piping shall not collapse when there is a complete shutoff of flow on the suction side of the pump.

Pumps and motors

Performance. A pump and motor shall be provided for circulation of the pool water.

_____ The performance of all pumps shall meet the conditions of flow required for filtering and cleaning (if applicable) the filters against the total dynamic head developed by the complete system and to meet the water clarity requirements.

_____ The design, construction, and installation of the pump(s) and component parts shall provide safe operation as per manufacturer's specifications.

_____ All motors shall be properly rated per ANSI/NEMA MG1 to perform satisfactorily and safely under the conditions of load and environment normally encountered in pool installations.

_____ Service factor. Motor(s) shall be capable of operating the pump under full load with a voltage variation of +10 percent from the nameplate rating.

_____ Performance pump curve. The pump supplier shall provide a performance curve for the pump.

_____ If at any point on the pump curve the maximum service factor of the motor is exceeded, the manufacturer shall indicate this on the pump curve.

_____ All motors shall have thermal or current overload protection, either built in or in the line starter, to provide locked rotor and running protection in accordance with NFPA 70.

Location

_____ Accessibility for service. Pump(s) and motor(s) shall be accessible for inspection and service per manufacturer's specifications.

_____ Waterline. Pumps located below the waterline shall have valves installed on suction and discharge lines, in an accessible place, for maintenance and removal of the pump. Pumps not located below the waterline shall be self-priming or the system shall be designed to provide a means for priming.

Codes

_____ ANSI/NSF 50. All pumps and intake strainers shall comply with ANSI/NSF 50.

_____ NFPA 70. Electrical components shall comply with NFPA 70, Article 680. Switching devices shall be installed per NFPA 70, article 680.22, and per the requirements of the authority having jurisdiction.

Anti-entrapment.

_____ The pump shall not be operated if the main drain grate, or anti-entrapment plate, is missing, broken, or loose. The pool or appliance shall be evacuated and closed to bathers until a proper repair or replacement has been accomplished.

Drip-proof enclosure.

_____ All motors shall have, at minimum, an open, drip-proof enclosure as defined by ANSI/NEMA MG1.

Switching devices.

_____ Switching devices on the property shall be located at least 5 feet (152 cm) horizontally from the inside walls of a pool unless separated from the pool by a permanent barrier.

Intake strainers.

_____ With all pressure filter systems, a cleanable strainer or screen shall be provided upstream of the circulation pump(s) to remove solids, debris, hair, lint, etc.

Mechanical seals.

_____ Where a mechanical pump seal is provided, components of the seal shall be corrosion-resisting and capable of operating under conditions normally encountered in pool operation.

Return inlets and suction outlets

Performance.

_____ Return inlets and suction outlets shall be provided and arranged to produce a uniform circulation of water and maintain uniform distribution of sanitizer throughout the pool.

Water velocity

_____ Water velocity throughout the system shall not exceed the following:

- 10 feet per second (305 cm/sec) for discharge piping;
- 6 feet per second (182.9 cm/sec) for suction piping; and
- 1-½ feet per second (45.7 cm/sec) for suction grates.

NOTE – Velocity rates through suction grates shall be permitted to exceed 1-½ feet per second (45.7 cm/sec) if the grate(s) comply with ASME/ANSI A112.19.8M Suction fittings for swimming and wading pools, spas, hot tubs, and whirlpool bathtub appliances.

_____ Flow distribution. Suction system flow through the main drain and skimming systems each shall be designed to accommodate 100 percent of the circulation turnover rate.

_____ When multiple systems are used in a single pool to meet this requirement, each sub-system shall proportionately comply with 9.2.2.

_____ Suction system designs shall be such that the maximum design flow rates cannot be exceeded during normal operation.

Inlets

_____ Minimum. A pool shall have a minimum of two return inlets regardless of pool size. The number of return inlets shall be based on at least one additional return inlet per 300 square feet (27.87 m²) pool surface area, or fraction thereof.

_____ Return inlets shall be sized to provide uniform distribution throughout the pool.

_____ Design. Return inlet(s) and outlets from the circulation system shall be designed so that they do not constitute a hazard to the bather.

_____ Bottom returns

_____ Bottom returns shall be flush with the pool bottom or designed to minimize hazards associated with protrusions.

_____ Bottom returns will be considered to have an area of influence described by a radius of 15 feet (457 cm).

Outlets

_____ Location. All pools shall be provided with main drain suction outlet(s) in the lowest point of the pool floor.

_____ Outlets per pump. A minimum of two hydraulically balanced suction outlets (suction fittings), with covers, per pool pump suction line shall be provided.

_____ A single outlet shall be permitted provided the outlet has at least one dimension (length, width, diagonal, or diameter) that is 24 inches (61 cm) or greater.

_____ Multiple sets of pump suction shall be permitted into two or more common suction outlets as long as they are hydraulically balanced and meet the requirement of “Alternate Designs”, below.

_____ The distance between the suction fittings shall be at least 3 feet (91 cm) if the suction outlets are less than 18 inches x 18 inches (324 square inches) (2,090 cm²) or do not have at least one dimension (length, width, diagonal, or diameter) that is at least 24 inches (61 cm).

_____ When dual suction outlets are used, no piping or valve arrangement is permitted that will isolate one suction fitting as the sole source of fluid to the pump. The single pipe to a pump suction inlet may be valved off to shut off the flow to the pump.

_____ Outlets that measure less than 18 inches x 18 inches. Suction outlets (other than skimmers) that measure less than 18 inches x 18 inches (324 square inches) (2,090 cm²) or do not have at least one dimension (length, width, diagonal, or diameter) that is at least 24 inches (61 cm) shall be provided with covers that have been tested by a nationally recognized testing laboratory and comply with and are stamped or labeled with ASME/ANSI A112.19.8M.

Entrapment avoidance

_____ The suction outlets, including covers, fittings, and hardware, shall be designed in accordance with the manufacturer's specifications to protect against a suction entrapment, evisceration, body entrapment, and hair entrapment/entanglement hazard. (See appendix D, Suction entrapment warning.)

_____ If a main drain grate, or anti-entrapment plate, is missing, broken, or loose, the pool shall be evacuated and closed to bathers until a proper repair or replacement has been accomplished.

Grates

_____ Grates or similar protective devices shall be designed to withstand the anticipated loading of flow velocity.

_____ The pool shall not be operated if any outlet grate is missing, broken, or secured in such a way that it can be removed without the use of tools.

_____ Grates or similar protective devices shall be installed in a manner that does not defeat the safety benefit designed into the device, in accordance with the manufacturer's instructions.

_____ The maximum opening in any grate shall prevent the passage of a ½ inch (12.7 mm) ball.

_____ Barriers shall be provided on caissons for D-1 pools (wave pools). Caisson barriers shall prevent passage of a 4-inch (10 cm) ball.

_____ Alternate designs. Other means, such as vacuum elimination devices, that produce equivalent protection against suction entrapment, evisceration, and hair entrapment shall be permitted. (See CPSC guideline Potential entrapment hazards associated with pools and spas.)

Vacuum fittings

_____ Where provided, vacuum fitting(s) shall be located in an accessible position(s) at least 6 inches (15 cm) and no greater than 18 inches (45.7 cm) below the minimum operating water level or as an attachment to the skimmer(s).

_____ When not in use, all vacuum fitting(s) shall be covered with an automatic closure device that cannot be opened without a tool. Where a skimmer is used for vacuuming, automatic closure is not required.

Surface skimming systems

Function

_____ A surface skimming system shall be provided on all pools.

_____ The surface skimming system shall be designed and constructed to skim the pool surface when the water level is maintained within the operational parameters of the system's rim or weir device.

Hazards

_____ Skimming devices shall be designed and installed so as not to constitute a hazard to the bather.

_____ When equalizer lines are used on skimmers, they shall have an anti-entrapment cover or other entrapment protection in accordance with the most recent edition of ASME/ANSI A112.19.8M.

Skimmer covers.

_____ Skimmer covers located on a walking surface shall meet the following requirements:

- securely seated;
- slip resisting;
- sufficiently strong to withstand normal deck use; and
- does not constitute a tripping hazard.

Automatic skimming devices.

_____ Where automatic surface skimming devices are used as the sole overflow system, at least one surface skimming device shall be provided for each 500 square feet (46.5 m²) or fraction thereof of the water surface area. Recessed areas such as stairs and swimouts shall not be considered in the calculation. When skimmers are used, they shall be located to maintain effective skimming action.

_____ Circulation systems shall be designed to handle 100 percent of the rated circulation volume through skimmers.

_____ Flow rate shall be no less than 3 gallons per minute (GPM) (11.4 L/min) per skimmer per inch of weir width (11.4 l/min per 25 mm of weir).

Recommended provisions.

The recommended provisions for surface-skimming systems are listed in table 3.

Perimeter systems

_____ When perimeter surface skimming systems are used, they shall be connected to the circulation system with a system surge capacity of not less than 1 gallon (3.8 L) for each square foot of pool surface. The water capacity of perimeter overflow system components shall be included in this calculation.

Electrical and illumination requirements

Code

_____ Electrical components shall comply with the requirements of the most recent edition of NFPA 70 and as adopted by the authority having jurisdiction.

Lighting

_____ When a pool is open during periods of low natural illumination, artificial lighting shall be provided so that all areas of the pool, including the bottom main drains, shall be visible.

_____ Overhead or underwater lighting shall be provided to illuminate the pool and adjacent deck areas.

_____ For outdoor pools, overhead lighting shall provide a minimum of 3 foot-candles of illumination at the pool water surface and on the adjacent deck areas. For indoor pools, overhead lighting shall provide a minimum of 10 foot-candles.

Table 3 — Accepted surface skimming systems

Pool type	System
D-1 Wave action	Zero-depth trench may be sole skimming device if at static water level. Other systems permitted.
D-2 Activity	May combine auto skimmers, zero depth trench, gutters as needed.
D-3 Catch	May combine auto skimmers, zero depth trench, perimeter devices.
D-4 Leisure rivers	Single or multiple skimmer devices for skimming flow.
D-5 Vortex	Skimmers are not allowed in the side area.

____ Underwater lighting shall provide a minimum of ½ watt per square foot of pool water surface area.

____ Underwater lighting requirements may be waived if overhead lighting provides a minimum of 15 foot-candles illumination at the pool surface.

Emergency illumination

____ Pools and pool areas that operate during periods of low illumination shall be provided with sufficient emergency lighting to permit evacuation of the pool and securing of the area in the event of a power failure.

____ Emergency lighting, as per the Illuminating Engineering Society, of ½ foot-candle is recommended.

Heaters

Energy sources.

This article pertains to appliances using either fossil fuels such as natural gas, propane (LPG), and fuel oil, or electric heating equipment for heating pool water. Alternative energy systems shall be permitted provided they are designed, constructed, operated, and maintained in accordance with all standards, codes, and regulations that apply to the energy source and the hardware utilized.

Standards

____ For gas application, heaters shall be tested and comply with ANSI-Z21.56.

____ Electric heating appliances shall be installed in accordance with the most recent edition of NFPA 70 or the equivalent code or standard imposed by the authority having jurisdiction.

____ For electrical application, heaters shall be tested and comply with the requirements of UL 1261.

____ Heater(s) shall be installed in accordance with all federal, state, and local codes as well as the manufacturer’s specifications.

____ Heat pumps shall comply with the UL 559 specifications and be accepted by a recognized testing facility.

Temperature

____ The owner/operator shall routinely check the pool water to ensure that the temperature does not exceed 104 °F. If adjustments are necessary, those adjustments shall be performed in accordance with manufacturer's instructions or by a qualified technician.

____ A means shall be provided to monitor the pool and control the water temperature.

Heater sizing.

____ Heaters shall be sized in accordance with the manufacturer's specifications.

Installation

____ The heater shall be installed on a surface with sufficient structural strength to support the heater when it is full of water and operating. The heater shall be affixed securely to minimize movement after plumbing, gas, or electrical connections are completed.

____ If the heater requires a non-combustible surface per the manufacturer, it shall be placed on a cement or other accepted surface per the most recent edition of ANSI-Z21.56 or applicable federal, state, and local codes.

____ All heaters shall be installed and maintained with the minimum clearances to combustibles for which the heater has been tested as specified by the manufacturer.

____ Heaters installed in areas occupied by bathers or employees shall be barriered to prevent accidental human contact with the heater and its piping, stacks etc.

____ The heater shall be grounded and bonded.

Ventilation

____ The heater shall have ventilation in accordance with the manufacturer's recommendations or the authority having jurisdiction.

____ Rooms containing fossil fuel heaters shall be provided with means of ventilation in accordance with federal, state, or local codes and the manufacturer's specifications.

____ The spent gas exhaust from fossil-fueled heaters shall discharge at a location and in a manner to ensure the exhaust is outside any enclosed structure.

_____ The spent gas exhaust from fossil-fueled heaters shall be discharged in a manner that prevents the gas from entering any adjacent or nearby enclosed structure or re-entering the building from which it is discharged.

Mechanical equipment

Natural gas energy

_____ The heater gas supply piping shall comply with the manufacturer's specifications and the most recent edition of NFPA 54.

_____ A gas cock, which is properly sized and readily accessible, shall be installed outside the jacket to stop the flow of natural gas at the heater for service or emergency shutdown.

Propane (LPG)

_____ Where propane (LPG) appliances are used, they shall be installed in accordance with the most recent edition of NFPA 54 and the manufacturer's instructions.

_____ The storage tank, supply piping, and regulator shall be sized to ensure operating fuel pressures as specified by the appliance manufacturer.

_____ Propane appliances located in a pit or enclosed area shall be installed in accordance with the most recent edition of NFPA 54.

_____ A gas cock shall be installed that is properly sized and readily accessible outside the jacket, to stop the flow of propane (LPG) at the heater for service or emergency shutdown.

Heater circulation system

_____ Water flow through the heater, any by-pass plumbing installed, any back-siphoning protection, and the use of heat sinks shall be done in accordance with the manufacturer's specifications and local codes.

_____ When required by the manufacturer, the energy source for the heater shall be turned off prior to stopping the water flow. Mechanisms, such as a "fireman's switch" adapted to the time clock, shall be used to turn the heater off long enough for it to cool down before the time clock turns the pump off.

Water supply

Water quality

_____ General. The water supply serving the pool shall be conditioned in the pool to meet the requirements of article 15 before the pool is opened to the public.

____ Make-up water. Make-up water to maintain the water level and water used as a vehicle for sanitizers or other pool chemicals, for pump priming, or for other such additions to the pool shall be from a potable water source.

NOTE – this shall not be applicable to saline water pools.

Anti-siphon connection.

____ No direct mechanical connection shall be made between the potable water supply and the pool, chlorinating equipment, or the pool piping, unless it is protected against back-flow and back-siphonage in a manner approved by the state or local authority, or through an air gap meeting the most recent edition of ASME/ANSI A112.1.2, or other equivalent means approved by the state or local authority.

Over rim filler.

____ An over-the-rim spout, if used, shall be located under a diving board, adjacent to a ladder, or otherwise properly shielded so as to minimize hazards.

____ The spout open end shall have no sharp edges and shall not protrude more than 2 inches (51 mm) beyond the edge of the pool.

____ The spout shall be separated from the pool water by an air gap at least 6 inches (15 cm) or 1.5 pipe diameters from the pipe outlet to the rim, whichever is greater.

Water level.

____ The pool water level shall be maintained within the specifications of the designer/manufacturer.

Waste water disposal

Permits

____ Backwash water or pool draining water shall be discharged in one of the following ways:

- into a sanitary or storm sewer through an approved air gap; or
- into an approved disposal system on the premises; or
- by other means approved by the authority having jurisdiction.

Waste salvage

____ Filter backwash or cleaning water shall be permitted to be returned to the pool if the backwash water has been filtered to remove particles and chemically treated provided this procedure has been approved by the authority having jurisdiction.

Waste post-treatment

_____ Filter backwash or cleaning water and pool drainage water shall be treated chemically or through the use of settling tanks when necessary to eliminate or neutralize chemicals, diatomaceous earth (DE), or contaminants in the water that exceed the limits set by the state or local effluent discharge requirements.

Sanitizing equipment, chemical feeders

Equipment standards.

_____ Sanitizing equipment shall be certified as in compliance with the requirements of ANSI/NSF 50 and shall be capable of introducing a sufficient quantity of a U.S. EPA-approved sanitizer to maintain the appropriate levels under all conditions of intended use. Equipment shall be certified by a nationally recognized testing laboratory.

_____ Each pool shall be fitted with equipment to feed sanitizers and pH control chemicals. These shall be installed and function in compliance with chemical operation requirements.

_____ Supplemental hand feeding of sanitizing chemicals shall be prohibited when the pool is accessible to the public.

_____ Skimmer baskets shall not be used as chemical feeders when the pool is accessible to the public. Undissolved sanitizer shall not be present within the skimmer basket when the pool is in use.

_____ The pool water shall contain sanitizer residuals at all times as per 15.5, which can be measured by industry-accepted field tests. Only EPA-registered sanitizers with appropriate state registration shall be used.

Chemical controls and feeders. The installation and use of chemical feeders shall conform to the following:

_____ Sanitizer and pH shall be monitored and controlled automatically by suitable devices, which may include ORP measurement or equivalent devices.

_____ Chemical feed and control systems shall be installed in accordance with manufacturer's specifications.

_____ Chemical feed systems shall be installed so they cannot operate unless there is return flow to properly disburse the chemical throughout the pool as designed.

Handholds, rope and float line, depth markers, barriers and other specific safety features

This article shall not be interpreted as presenting an all-inclusive source for safety standards and recommendations for aquatic recreation pools. The designer, builder, and operator shall conduct appropriate investigations to identify safe practices and standards that apply to the operations, equipment, and circumstances of the facility.

Handholds

_____ Pools shall be provided with a handhold around their perimeter in areas where depths exceed 5 feet (152 cm).

_____ Handholds shall be provided no farther apart than 42 inches (107 cm) to include, but not limited to, any one of the following or a combination of the following:

- coping, ledges, or decks along the immediate top edge of the pool. The coping, ledges, or decks shall provide a slip-resisting surface of at least 4 inches (10 cm) minimum horizontal width and shall be located no more than 12 inches (30 cm) above the waterline;
- ladders, stairs, or seat ledges; or
- a secured rope or railing placed at or no more than 12 inches (30 cm) above the waterline.

Rope and float line

_____ Locations. A rope and float line shall be provided for each of the following.

- separate activity areas;
- identify break in grade at depths less than 5 feet (152 cm); and
- identify water depth greater than 4.5 feet (137 cm) in constant floor slope in Class D-2 activity pools.

_____ The rope and float line shall be 1 foot (30 cm) toward the shallow end in each location.

_____ This provision shall not apply to D-1 (wave action pools) or any other pool where the designer stipulates such a line is not required or the line would constitute a hazard.

_____ Class D-1 pools. Class D-1, wave pools, shall be fitted with a float line located to restrict access to the caisson wall.

_____ A rope and float line provided to meet the requirement of this subarticle shall not be used to meet the requirements as described in 16.1.2.

_____ Fastening. If provided, a rope and float line shall be securely fastened to wall anchors of corrosion-resisting materials and of the type that shall be recessed or have no projection that will constitute a hazard when the line is removed.

_____ Size and strength. If provided a line shall be of sufficient size and strength to provide temporary support and a handhold.

_____ Lifelines. Lifelines shall be located 1 foot (30 cm) to the shallow side of the 5 foot (152 cm) depth mark.

Depth markers

_____ Vertical and horizontal. Depth of water shall be plainly and conspicuously marked at or above the waterline on the vertical pool wall and on the top of the coping or edge of the deck or walk next to the pool.

_____ Depth markers on the vertical pool wall shall be positioned to be read from the water.

_____ When standard placement of the marking on tiles causes the marking to be submerged, the marking shall be located so it is not submerged more than 25 percent of the height of the marking and so that the marking shall be clearly visible.

_____ Size of characters. Depth marker characters shall have a 4 inch (10 cm) minimum height. Characters shall be of contrasting color to the background on which they are applied, and the color shall be of a permanent nature.

_____ Feet/meters. Depth of water shall be marked in feet or inches. In addition the depth of water may also be displayed in meters as required by the local authority having jurisdiction.

_____ When water depths are posted in both feet and meters, the markings for each unit shall be distinctive to minimize guest confusion.

_____ Lettering shall either spell out feet or inches or abbreviate Ft., In., or feet to the nearest inch. In addition, the depth of water may also be displayed in meters. Lettering for meter depth markers may be spelled out "Meters" or abbreviated "m."

_____ Water depths 5 feet or less. Depth markers for water depths of 5 feet (152 cm) or less shall indicate the actual pool depth within 3 inches (76 mm), at normal operating water level when measured 3 feet (91 cm) from the pool wall at the location of the marker.

_____ Water depths greater than 5 feet. Depth markers for water deeper than 5 feet (152 cm) shall indicate the actual pool depth as measured at a location measured from the wall equal to 60 percent of the nominal pool depth and at the location of the depth marking.

_____ Maximum/minimum. Depth markers shall be installed at the maximum and minimum water depths and at all points of slope change.

_____ Slope changes. Where slope changes or changes in water depth, or both, do not occur near a pool wall or in-water structure that can accommodate

required markings, signage shall be posted warning bathers that deeper water or irregular floor shapes occur within the pool.

____ Intermediate depths. Depth markers shall be installed around the perimeter of the pool at intermediate increments of water depth not to exceed 2 feet (61 cm) and shall be spaced at increments less than 25 feet (762 cm).

____ Irregularly shaped pools. Depth markers on irregularly shaped pools shall designate depths at all major deviations in depth.

Deck markers

____ Depth markers on the deck shall be within 18 inches (45.7 cm) of the water edge and positioned to be read while standing on the deck facing the water along the affected parameter.

____ Horizontal depth markers shall be slip resisting.

No diving signs

____ Pools having depths of 5 feet (152 cm) or less shall have “NO DIVING” signs and the universal “NO DIVING” symbol entirely above the actual waterline on the deck at intervals of no more than 25 feet (762 cm). The sign and the symbol shall be posted.

____ “NO DIVING” marker characters and the universal “NO DIVING” symbol shall not be less than 4 inches (10 cm) in height.

____ “NO DIVING” marker characters and the universal “NO DIVING” symbol shall be of a color contrasting with the area of installation.

Barriers.

____ Pool complexes shall be separated from surrounding property by a fence, wall, building, vegetation, or assigned staff or as required by the authority having jurisdiction.

____ Natural or artificial barriers, when provided, shall meet the following requirements:

- shall be configured to discourage unauthorized entry;
- shall be configured to afford no external handholds or footholds; and
- shall be at least 4 feet (122 cm) in height.

____ Gates. Barrier gates, when provided, shall be provided with hardware for locking.

____ Gates at unstaffed barriers in public areas, when provided, shall open outward.

_____ Gates at unstaffed barriers in public areas, when provided, shall be equipped with a self-closing, positive self-latching closure mechanism at a minimum height of 45 inches (114 cm) and a maximum height of 54 inches (137 cm) above the ground in conformance with ADAAG.

_____ Multiple pools. Except as provided in “Toddler areas” below, one barrier may surround multiple pools at one facility.

_____ Toddler areas. A barrier shall be provided to separate areas designed for use by infants or toddlers from a pool with water depth in excess of 24 inches (61 cm) if not staffed by lifeguard personnel.

Restroom and sanitary facilities

Restrooms provided.

_____ Sanitary facilities shall be provided unless such facilities are provided in connection with the general development for other purposes and are in close proximity to the pool.

_____ Codes. Dressing and sanitary facilities shall be in accordance with ANSI/ICC A117.1, Standard on accessible and useable buildings and facilities, and applicable local codes and ordinances.

_____ Lighting and construction. The rooms shall be well lighted, drained, ventilated, and constructed with impervious materials. They shall be developed and planned so that proper sanitation can be maintained throughout the building at all times.

_____ Partitions. Partitions between portions of the dressing room area, screen partitions, shower, toilet, and dressing room booths shall be of durable material and shall be designed to permit thorough cleaning of the walls and floors.

Floors

_____ Floors shall have a slip-resisting surface that allows the surface to be effectively cleaned.

_____ Floor drains shall be provided, and floors shall be sloped not less than ¼ inch per foot (6.4 mm/m) toward the drains to ensure positive drainage.

_____ Hose bibs. Hose bibs with vacuum breakers and hose shall be provided for flushing down the interior of all dressing facilities.

_____ Servicing of restrooms. Each restroom shall be serviced at intervals to maintain sanitary walls, counters, floors, and fixtures.

_____ Instructions for bathers. Instructions shall be posted in each restroom to direct guest action for notification of personnel having authority should there be unsanitary conditions between regular service intervals.

Fixtures

_____ Fixtures shall be installed in accordance with local plumbing codes and shall be properly protected against back-siphonage.

_____ Fixtures shall be designed and installed so that they are readily cleanable and not damaged by frequent cleaning and disinfecting.

_____ Number of fixtures. Lavatories, showers, and toilets for pools shall have the capacity to meet or exceed the following general requirements. The minimum number of sanitary facilities shall be as follows:

_____ Facilities having less than 7500 gross square feet (697 m²) water area shall provide one sanitary unit.

NOTE – When the calculation results in fractional components the actual number of components shall be the next highest integer.

_____ The minimum number of sanitary facilities shall be one sanitary unit per 7500 gross square feet (697 m²) of water available for bather access.

NOTE – When the calculation results in fractional components the actual number of components shall be the next highest integer.

_____ Sanitary units. A sanitary unit shall consist of the following components:

- 0.7 male water closets;
- 1.0 male urinal;
- 0.85 lavatories for males;
- 1.0 showers for males;
- 2.0 female water closets;
- 1.0 lavatory for females; and
- 1.0 showers for females.

Showers

_____ This standard shall permit up to half of the shower units to be located on the pool deck or at the pool entrance.

_____ At least half of the showers counted in a sanitary unit shall be heated to comply with showerhead water temperature requirements below.

_____ When heated water showers are provided, the shower water supply shall be controlled by an anti-scald device.

_____ The water heater and thermostatically controlled mixing valves shall be inaccessible to bathers.

_____ The water supply shall be capable of providing a minimum of 2 gallons (7.6 L) per minute of water to each shower head.

_____ At each showerhead the heated shower water temperature shall not exceed 120 Deg F (49 Deg C) and shall be at least 90 Deg F (32 Deg C).

Soap dispensers

_____ Soap dispensers providing either liquid or powdered soap shall be provided in each restroom.

_____ The dispenser shall be of all metal or plastic type with no glass permitted in these units.

_____ Reusable cake soap shall not be provided.

_____ Toilet tissue. Toilet paper holders and papers shall be provided at each water closet.

_____ Lavatory mirror. If mirrors are provided, they shall be shatter resistant.

_____ Sanitary napkins

_____ Sanitary napkin receptacles shall be installed in toilet stalls and shower areas designated for female bathers.

_____ Sanitary napkin dispensers shall be provided in female restrooms.

_____ Infant care. Baby-changing tables shall be provided in all restrooms equipped with two or more sanitary units.

Entries/exits, stairs and ladders, swimouts, and benches

_____ Entry/exit locations shall be in accordance with table 4.

Restrictions.

_____ Because the location of entry and exit steps, ramps, ladders, and other devices can affect the safety and well-being of bathers, the following restrictions shall be applied.

_____ Entry/exit required. A means of entry/exit shall be provided at the designated ingress and egress points of all pools.

_____ The means of entry/exit may consist of a ramp or beach entry, pool stairs, or ladders.

_____ When provided, a second means of entry/exit shall consist of one of the following:

- steps;
- stairs;
- ladders with grab rails;
- treads (recessed);
- ramps;
- beach entries;
- swimouts; or
- other designs that provide the minimum utility as specified in this standard.

_____ Natural mode of entry/exit. Where the distance from the pool floor to the top of the wall is 24 inches (610 mm) or less, such areas shall be considered as providing their own natural mode for entry/exit.

Table 4— Entry and exit requirements

Pool type	Function	Entry and exit requirements
D-1	Wave pool	Bather ingress prohibited at all areas except beach end. Side and end wall passage may be utilized for egress only.
D-2	Activity pools	Ingress/egress determined by pool designer.
D-3	Catch pools	Entry prohibited from deck areas. Egress by ladder steps or ramps as determined by designer. See table 3.
D-4	Leisure rivers	Ingress/egress prohibited except at designated locations established by the designer.
D-5	Vortex pools	No ingress/egress except at designer-designated location
NOTE – Pools shall have entrance and exit configurations to meet lifeguard/staff functions.		

Provisions for diving.

_____ If diving facilities are part of the attraction or pool complex, entries, exits, pool stairs, ladders, underwater benches, special features, and other accessories shall be located outside the minimum diving water envelope as defined by ANSI/NSPI-1.

_____ Slip resisting treads. All treads shall have slip-resisting surfaces.

_____ Beach entry, zero-depth entry, and sloping entries. The shallow end for beach entries and sloping entries shall conform to the following requirements.

_____ Slope of 1:12. Sloping entries used as a pool entrance shall not exceed 1 foot in 12 feet (30 cm/366 cm).

_____ Use with steps. Sloping entries are permitted in conjunction with steps and benches.

_____ Where benches are used in conjunction with sloping entries, the vertical riser distance shall not exceed 12 inches (30 cm).

_____ For steps used in conjunction with sloping entries all requirements of 21.3 shall apply.

_____ Slip-resisting surfaces. Beach and sloping entry surfaces shall be slip-resisting to a water depth of at least 18 inches (46 cm).

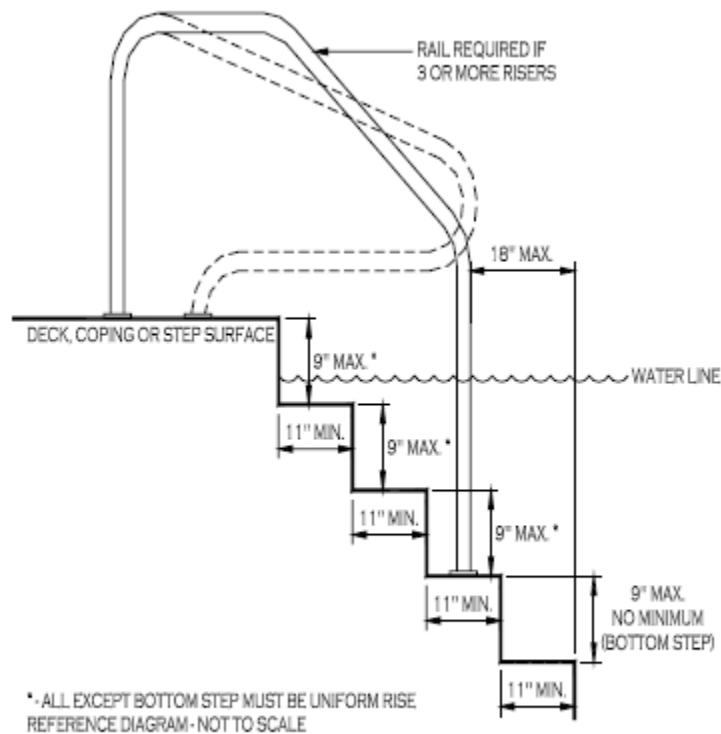


Figure 1 – Pool stairs side view

Pool stairs. The design and construction of stairs into the shallow end and recessed pool stairs shall conform to the following requirements.

_____ Uniform height of 9 inches. Except for the bottom riser, all risers at the centerline shall have a maximum uniform height of 9 inches (23 cm). The bottom riser height shall be allowed to vary from the other risers as may be required to meet the floor.

_____ Distance from coping or deck. The vertical distance from the pool coping, deck, or step surface to the uppermost tread shall be a maximum of 9 inches (23 cm).

_____ Color to mark leading edge. The leading edge of all steps shall be distinguished by a color contrasting with the color of the steps and pool floor.

_____ Stairs in water depths over 48 inches. Stairs that are located in water depth over 48 inches (122 cm), shall have the lowest tread located below the deck at a depth no less than 48 inches (122 cm) below the deck.

_____ Tread dimensions

_____ Horizontal depth. Treads shall have a minimum unobstructed horizontal depth of 11 inches (28 cm) (see figure 1).

_____ Surface area. Treads shall have a minimum unobstructed surface area of 240 square inches (1,548 cm²).

Pool ladders. Design and construction of ladders shall conform to the following requirements.

_____ Slip resisting. All ladder and stair treads shall have slip-resisting surfaces.

Handrails

_____ Ladders shall provide two handrails or handholds.

_____ The clear distance between ladder handrails shall be 17 inches (43 cm) minimum and 24 inches (61 cm) maximum.

_____ Clearance between ladder and wall. There shall be a clearance of 3 inches (76 mm) minimum and 6 inches (15 cm) maximum between the pool wall and the ladder.

Treads

_____ There shall be a uniform distance between ladder treads, with a 7 inches (17.8 cm) minimum distance and 12 inches (30 cm) maximum.

_____ Ladder treads shall have a minimum horizontal uniform depth of 2 inches (51 mm).

Recessed treads. The design and construction of recessed treads in the pool wall shall conform to the following requirements.

_____ Slip resisting. All recessed treads shall have slip-resisting surfaces.

_____ Vertical spacing. Recessed treads at the centerline shall have a uniform vertical spacing of 7 inches (17.8 cm) minimum and 9 inches (23 cm) maximum.

_____ Distance to coping or deck. The vertical distance between the pool coping edge, deck, or step surface and the uppermost recessed tread shall be 9 inches (23 cm) maximum.

_____ Dimensions. Recessed treads shall have a depth of 5 inches (13 cm) minimum and a width of 12 inches (30 cm) minimum.

_____ Handrail. Recessed treads shall be provided with a handrail, grab rail, or handhold on each side of the treads.

_____ Draining. Recessed treads shall drain into the pool.

Handrails

_____ Dimensions. Handrails shall be between 34 inches (86 cm) and 38 inches (97 cm) above the ramp or step surface.

_____ Material. Handrails shall be made of corrosion-resisting materials.

_____ Nonremovable. Handrails shall be installed so they cannot be removed without the use of tools.

_____ Distance from bottom riser. The leading edge of handrails/handholds facilitating stairs and pool entry/exit shall be \pm 18 inches (46 cm) from the vertical face of the bottom riser.

_____ Diameter. The outside diameter/width of handrails shall be a minimum of 1- $\frac{1}{4}$ inches (32 mm) and shall not exceed 1- $\frac{1}{2}$ inches (38 mm).

Swimouts

_____ Swimouts shall be located completely outside of the perimeter's shape of the pool.

_____ Swimouts shall be allowed in the deep end and the shallow end of the pool.

_____ A minimum unobstructed surface equal to that required for the top tread of the pool stairs shall be provided. (See 21.4.5). No other restrictions on sizes apply.

_____ When used as an entry/exit access, swimouts shall be provided with a step to meet the pool stair requirements (see 21.4).

_____ The horizontal surface of swimouts shall be 20 inches (51 cm) maximum below the water line.

_____ Color marking. The leading edge of swimouts shall be visually set apart by a stripe in a contrasting color.

Underwater seats and benches

_____ Seats and benches shall be located completely inside of the perimeter shape of the pools.

_____ Underwater seats shall not be located in the area of the pool where diving equipment (manufactured or constructed) is installed.

_____ A minimum unobstructed surface 10 inches (25 cm) minimum front-back dimension and 24 inches minimum (610 mm) wide shall be provided.

_____ Underwater seats and benches shall not be used as an entry or exit.

_____ Underwater seats and benches are allowed in conjunction with pool stairs.

_____ The horizontal surface of seats and benches shall be 20 inches (51 cm) maximum below the water line.

_____ The leading edge of seats and benches shall be visually set apart by a stripe in a contrasting color.

_____ The top surface of seats and benches shall be slip resisting.

Decorative objects and structures

_____ Decorative objects and structures intended for guest contact such as climbing, walking, and hanging on shall be permitted in pools subject to the provisions of this sub-section. The design, construction, and operation of these structures are outside the scope of this standard.

_____ Structures and objects not intended for bather contact shall be either barriered or supervised to prevent bather contact.

_____ When these objects and structures are located in pools the objects and structures shall not obstruct the lifeguard's surveillance of the pool bottom.

_____ Floating devices not intended to be mobile shall be anchored in a manner to restrict movement to the range established by the designer. Anchoring means floating devices shall be configured to minimize circumstances of possible entrapment of bathers, bodies, hair, limbs, or appendages should they come in contact with any element of the floating device or its anchors.

_____ Rafts, tubes, noodles, and other personal use devices, whether provided by the park or not, that are intended for moving flotation are not subject to 21.10.1.3.

Entry and exit requirements for persons with disabilities

_____ ADAAG Aquatic recreation facilities shall provide access for persons with disabilities in accordance with the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Recreation Facilities (ADAAG).

_____ Pools or attractions employing wave action, surging water, moving water for user transport, injected air or water, and transported riders shall be evaluated to determine the safest option for access.

_____ Sidewall openings, curbs, corners, and buttresses, if used to provide access, shall be arranged such that they will not change the dynamic balance of the pool or attraction.

_____ There shall be no permanent or temporary placement of access devices or their components within the perimeter of any wave pool, leisure river, or vortex pool while the water is in motion.

_____ Water motion occurring due to pumps provided for water treatment and circulation shall not be part of the consideration.

_____ Portable access equipment shall be permitted to serve multiple pool locations.

_____ Number of accessible points. Pools intended for entry from or exit to deck levels shall have one accessible means of ingress or egress as applicable. Pools having more than 300 feet (91 m) of usable and unusable perimeter shall have two provisions for accessibility in accordance with ADAAG.

_____ Type D-1 wave pools shall provide accessible ingress and egress only from the area commonly identified as the beach end. The zero depth shallow end and sidewall handholds shall meet all requirements for access to wave pools.

_____ Type D-2 activity pools shall not be equipped for accessible ingress and egress at perimeter areas where the pool water depth is greater than 4.5 feet deep (137 cm) if access is available by beach (zero depth) entry.

_____ Type D-3 catch pools shall not be required to provide accessible entry from the deck.

_____ Type D-4 leisure rivers shall have at least one accessible entry point in accordance with ADAAG. In accordance with ADAAG, if there is more than one entry point and more than 300 linear feet (91 m) of pool edge, an additional means of access shall be provided.

_____ Type D-5 vortex pools shall provide access within the confines of the standard entry well.
No public access shall be permitted at the perimeter of the vortex component.

_____ Type D-5 vortex pools shall provide access within the confines of the standard entry well.
No public access shall be permitted at the perimeter of the vortex component.

Appendix B – Glossary

Definition

Abrasion Hazard: A surface that presents an unreasonable risk of irritation to the skin upon contact.

Accessible: 1. Easily and readily exposed for inspection and the replacement of materials and/or parts with the use of tools. 2. Methods providing access to persons with disabilities.

Acid: A liquid or dry chemical used to lower the pH and/or alkalinity of pool or spa water.

Acid Demand: A measure of the amount of acid required to lower the pH to a desired level.

Acid Demand Test: Acid of known strength is added in increments to a measured water sample to determine the amount of acid necessary to make an adjustment in a pool to achieve the desired pH.

Acidic: Having a pH below 7.0. Opposite of basic.

Acid Wash: A procedure using an acid solution to clean an interior surface of a pool with subsequent neutralization of the acid.

Acrylic: A thermoplastic material that can be extruded, injection molded, or vacuum formed into usable shapes and surfaces.

Action Pool: A wave pool in which standing waves are generated in an assortment of patterns.

Activated Carbon: A charcoal-like material used to remove colors, odors, and/or excess oxidizer from water.

Activity Pool: Any pool designed primarily for play activity that uses constructed features and devices including lily pad walks, flotation devices, small slide features, and similar attractions.

Admixture: A material (other than aggregate, cement, or water) added in small quantities to concrete to produce some desired change in properties.

Adult Supervision: A situation whereby a child at rest or play is within the constant sight and hearing of an adult charged with safeguarding the child. Such supervision must be of a nature that is uninterrupted — without absences, voids, or distractions that separate adult from child by distance, obstacles, or any hindrance to sight and sound communication.

AF: See Alkalinity Factor.

Aggregate: Marble dust, sand, rocks, pebbles, colored quartz, dolomite, and other similar materials used as components of concrete or plaster.

Aggressive Water: Water that is corrosive because it is low in pH, and/or calcium hardness, and/or alkalinity.

Air Blower: A device that produces a continuous flow of air.

Air Channel: A system whereby a volume of air is introduced into hollow ducting built into a spa floor, bench, or other location. The air channel is activated by a separate air power unit (blower).

Air Control: A means for spas and hot tubs to regulate air flow in the air induction system, increasing or decreasing hydrotherapy action. **Air Entrainment:** Process in which minute air bubbles, ranging in size from 0.01 inches (0.25 mm) to 0.001 inches (0.03 mm) are mixed in a concrete mortar mix. Improves workability and frost resistance of the mix.

Air Induction System: A system whereby a volume of air is introduced into hollow ducting built into a spa floor, bench, or hydrotherapy jets.

Air Switch System: An isolated device that utilizes a pulse of air sent down a tube to remotely operate electrical equipment.

Algae: Microscopic plant-like organisms that contain chlorophyll.

Algicide: Any chemical or material that kills algae. ALGAECIDE.

Algistatic: Able to inhibit the growth of algae.

Alkali: A term applied to bases, usually carbonates, bicarbonates, and hydroxides, that raise the pH and alkalinity when added to water.

Alkaline: Having a pH above 7.0.

Alkalinity: See Total Alkalinity.

Alkalinity Factor (AF): Used to calculate the saturation index of water.

Alum (Aluminum Sulfate) (Al₂SO₄)₃: A compound used to cause suspended solids in the water to form filterable masses (flocculate).

Alteration: See Remodel and Renovate.

Ammonia (NH₃): A chemical compound of hydrogen and nitrogen that combines with free chlorine in pools to form chloramines or combined chlorine. It also combines with free bromine to form bromamines.

Amperage: The strength of a current of electricity expressed in amperes.

Ampere (Amp): A unit of electrical current that is equivalent to a flow of one coulomb per second

or to the steady current produced by one volt applied across a resistance of one ohm. It also applies to the strength of a current of electricity expressed in amperes.

Amphoteric: Having the ability to serve as either an acid or a base.

Analog Meter: A testing device in which a needle is used to indicate readings on the dial face.

Ancillary Facility: Area used in conjunction with, or the operation of, a pool such as public dressing, locker, shower, or bathroom area, equipment room, pool deck area or building space intended to be used by pool users.

Antivortex Drain Cover (Antivortex Plate or Cover): A plate or cover that is affixed to the main outlet of a swimming pool or spa that prevents a vortex from forming as water passes through to the main outlet.

Aquatic Recreation Facility: A facility that is designed for free-form aquatic play and recreation. The facilities may include, but are not limited to, wave or surf action pools, leisure rivers, sand bottom pools, vortex pools, activity pools, inner tube rides and body slides, and interactive play attractions.

Available Chlorine: A rating of a chemical's total chlorine content based on a comparison to elemental (gaseous) chlorine having 100% available chlorine.

Backboard: Device for immobilizing a person with a suspected injury to the spinal column.

Back Pressure: Resistance to flow, normally expressed in pounds per square inch (kilograms per square centimeter).

Backwash: The process of cleansing the filter medium and/or elements by the reverse flow of water through the filter.

Backwash Cycle: The time required to backwash the filter medium and/or elements and to remove debris in the filter vessel.

Backwash Rate: The rate of water flow through the filter media per unit of area (U.S. gallons/minute/square feet) of effective filter area. One U.S. gallon per minute per square foot is equivalent to 40.75 liters per minute per square meter.

Bacteria: Single-celled microorganisms of various forms, some of which cause infections or disease.

Bactericide: Any chemical or material that kills bacteria.

Balance: In pools and spas, used to refer to a condition of the water that is neither scaling nor corrosive.

Ball Valve: A device that can partially or totally obstruct the flow of water, using a ball-shaped diverter.

Barrier: A means to limit, delay, or restrict access to a pool, spa, or hot tub. (Refer to ANSI/IAF-8, Model barrier code for residential swimming pools, spas, and hot tubs, latest edition.)

Base: A chemical used to raise pH and/or total alkalinity of pool or spa water.

Base Demand: A measure of the amount of alkaline material required to raise pH to a predetermined level. This can be accomplished by use of a base demand test, whereby a standard base is added by drop to the pH test solution until the desired pH is reached.

Basic: Having a pH above 7.0. Opposite of acidic.

Bather: Any person using a pool, spa, or hot tub and adjoining deck area for the purpose of water sports, recreation, therapy or related activities. **USER.**

Bather Load: The number of persons in the pool/spa water at any given moment or during any stated period of time. **SWIMMER LOAD.**

Batter Board: One of two horizontal boards nailed to a post set up near the proposed corner of an excavation. Cord is attached for locating the exact corner of the excavation.

BCDMH (Bromo Chloro-Dimethyl Hydantoin) Products: Sanitizer product that is used to generate available bromine. Contains available bromine and available chlorine.

Beach Entry: Sloping entry starting above the water line at deck level and ending below the water line. (Does not refer to sand only). **ZERO ENTRY.**

Beginner's Area: Those areas in pools that are three feet (3') (0.91 meters) or less in water depth.

Bench (Underwater): See Seat.

Bentonite: Highly absorptive and compressible clay material tamped into place to restrict water seepage or suspended in water slurry to keep earth from falling into an excavation.

Biofilm: A community of microorganisms such as bacteria, algae, or fungi that are encased in a gelatinous matrix and usually attached to surfaces. The matrix protects the microorganisms from harsh environmental conditions and confers greater resistance to sanitizers and algicides. **SLIME.**

Bleach (NaOCl): Sodium hypochlorite. A chlorine source that typically has between 5% and 16% available chlorine. **LIQUID CHLORINE.**

Bleeder Valve: A device that allows air to be vented from a system.

Blister: An area of raised surface detached from the structural matrix of a material.

Body Coat: A layer of diatomaceous earth or similar materials on a filter element that acts as the filtering media.

Body Feed: A controlled amount of diatomaceous earth or similar materials that is continuously added to the filter element during the course of a filter run to help maintain filter porosity.

Bond Beam: Traditional extra-structural strength or rigidity provided along the top edge of a pool wall.

Bond Failure: Failure of plaster or other surfaces to adhere to the underlying subsurface; delamination.

Bonding, Electrical: The joining of metallic parts to form an electrically conductive path that will ensure electrical continuity.

Booster Pump System: A pump that is completely independent of the filtration and heating system. Used to provide support for hydrotherapy jets, cleaning systems, and gas chlorinators, or special water features.

Bottom Rail: The lower portion of an aboveground pool frame used as a structural retainer for aboveground pool wall.

Break In Grade: Occurs when the slope of the pool floor changes to a greater slope.

Breakpoint Chlorination: The addition of a sufficient amount of chlorine to water to destroy the combined inorganic chlorine present. Normally, the amount added is equal to ten times or more the combined chlorine concentration.

Bridging: Build-up of a body coat on diatomaceous earth filter elements to the point where the body coats of two adjacent elements touch.

Broadcast: A method of applying chemicals in a pool or spa by spreading them uniformly over the water surface.

Bromamines: Bromine-ammonia compounds exhibiting sanitizing properties similar to hypobromous acid.

Bromide: A salt that contains a bromide (Br^-) ion. Bromide becomes hypobromous acid when it reacts with oxidizers such as chlorine, ozone, or persulfates.

Bromine (Br_2): One of several chemicals that yield hypobromous acid when added to water.

Bromine Feeder: A device to add or deliver bromine sanitizer at a controlled rate.

Bromine Generator: See Electrolytic Chlorine/Bromine Generator.

Brown Coat: First coat of plaster applied with a fairly rough texture prior to the finish coat.

BTU: British thermal unit. A unit of measurement used to define the capabilities of heaters. One

BTU is capable of raising the temperature of one pound of water by one degree Fahrenheit. One BTU is capable of raising the temperature of one kilogram of water by 1.22 degrees Celsius.

Buffer: Chemical that when dissolved in water will resist pH change. Also a chemical solution used to calibrate pH instrument.

Bullnose: 1. A convex rounding of an object. 2. A brick, stone, or coping with a rounded edge.

Burner: The component of the heater where the combustion of fossil fuel takes place.

Bypass Valve: A valve used to limit or adjust the amount of water flowing through a device in a bypass loop to divert flow to an alternate plumbing path.

Calcification: Formation of calcium carbonate on walls of pools or pipes, or in a filter or heater, due to low solubility of calcium salts.

Calcium Carbonate (CaCO₃): An insoluble calcium compound that is the major component of scale. CaCO₃ occurs normally in limestone, marble, various eggshells, seashells, etc.

Calcium Chloride (CaCl₂): A soluble white salt used to raise the calcium hardness of pool and spa water.

Calcium Hardness: A measure of the amount of calcium dissolved in water and expressed in parts per million (ppm) or milligrams per liter (mg/L) as calcium carbonate.

Calcium Hardness Factor (CF): Used to calculate the saturation index of water.

Calcium Hypochlorite (Ca(OCl)₂): A solid white form of chlorine found in both granular and tablet forms (65% - 78% available chlorine).

Cantilever: A projecting beam supported only at one end.

Capacitor: A device that consists essentially of two conductors (such as parallel metal plates) insulated from each other by a dielectric and that introduces capacitance into a circuit, stores electrical energy, blocks the flow of direct current, and permits the flow of alternating current.

Carbon Dioxide (CO₂): Common gas found in air. Can be used to lower pH in a pool.

Cardiopulmonary Resuscitation (CPR): A lifesaving technique involving both chest compressions and mouth-to-mouth breathing, to circulate oxygen and blood to vital organs.

Cartridge: A replaceable porous element designed to retain suspended particles from water. **Cartridge Filter:** A filter that utilizes a porous element that acts as a filter medium.

Catch Pool: A pool or designated section of a pool used as a terminus for waterslide flumes. See Splash Pool.

Caustic: Sodium hydroxide, lye; used in pools, an extremely high pH alkalizer; referring generally to high pH.

Caustic Soda (NaOH): Sometimes called caustic sodium hydroxide or lye. A highly alkaline substance sometimes used to raise pH.

Caution: See Signal Word.

Cavitation: Formation of partial vacuums when the pump capacity exceeds water replacement supply.

Cement: A powdered substance of lime and clay generally mixed with water and aggregate to make concrete.

Centrifugal Force: The outward force exhibited by a circular motion.

Centrifugal Pump: A pump to circulate water using an impeller, powered by an electric motor or gasoline engine. The centrifugal force of the spinning impeller creates the flow through the pump.

CF: See Calcium Hardness Factor.

CFU (colony forming units): Used to express the concentration of microorganisms per unit of volume, most often as CFU per ml of bacteria in water.

CFM: Cubic feet per minute (of air). One cubic foot per minute is equivalent to 0.03 cubic meters per minute.

Channelization: The undesirable process whereby filter sand is permeated by tubes or channels of calcified or oily material allowing water to pass freely, without filtration.

Check Valve: A valve allowing flow in one direction and obstructing flow in the other direction.

Chelating Agent: A chemical used to bind (sequester) metals dissolved in water, to prevent them from precipitating and staining pool surfaces.

CHELANT.

Chemical Feeder: A device (floating or mechanical) for adding a chemical to pool or spa water.

Chemical Feeder Output Rate: Amount of chemical or active ingredient delivered by a feeder per unit time (for example, pounds of chlorine per hour). One pound per hour is equivalent to 0.45 kilograms per hour.

Children's Pool/Ride: Ride, flume ride, or other slide attraction, at a water theme park, designed primarily for the use of small children.

Chine: That portion of the stave of a hot tub below the bottom of the croze.

Chine Joist: A brace that provides support to the floor of a hot tub.

Chloramines: They are formed when free chlorine combines with nitrogen-containing compounds (for example: perspiration, ammonia). These compounds can cause eye and skin irritation, have strong objectionable chlorine-type odors, and low sanitizing capability. COMBINED CHLORINE.

Chlorinated Isocyanurates (ISOS): Sanitizer products that are self-stabilizing due to release of free available chlorine and cyanuric acid when they dissolve.

Chlorinator: A device to add or deliver a chlorine sanitizer at a controllable rate.

Chlorine: See Calcium Hypochlorite, Sodium Dichlor, Isocyanurates, Sodium Hypochlorite, and Trichloro-Iso-Cyanurate.

Chlorine Demand: The amount of chlorine that will be consumed by readily oxidizable impurities in pool or spa water.

Chlorine Gas (Cl₂): A gaseous form of chlorine used to sanitize pools and spas; contains 100% available chlorine.

Chlorine Generator: See Electrolytic Chlorine/ Bromine Generator.

Chlorine Neutralizer: A chemical used to reduce chlorine residuals.

Chlorine Residual: See Residual.

Circuit: The complete path of an electric current.

Circuit Breaker: A device designed to open and close an electrical circuit manually and to open a circuit automatically at a predetermined level, thus providing protection to the wiring and electrical components.

Circulation Equipment: The components of a circulation system.

Circulation System: The mechanical components that are a part of a recirculation system on a pool or spa. Circulation equipment may be, but is not limited to, categories of pumps, hair and lint strainers, filters, valves, gauges, meters, heaters, surface skimmers, inlet/outlet fittings, and chemical feeding devices. The components have separate functions, but when connected to each other by piping, perform as a coordinated system for purposes of maintaining pool or spa water in a clear and sanitary condition.

Clarifier: A chemical that causes fine suspended solids in water to combine into filterable clusters. See Flocculant.

Clarity: The degree of transparency of pool water. Characterized by the ease with which an object can be seen through a given depth of water.

Cleat: See Kicker.

Coliform Bacteria: Bacteria found in the intestines and fecal matter of warm-blooded animals. The detection of coliforms is used to indicate the possibility of disease-causing bacteria.

Collector, Solar: An assembly of components used to collect solar energy for heating, i.e., rooftop structure, floating devices, etc.

Combined Chlorine: COMBINED AVAILABLE

CHLORINE. See Chloramines.

Commercial/Public Pool: Any pool, other than a residential pool, that is intended to be used for swimming or bathing and is operated by an owner, lessee, operator, licensee, or concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/IAF-1, Standard for public swimming pools, latest edition).

Commercial/public pools shall be further classified and defined as follows:

Class A, Competition Pool: Any pool intended for use for accredited competitive aquatic events such as La Federation Internationale De Natation Amateur (FINA), U.S. Swimming, U.S. Diving, National Collegiate Athletic Association (NCAA), National Federation of State High School Associations (NFSHSA), etc. The use of the pool is not limited to competitive events.

Class B, Public Pool: Any pool intended for public recreational use.

Class C, Semi-Public Pool: Any pool operated solely for and in conjunction with lodgings such as hotels, motels, apartments, condominiums, etc.

Class D, Other Pool: Any pool operated for medical treatment, therapy, exercise, lap swimming, recreational play, and other special purposes, including, but not limited to, wave or surf action pools, activity pools, splasher pools, kiddie pools, and play areas.

Class D-1, Wave Action Pools: Wave action pools include any pool designed to simulate breaking or cyclic waves for purposes of general play or surfing.

Class D-2, Activity Pools: Activity pools are those pools designed for casual water play ranging from simple splashing activity to the use of attractions placed in the pool for recreation.

Class D-3, Catch Pools: Catch pools are bodies of water located at the termination of a manufactured waterslide attraction provided for the purpose of terminating the slide action and providing a means for exit to a deck or walkway area.

Class D-4, Leisure Rivers: Manufactured streams of near-constant depth in which the water is moved by pumps or other means of propulsion to

provide a river-like flow that transports bathers over a defined path that may include water features and play devices.

Class D-5, Vortex Pools: Circular pools equipped with a method of transporting water in the pool for the purpose of propelling riders at speeds dictated by the velocity of the moving stream.

Class D-6, Sand Bottom Pools: Pools that use sand as an interior floor finish over an impervious surface and are equipped to treat and filter the water in the sand areas to maintain a healthful sand condition.

Class D-7, Interactive Play Attractions: Manufactured devices using sprayed, jetted, or other water sources contacting the bathers and do not incorporate standing or captured water as part of the bather activity area.

Class D-8, Amusement Park Attractions: Manufactured features designed for bather interaction or incidental contact with static, splashing, or flowing water.

Class D-9, Natural Bodies of Water: Those natural or man-made aquatic play areas normally regarded as oceans, lakes, ponds, streams, quarries, or bodies of water that the local jurisdiction has designated as Natural Bodies of Water. (The design or construction of these facilities is not included in the scope of ANSI/IAF standards.)

Class E: Pools used for instruction, play or therapy and with temperatures above 86° F.

Public pools may be diving or nondiving. If diving, they shall be further classified into types as an indication of the suitability of a pool for use with diving equipment.

Type VI-IX: Public pools suitable for the installation of diving equipment by type.

Type N: A non-diving public pool. (No diving allowed.)

Competitive Diving Equipment: Competitive diving equipment includes diving boards and adjustable fulcrum-setting diving stands intended for competitive diving.

Coping: The cap on the wall that provides a finishing edge around the pool/spa. Can be formed, cast in place, precast, brick, stone, or pre-fabricated from metal or plastic materials. It may be used as part of the system that secures a vinyl liner to the top of the pool wall.

Copper Sulfate (CuSO₄): A blue inorganic salt, sometimes used as an algicide.
BLUESTONE.

Cove: The radius that joins the floor and wall of a pool or spa.

Cover: Something that covers, protects, or shelters a pool, spa, or hot tub. Types of covers are:

Safety Cover: As defined by ASTM in F1346-1991, Standard performance specification for safety covers and labeling requirements for all covers for swimming pools, spas and hot tubs, latest edition, a barrier (intended to be completely removed before entry of users) for swimming pools, spas, hot tubs or wading pools, attendant appurtenances and/or anchoring mechanisms that will, when properly labeled, installed, used, and maintained in accordance with the manufacturer's published instructions, reduce the risk of drowning of children under five years of age by inhibiting their access to the contained body of water and by providing for the removal of any substantially hazardous level of collected surface water. (These covers may be power or manual.)

Solar Cover: A cover that when placed on a pool or spa surface increases the water temperature by solar activity and reduces evaporation and heat loss.

Thermal Cover: An insulating cover used to prevent evaporation and heat loss from pools or spas.

Winter Cover: A cover that is secured around the perimeter of a pool or spa that provides a barrier to debris, when the pool or spa is closed for the season.

Craze: See Surface Checks.

Cross Connection: An unprotected connection between domestic water supply and pool water or other non-potable water, where a contamination of the domestic system could occur.

Cross-Over Deterrent: A feature to deter a person from crossing over a barrier wall or fence to the opposite side (e.g., pointed picket fences).

Cuddle Cove: See Swimout.

Cut Off Head: See Shut Off Head.

Cyanuric Acid: A chemical that reduces the loss of chlorine in water due to the ultraviolet rays of the sun. STABILIZER, ISOCYANURIC ACID, CONDITIONER, TRIAZINETRIONE.

Danger: See Signal Word.

Dead Load: The weight of all permanent structural and nonstructural components of a building, such as walls, floors, roofs, ceilings, stairways, and fixed service equipment.

Deck Dive: A dive performed from the deck area of a pool into five feet (5') (1.52 meters) or more of water depth.

Decks: Those areas immediately adjacent to or attached to a pool or spa that are specifically constructed or installed for sitting, standing, or walking. Generally made of concrete, wood, or masonry.

Deep Area: Water depth areas exceeding five feet (5') (1.52 meters).

Design Rate of Flow: The rate of flow used for design calculations in a system.

Diatomaceous Earth (DE): A white powder used as a filtering medium composed of microscopic fossil skeletons of diatoms.

Diatomaceous Earth Filter: A filter that utilizes a coating of diatomaceous earth (DE) or other filter media over a porous fabric as its filter medium.

Diatomite Filter Element: Device used in a filter tank called a filter grid or element coated with a fabric that traps diatomite on its surface.

Dichlor: See Sodium Dichlor.

Diethylphenylene Diamine (DPD): A chemical testing reagent that measures bromine or free available and total chlorine; produces a series of colors from pale pink to dark red.

Diffuser: A component of a pump whose function is to reduce velocity and increase static pressure of a fluid passing through a system.

Digital Multimeter: This meter is read by means of an LED or LCD display.

Discharge Head: The resistance, caused by friction and/or changes in elevation, of the water flow encountered on the discharge side of the pump back to the swimming pool or spa.

Dive: A free-fall entry into water from a planned acrobatic maneuver into a designated diving area of a pool.

Diving Area: The area of a swimming pool that is designed for diving.

Diving Board: A flexible board secured at one end that is used for diving.

Diving Platform: Stationary platform designed for diving.

Diving Stand: Any supporting device for a springboard or diving board.

Draft Hood: Part of a heater venting system used to prevent a downdraft.

Dry Acid (NaHSO_4): See Sodium Bisulfate.

Dynamic Head: The sum of the total resistance caused by friction and/or changes in elevation, of the water flow through the entire circulation system that the pump has to overcome to achieve the necessary flow rate.

Edge Guards: Shields designed to cover sharp edges in aboveground pools.

Effective Filter Area: Total surface area through which designed flow rate will be maintained during filtration.

Cartridge Type: The total effective filter area is the cartridge fabric area that is exposed to the direct flow of water, figured in square footage of fabric. This excludes cartridge ends, seals, supports, and other areas where flow is impaired.

Diatomaceous Earth (DE) Type: The actual area of the element is the total effective area of the porous fabric septum, less any area of a septum support member greater than one-fourth inch (1/4") (6.35 millimeters) wide contacting the septum during filtration.

Permanent Medium Type: The effective filter area is the filter surface that is perpendicular to the flow direction.

Sand Filtration Type: The top surface area of the filter medium within the filter, calculated in square inches or square feet. One square inch is equivalent to 6.45 square centimeters. One square foot is equivalent to 0.09 square meters.

Effluent: The outflow of water from a filter, pump, or pool.

Egress: Means of exit.

Electrical Induction: The process by which an object having electrical or magnetic properties produces similar properties in a nearby object, usually without direct contact. See Air Induction System.

Electrolysis: The decomposition of material by an outside electrical current.

Electrolytic Chlorinator: See Electrolytic Chlorine/Bromine Generator.

Electrolytic Chlorine/Bromine Generator: An electrolytic device used to generate free available chlorine or total bromine from either chloride or bromide salts.

Electron: A minute particle of negatively charged electricity.

Entry Pool: Pool at a water theme park that is provided at the entrance of a water slide or inner tube ride.

EPA-Registered Product: A product bearing the EPA stamp indicating that it meets EPA standards for efficacy, human health and safety, environmental impact, use instructions, and product labeling. All products that claim to kill or control bacteria, algae, etc., are required to be registered.

Equalizer Line: 1. A line below the pool surface to the body of a skimmer that prevents air from being drawn into the pump. 2. A pipe between two pools/spas to equalize water levels.

Equipment Area: Area used to house recirculation and disinfecting equipment and related appurtenances.

Erosion: 1. Act of destroying or dissolving by slow disintegration or wearing away. 2. In an erosion feeder, it is the way water dissolves the chemical being fed.

Erosion Feeder: A device that dispenses a sanitizer by directing a flow of water past tablets, briquettes, or pellets.

Etching: Corrosion on the surface; the pitting or eating away of a material such as the surface of plaster.

Evaporation: Conversion of liquid molecules into vapor.

Exercise Bar: A tubular device installed in the wall as a handhold.

Expansive Soil: Clay soil that absorbs moisture and swells, creating the potential for structure damage.

Fecal Streptococci: The fecal streptococcus group of microorganisms includes, but is not limited to, the organisms *S. faecalis*, and *S. faecium*, which inhabit the gastrointestinal tract of warm blooded animals. These organisms are indicators of contamination in water. The ingestion of the fecal streptococci can cause illness.

Feet of Head: The resistance in a hydraulic system based on the equivalent to the height of a column of water that causes the same resistance (100 feet of head equals 43 pounds per square inch). The total dynamic head is the sum of all resistances in a complete operating system. One pound per square inch is equivalent to 6.89 KiloPascal (kPa). One pound per square inch is also equivalent to 70.3 grams per square centimeter. 100 feet of head is equivalent to 296.47 KiloPascal (kPa). 100 feet of head is equivalent to 3.02 kilograms per square centimeter.

Ferric Iron (Fe⁺³ or Iron III): Generally insoluble in water, commonly precipitating as rust.

Ferrous Iron (Fe⁺² or Iron II): Found in groundwater. It is soluble in water and will generally impart a pale green color. In the presence of oxidizers, it will convert to Iron III.

Fiberglass: Fine-spun filaments of glass that are available in a rope or mat form. When used in a process with polyester resins and hardeners, can be formed and molded into pools, spas, and related equipment.

Filter: A vessel that removes undissolved particles from water by recirculating the water through a porous substance (a filter medium or elements).

Cartridge Filter: A filter that utilizes a porous element that acts as a filter medium.

Diatomaceous Earth Filter: A filter that utilizes a thin coating of diatomaceous earth (DE) or other filter aid over a porous fabric as its filter medium.

Permanent Medium Filter: A filter that utilizes a filter medium (sand).

Filter Agitation: The mechanical or manual movement to dislodge the filter aid and dirt from the filter element.

Filter Aid: Usually refers to powder-like substances such as diatomaceous earth or volcanic ash used to coat a septum type filter. Also used as an aid to sand filters.

Finely divided medium (diatomaceous earth, processed perlite, etc.) used to coat a septum of a diatomite-type filter.

Filter Cartridge: A filtering element, usually of fibrous material.

Filter Cycle: The operating time between cleaning or backwash cycles.

Filter Element: A device within a filter tank designed to entrap solids and conduct water to a manifold, collection header, pipe, or similar conduit and return it to the pool, spa, or hot tub. A filter element usually consists of a septum and septum support, or a cartridge.

Filter Medium: A finely graded material (such as sand, diatomaceous earth, polyester fabric, anthracite, etc.) that removes solid particles from the water.

Filter Sand: A hard silica-like material free of carbonates or other foreign material used in sand filters as the media.

Filtration: The process of removing undissolved particles from water by recirculating the water through a porous substance (a filter medium or elements).

Filtration Flow: The design rate of flow, in volume per time (GPM, GPH), through the filter system installed per manufacturer's instructions with a new, clean filter medium. One U.S. gallon per minute is equivalent to 3.79 liters per minute. One U.S. gallon per hour is equivalent to 3.79 liters per hour.

Filtration Rate: The rate of water flowing through a filter during a given period of time, expressed in U.S. gallons per minute per square foot of effective filter area. One U.S. gallon per minute per square foot is equivalent to 40.75 liters per minute per square meter. FILTRATION FLOW RATE.

Firebox: A chamber in the pool/spa heater where combustion takes place.

Firebrick: A refractory brick capable of sustaining high temperatures.

Fireman's Switch: A mechanism adapted to the time clock that will turn the heater off long enough for it to cool down before the time clock turns the pump off.

Float Valve: A valve controlled by the level of a fluid.

Flocculant (floc): A chemical that causes fine suspended solids in water to combine into large clusters that settle out.

Floor: The interior bottom surface of a pool or spa.

Flow: The rate of the movement of water, typically in gallons per minute. One U.S. gallon per minute is equivalent to 3.79 liters per minute.

Flow Balance Valve: Device that regulates the flow from skimmers, drains, or other outlets.

Flow Meter: A device that measures the rate of flow of water or other liquid through piping.

Flow Rate: The volume of liquid flowing past a given point in a specified time period. Usually expressed as U.S. gallons per minute (GPM) or gallons per hour (GPH). One U.S. gallon per minute is equivalent to 3.79 liters per minute. One U.S. gallon per hour is equivalent to 3.79 liters per hour.

Flow Rider: Pool at a waterpark that uses wave sheet technology for body boarding or body surfing activity.

Flow Switch: A safety device that prevents the equipment from firing if there isn't adequate water flow through the system.

Flume: A trough-like or tubular structure, generally recognized as a water slide, that directs the path of travel and the rate of descent by the rider.

Flume Slide: Slides of various configurations that are characterized by having deep riding channels, vertical and lateral curves, high water flows, and accommodate riders using or not using mats, tubes, rafts, and other transport vehicles. Included but not limited to family raft rides, inner-tube rides, body slides, and speed slides.

Fly Ash: 1. A fine particulate, essentially noncombustible refuse, carried in the gas stream from a furnace. 2. A product used in concrete mixtures. 3. Admixture.

Frame: The structure that defines and/or supports the outline or shape of the aboveground pool wall.

Free Available Chlorine: That portion of the total chlorine that is not combined chlorine and is available as a sanitizer.

Freeboard: The clear vertical distance between the top of the filter medium and the lowest outlet of the upper distribution system in a permanent medium filter.

Freeze-Thaw Cycle: Seasonal weather and temperature changes that can cause stress to a surface.

Friction Head: Head specifically caused by friction or drag.

Friction Water: Resistance created by the liquid passing the inner surface of the conductor pipe and fittings.

Fusible Link (Gas Heater): A thermal safety cut-off device in the control circuitry that melts if temperature parameters are exceeded.

Gallonage: A specific quantity of fluid in terms of gallons. One U.S. gallon is equivalent to 3.79 liters.

Galvanic Action: The creation of electrical current by the process of electro-chemical action of dissimilar metals in a liquid.

Galvanic Corrosion: The deterioration of metal produced when two dissimilar metals are exposed to the electrical current produced by electro-chemical action.

Gate Valve: A device in a pipe that can partially or totally obstruct the flow of water, using an internal "gate" that moves in and out as the valve is operated.

Gelcoat: A colored polyester-resin material applied in liquid form that hardens to a smooth durable form when applied over a mold.

GFCI: See Ground Fault Circuit Interrupter.

GPD: Gallons per day. One U.S. gallon per day is equivalent to 3.79 liters per day.

GPH: Gallons per hour. One U.S. gallon per hour is equivalent to 3.79 liters per hour.

GPM: Gallons per minute. One U.S. gallon per minute is equivalent to 3.79 liters per minute.

Grab Bar/Rail: Rails used to enter or leave a pool or spa.

Groover: See Jointer.

Ground Clearance: Distance between the surface of the ground and the bottom of the fence. The distance should be small enough to prevent entrapment or entry.

Ground Fault Circuit Interrupter (GFCI): A device intended for the protection of people and/or equipment that functions to de-energize an electrical circuit within an established period of time when current to ground exceeds some pre-determined value (5/1000th of an ampere (0.005)).

Grounding: Connecting to or providing a conducting path to earth or to some conducting body that serves in place of earth.

Gunite: A pneumatically applied (sprayed) concrete that is a dry mixture of cement, aggregate, and/or sand. Water is applied to the mix at the hose nozzle.

Gutter: Overflow trough in the perimeter wall of a pool that is a component of the circulation system or flows to waste.

Hair and Lint Strainer: A device attached on or in front of a pump to which the influent line (suction line) is connected for the purpose of entrapping lint, hair, or other debris that could damage the pump.

Halogen: Any of the family of chemical elements including fluorine, chlorine, bromine, and iodine. Chlorine and bromine are commonly used as sanitizers or oxidizers in recreational water.

Handhold/Handrail: A support device that is intended to be gripped by a user for the purpose of resting or steadying. It is typically located within or at exits to the pool or spa or as part of a set of steps.

Hardness: The amount of calcium and magnesium dissolved in water; measured by a test kit and expressed as parts per million (ppm) of equivalent calcium carbonate.

Hazard: A condition or set of circumstances that has the potential of causing or contributing to injury or death.

Head: A measure of the amount of pressure or resistance in a hydraulic system expressed in "feet." 100 feet of head is equivalent to 296.47 KiloPascal (kPa). 100 feet of head is also equivalent to 3.02 kilograms per square centimeter.

Head Loss: The amount the flow would reduce as the head increases.

Header: A manifold in a heater that directs the flow of water into and out of the heat exchanger.

Heater: Fossil-fueled, electric, or solar device to heat the water of pools or spas.

Direct Electric: Uses resistive heating element placed in line with the circulation system.

Fossil-Fueled: Natural gas, propane gas, or fuel oil. They utilize an open flame to heat a heat exchanger.

Heat Pump: Uses a compressor with a closed freon loop to exchange heat between either the ambient air or external water source with the pool or spa water.

Solar: Uses energy from the sun to heat the collector or through the blanket to heat the water.

Other ways to categorize heaters include:

Direct Heaters that heat the tubes in which water circulates.

Indirect Heaters that circulate steam or hot water inside a heat exchanger through which water flows.

Heat Exchanger: A device with coils, tubes, and plates that takes heat from any liquid, or air, and transfers that heat to another fluid without intermixing the fluids.

Heat Loss: The natural drop in water temperature as heat is transferred to the surrounding air.

Heat Pump: A refrigeration compressor, usually electrically driven, that is operated in reverse. To obtain heat, the evaporator side (cooling coil) is exposed to water, air, or ground. The coil takes the heat from this source and transfers it to the condenser coil where it discharges the heat to the pool/spa to be heated.

Heat Sink: A type of device capable of absorbing and dissipating heat.

High Limit Switch: A temperature control switch that can deactivate a control circuit at a preset temperature. They are normally preset at the factory and are non-adjustable. Some must be manually reset.

High Permeability Element: Mechanically interlocked, non-woven filter material designed to remove suspended solids.

Hoop: 1. A circular constraint that provides the structural bonding of staves of a hot tub to prevent separating. 2. A device used to secure sections of a filter together.

Hoop Connector: A tightening and connection device.

Horsepower: A unit for expressing the power of motors or engines, equal to a rate of 33,000 foot-pounds per minute. One horsepower is equivalent to 42.41 BTU per minute. One horsepower is also equivalent to 745.7 watts.

Hose Bib: A valve with a threaded connection and specifically used as a hose connection.

Hot Tub/Spa: A warm water reservoir with hydromassage jets that are manufactured from prefabricated materials at a factory. Hot tubs/spas may be "self-contained," or "non-self-contained." (Refer to ANSI/IAF-6, Standard for portable spas, latest edition.)

Self-Contained Hot Tub/Spa: A hot tub/spa that has a cabinet that houses the controls, the pump, heater, and filter. Most "portable hot tubs/spas" are made of an acrylic thermoplastic shell and are surrounded by a cabinet made of wood, alternative wood, or thermoplastic. A "self-contained hot tub/spa" can be moved to another location and reinstalled. A "self-contained hot tub/spa" has all control, water heating and water circulating equipment as an integral part of the product. A "self-contained hot tub/spa" may be permanently wired or cord connected. Also known as a "portable hot tub/spa."

Non-Self-Contained Hot Tub/Spa: A hot tub/spa that is made of an acrylic or thermoplastic shell molded at the factory to comfortably fit the body's contours. A "non-self-contained hot tub/spa" does not have water heating and circulating equipment as an integral part of the product. "Non-self-contained hot tubs/spas" may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components.

Hydraulics: Deals with the physical movement of water through the entire circulation system and is concerned with such matters as friction and turbulence generated in the pipes and other components of the system by the moving water. **Hydrochloric Acid (HCl):** Also called muriatic acid when diluted. A very strong acid used in pools or spas for pH control and for certain specific cleaning needs. A by-product of the addition of chlorine gas to water. Use extreme caution in handling.

Hypochlorous Acid (HOCl): Formed when any chlorinating product is dissolved in water. This is the most active sanitizing form of chlorine. Its dissociation in water into H⁺ and OCl⁻ is pH dependent.

Hydrogen Peroxide (H₂O₂): Compound consisting of hydrogen and oxygen supplied in an aqueous solution, used as an oxidizer. Will neutralize halogen sanitizer in water.

Hydrostatic Pressure: The pressure created by a depth of water, such as the upward pressure that high ground water may exert on the bottom.

Hydrostatic Relief Valve: A fitting installed in the bottom of the pool that is designed to open automatically or manually to relieve upward ground water pressure by allowing water to flow into the pool or spa.

Hydrotherapy Jet: A fitting that blends air and water, creating a high-velocity turbulent stream of air-enriched water.

Hypobromous Acid (HOBr): A chemical compound that acts as a sanitizer and algicide in water.

Hypochlorinator: A chemical feeder through which liquid solutions of chlorine-bearing chemicals are fed into the pool water at a controlled rate. See Chlorinator.

Hypochlorite: A family of chemical compounds including calcium hypochlorite, lithium hypochlorite, sodium hypochlorite, etc., found in various forms for use as a chlorine carrier in pool/spa water.

Hypochlorite Ion (OCI): The anion from ionization of hypochlorous acid.

Hypochlorous Acid (HOCl): A chemical compound that acts as an algicide. The most powerful sanitizer of chlorine in water.

Impeller: The rotating part of a centrifugal pump that creates the flow of water.

Inertia: The tendency of all matter to persist in its state of rest or uniform motion until acted upon by some external force.

Influent: The water entering a filter or other device.

Ingress: Means of entry.

Inlet Fitting: A pipe that allows water to enter a pool, spa, or hot tub.

Insulator: In electricity, any device that serves as a nonconductor.

Intermediate Pool: Any section of a quiescent water flow between the entry and landing pools in attractions at a waterpark that utilize a series of pools.

Intermittent Ignition Device: An electrical spark device used to ignite a gas heater.

Iodine (I₂): A chemical element that exists as a grayish-black granule in its normal state or as a part of a chemical compound that is a biocidal agent.

Ionization: The process whereby a compound in solution separates into positive ions (cations) and negative ions (anions).

Ionizer: A device that electro-chemically generates metal ions such as silver and/or copper ions from anodes of these metals.

Iron: See Ferric Iron and Ferrous Iron.

Isocyanurates: See Chlorinated Isocyanurates.

Jets: See Hydrotherapy Jet.

Jointer: Tool used to prepare, make, or simulate joints in concrete flat work. Tool used to smooth out coping joints or brick joints. GROOVER.

Joist: See Chine Joist.

Jump Board: A premanufactured diving board that has a coil spring, leaf spring, or comparable device located beneath the board that is activated by the force exerted by jumping on the board's end.

Jumping Jet: A hydraulic device used in fountains to fluctuate the stream of water by blowing through the stream of water with another stream of water to deflect its flow. Can also be accomplished with air.

Kicker: A block of wood attached to formwork to take the thrust from other formwork. To stabilize forms commonly placed at the bottom of forms to prevent spreading during concrete placement.

Kilowatt: A unit of power equal to 1000 watts. One kilowatt is equivalent to 56.89 BTU per minute. One kilowatt is also equivalent to 1.341 horsepower.

Kilowatt Hour: A unit of work or energy equal to that expended by one kilowatt in an hour. One kilowatt hour is equivalent to 3413 BTU. One kilowatt hour is also equivalent to 3.6 millio joules.

Ladder: A structure for ingress/egress that usually consists of two long parallel side pieces joined at intervals by crosspieces (treads). Ladders for aboveground/onground pools consist of the following; also see the latest edition of IAF-4 Aboveground/Onground Residential Swimming Pools:

"A-Frame" Ladder: An entry ladder that straddles an aboveground/onground pool wall and is either removable or has a built-in entry limiting feature.

Double Access Ladder (Type A): An "AFrame" ladder that straddles the pool wall of an aboveground pool and provides ingress and egress and is intended to be removed when not in use.

Limited Access Ladder (Type B): An "AFrame" ladder that straddles the pool wall of an aboveground/onground pool. Type B ladders are removable and have a built-in feature that prevents entry to the pool when the pool is not in use.

Staircase Ladder (Type C): A "ground to deck" staircase ladder that allows access to an aboveground pool deck and has a built-in entry-limiting feature.

"In-pool" Staircase Ladder (Type E): Located in the pool to provide a means of ingress and egress from the pool to the deck.

Landing Pool: Pool at a waterpark that is located at the end of a flume that is designed to safely receive the rider of an attraction.

Langelier Index: A numerical calculation, based on the Langelier water balance equation, that indicates whether the water may be corrosive or scale forming. See Saturation Index.

Leaching: The extracting of a soluble substance from some material, commonly tannic acid from redwood or cedar in hot tubs or a mineral extracted from plaster.

Lifeguard: A qualified person who is responsible for supervision and lifesaving at a pool.

Lifeline: An anchored line thrown to aid in rescue.

Line Level: A small spirit level that can be suspended from a stringline.

Liner: See Vinyl Liner.

Liquid Acid (HCl): Chemical used to lower pH and total alkalinity, most commonly muriatic acid.

Liquid Chlorine: See Sodium Hypochlorite.

Liquid Propane Gas: The liquid form of propane gas, a heavy hydrocarbon occurring naturally in petroleum.

Lithium Hypochlorite (LiOCl): A white solid used as a sanitizer and oxidizer in pools and spas that has a pH of approximately 9 and that typically contains 35% available chlorine.

Lower Distribution System: A device used in the bottom of a permanent medium filter to collect water during filtering and distribute it during backwashing (underdrain).

Magnesium Hardness: A measure of the amount of magnesium dissolved in water and expressed in parts per million (ppm) or milligrams per liter (mg/L) as calcium carbonate.

Main Drain: An outlet located at the bottom of a pool or spa to conduct water to the recirculating pump.

Make-Up Water: Water used to fill or refill a pool/spa. SOURCE WATER.

Manifold: A pipe with several openings for making multiple connections.

Manometer: An instrument that measures vacuum or pressure differential.

Manufactured Diving Equipment: Manufactured diving equipment shall include diving boards, jump boards, springboards, and starting platforms. Architectural features such as decorative rocks and elevated bond beams are not considered to be manufactured diving equipment. Marcite®: Marcite® is a registered trademark of Paddock of

California, Inc. See Plaster. Maximum Pool User Load: The maximum number of people allowed in a pool/spa at any one time.

Mechanical Seal: A device to prevent the passage of water in or out of a centrifugal pump at the motor shaft.

Medical Facility Pool: Special purpose pool used by a medical institution.

Mesh Restraining Barrier/Fence: A combination of materials, including fabric, posts, and other hardware to form a barrier around a swimming pool (or other areas).

Micron: One millionth of a meter. Used to describe the size of particles that filters are capable of trapping.

Microorganism: A microscopic plant or animal life. Usually refers to bacteria, protozoa, and algae in the water.

Millivolt: A measure of electrical potential equal to one thousandth of a volt.

Millivolt Ignition (Flame): Heat from a continuous pilot is used to generate electrical energy that opens the main gas valve.

Moment: A point at which load or stress can cause bending in a structural member.

Motor: A machine for converting electrical energy into mechanical energy. When electrical current is supplied to a series of wires (windings), a magnetic field is created that spins the rotor and shaft to drive a pump impeller.

Mottling: A different coloration of plaster similar to the shading difference of cumulus clouds with no apparent pattern. A blotch, spot, or streak of different shades of color, usually in a variegated pattern.

Multiple Function Filter: CONTROL VALVE. See Multiport Valve.

Multiport Valve: A device that allows for the multidirectional control of the passage or flow of water through a system.

Muriatic Acid (HCl): A commercial name for hydrochloric acid.

National Sanitation Foundation (NSF International): An independent, nonprofit organization of scientists, engineers, educators, and others engaged in research and testing and in the development of standards in selected public health and environmental areas.

National Swimming Pool Foundation (NSPF): A nonprofit organization dedicated to research and education in aquatic safety.

Natural Gas: Admixture of gaseous hydrocarbons, chiefly methane, occurring naturally underground, often in association with petroleum products.

Negative Edge: See Vanishing Edge.

Nitrogen (N₂): An element present in ammonia, sweat, urine, fertilizers, and a variety of personal care products and environmental sources. When inadvertently introduced into pools or spas it readily reacts with chlorine to form chloramines.

Non-Swimming Area: Any portion of a pool where water depth, off-set ledges, or other irregularities prevent normal swimming activities.

Non-Toxic: Generally having no adverse physiological effect on human beings or other living organisms.

Ohm: A unit of measure of electrical resistance.

Ohm's Law: An electrical relation between volts, amperes, and ohms that can be expressed as follows: $\text{amps} = \text{volts}/\text{ohms}$, or $\text{current} = \text{voltage}/\text{resistance}$, or $I = E/R$.

Organic Matter: Carbon-based substances, generally originating from living organisms, often introduced to pools or spas by bathers and the environment. For example, perspiration, urine, saliva, suntan oil, cosmetics, lotions, and dead skin.

Organisms: Plant or animal life. Usually refer to algae or bacteria-like growth in pool water.

Orifice: An opening in a device, usually calibrated in size, through which water, air, or gas flows.

Orifice Plate: A disk, placed in a water flow line, with a concentric, sharp-edged circular opening in the center that creates a differential pressure to measure flow and to operate feeders and instruments or other hydraulic equipment.

ORP: See Oxidation Reduction Potential.

Orthotolidine (OTO): A colorless reagent that reacts with chlorine or bromine to produce yellow-to-orange colors that indicate the amount of total chlorine or bromine in water. OTO measures total chlorine. Because OTO is a suspected carcinogen and very acidic, use caution when handling this chemical.

Outdoor Stack: A type of equipment to be used on outdoor heaters in areas of extreme, constant winds.

Outlet: The aperture or fitting through which the water flows from the pool, spa, or hot tub.

Outlet, Suction: See Suction Outlet.

Overflow Gutter: The gutter around the top perimeter of the pool/spa, which is used to skim the surface of the water and carry off the waste or collect it for return to the filters.

Overflow System: Refers to removal of pool/spa surface water through the use of overflows and surface water collection systems of various design and manufacture.

Oxidation-Reduction Potential (ORP): A measure of the oxidation-reduction potential of chemicals in water. It is generally measured in millivolts by means of an electronic

meter and depends upon the types and concentrations of oxidizing and reducing chemicals in the water.

Oxidizers: Products used to destroy organic and inorganic contaminants in water.

Ozone (O₃): A gaseous molecule composed of three (3) atoms of oxygen that is generated on site and used for oxidation of water contaminants. It can also be used to regenerate bromine from bromide ions and as a supplemental contact sanitizer in conjunction with an EPA registered sanitizer that provides a constant residual.

Ozone Contact Concentration: The amount of ozone that is dissolved in pool/spa water.

Ozone Generator: A device that produces ozone, generally exposing oxygen or air to corona discharge or ultraviolet light.

Ozone, Low Output Generating Equipment (Ozonator): Refers to units that will produce ozone in air at a concentration less than 500 ppm. Usually this term will refer to ultraviolet (UV) generators.

Parts Per Million (PPM): The unit of measurement used in chemical testing that indicates the parts by weight in relation to one million parts by weight of water. It is essentially identical to the term milligrams per liter (mg/L) in pool water.

Pass Through: Openings between vertical pickets of a fence.

Pathogens: Disease-causing microorganisms.

Pathological Agents: Toxins, microbes, etc. capable of causing diseases.

Permanently Installed Swimming Pool: A pool that is constructed in the ground or in a building in such a manner that it cannot be readily disassembled for storage.

pH: A value used to express acidity of a substance. Expressed as a number on a scale of 0 to 14, with 7.0 being neutral; values less than 7.0 are acidic and values greater than 7.0 are basic.

Phenol Red: A pH indicator used in water analysis in the range between 6.8 and 8.4. The color changes from yellow to red to purple as pH increases.

pH Meter: An electronic device that measures

pH by means of a pH electrode immersed in the water to be tested.

Pilot Flame Generator: The component in a millivolt system that transforms heat from the pilot into electrical energy. THERMAL COUPLING, THERMOCOUPLE.

Pilot Light: A small permanent flame used to ignite gas at the burner.

Pinching Hazard: Any configuration of component that may pinch the user.

Pitting: A form of etching or the deterioration of the integrity of the surface.

Plaster: Mixture of portland cement, water and sand; used as an interior and exterior wall finish material. Variety of finishes and ornamental designs may be formed with plaster.

Polyvinyl Chloride (PVC): Thermoplastic resin commonly used for pool piping and plumbing components and pool liners.

Pool: A body of water contained in a reservoir used for recreational purposes. See Residential

Pool. See Commercial/Public Pool.

Pool Slide: An attraction having a configuration as defined in The Code of Federal Regulations (CFR) Ch. II, Part 1207, or is similar in construction to a playground slide used to allow users to slide from an elevated height to a pool.

Pool User: Any person using a pool and adjoining deck area for the purpose of water activities or other related activities. Potable Water: Water that is safe and satisfactory for drinking.

Potassium Monopersulfate (KHSO₅): A solid oxidizer used to prevent the buildup of contaminants in pool and spa water. POTASSIUM PEROXYMONOSULFATE.

Pozzolan: Siliceous and/or aluminous material in cement that reacts with calcium hydroxide when finely divided to improve cementitious value. May be mixed with portland cement. Also is an admixture.

Precipitate: A substance separating out in the form of solid particles from a liquid. A result of a chemical or physical change that settles out or remains as a haze in suspension (turbidity).

Pre-Coat: The coating of filter aid on the septum of a diatomaceous earth type filter at the beginning of each filter cycle.

Pre-Coat Feeder: A chemical feeder designed to inject filter agents such as diatomaceous earth into a filter in sufficient quantity to coat the filter septum at the start of a filter run.

Pressure: A type of force that is exerted uniformly in all directions. It is expressed as pounds per square inch, feet of liquid, or feet of head.

Pressure Differential: The difference in pressure between two parts of a hydraulic system, such as the influent and effluent of a filter.

Pressure Gauge: Instrument for measuring pressure in a closed system.

Pressure Switch (Heater): A device that will not allow the equipment to operate unless there is adequate water pressure in the system.

Pressure Test: A test for leaks in a closed system.

Primary Structural Members: Any part of the aboveground/onground pool structure that carries or retains any static load or stress caused by water pressure, surge, and/or natural forces, and for the reasonable foreseeable use.

Priming: A term used to define re-establishing the water flow by the recirculating pump.

PSI: Pounds per square inch. One pound per square inch is equivalent to 6.89 KiloPascal (kPa). One pound per square inch is also equivalent to 70.3 grams per square centimeter.

Public Pool: See Commercial/Public Pool.

Pump: A mechanical device, usually powered by an electric motor, that causes hydraulic flow and pressure for the purpose of filtration, heating, and circulation of the pool or spa water. Typically, a centrifugal pump design is used for pools, spas, or hot tubs.

Pump Capacity: The volume of liquid a pump is capable of moving during a specified period of time against a given total head.

Pump Curve: A graph of performance characteristics of a given pump under varying horsepower, flow, and resistance factors. Used in checking and sizing a pump.

Pump Strainer: A device, placed on the suction side of a pump, that contains a removable strainer basket designed to trap debris in the water flow with a minimum of flow restriction. Sometimes referred to as a hair/lint pot or trap.

Puncture Hazard: Any protrusion that is capable of causing injury to skin.

Push-pull Valve: A device that allows for the dual directional control or flow of water through a system.

Quaternary Ammonium (QUAT): Organic compound of ammonia used as an algistat and an algicide.

Radius of Curvature: The curved surface from the springline (vertical sidewall) to the pool bottom. WALL COVE.

Rated Pressure: The pressure rating specified for a piece of equipment.

Rate of Flow: The quantity of water flowing past a point within a specified time, such as the number of gallons flowing in one minute (GPM). One gallon per minute is equivalent to 3.79 liters per minute.

Reagents: The chemical used to test various aspects of water quality.

Rebar: See Reinforcing Bar.

Recessed Treads: A series of vertically spaced cavities in a pool/spa wall creating tread areas for step holes.

Recirculation System: See Circulation System.

Reinforcing Bar: Steel rod with deformed surface. Used to reinforce concrete construction. The deformations of the steel rods interlock with the concrete mix to give a structure the required tensile strength. REBARS.

Relay: A device that responds to a current or voltage change by activating switches or other devices in an electric circuit.

Remodel: To install cosmetic changes, accessory add-ons, or modernizations. Includes both residential and commercial installations.

Remote Switch: Any device used to activate/ deactivate an apparatus from a distance.

Removable: Capable of being easily disassembled or removed.

Renovate: Material alteration. The activity of restoring all or part of a pool or spa structure and its component parts including the rebuilding and/or replacing of worn and broken components. See Remodel.

Residential Pool: Any pool that is intended for non-commercial use as a swimming pool by three (3) families or less and their guests and that is over twenty-four inches (24") (60.96 centimeters) in water depth and has a volume greater than 3250 gallons (12,301.25 liters). (Refer to ANSI/NSPI-5, Standard for residential inground swimming pools, latest edition.)

Residential Aboveground Swimming Pool — Type O: A pool of any shape that has a minimum water depth of thirtysix inches (36") (0.91 meters) and a maximum water depth of forty-eight inches (48") (1.22 meters) at the wall. The wall is located on the surrounding ground and is capable of being disassembled or stored and reassembled to its original integrity. Diving and the use of a water slide are prohibited (Refer to ANSI/IAF-4, Standard for aboveground/ onground residential swimming pools, latest edition). See Residential Onground Swimming Pool.

Residential Onground Swimming Pool — Type O: A pool package whose walls rest fully on the surrounding ground and has an excavated area below the ground level where diving and the use of a water slide are prohibited. (Refer to ANSI/IAF-4, Standard for aboveground/onground residential swimming pools, latest edition). The slope adjacent to the shallow area shall have a maximum slope of 3:1, and the slope adjacent to the sidewalls shall have a maximum slope of 1:1. See Residential Aboveground Swimming Pool.

Type I-V: Residential pools suitable for the installation of diving equipment by type.

Type O: Residential pools where the installation of diving equipment is prohibited.

Residual: The measurable sanitizer present in water.

Response Time: The time between recognition of pool user distress and rescue by a lifeguard.

Return Inlet: The aperture or fitting through which the water under positive pressure returns into a pool or spa.

Return Piping: The piping that is referred to as effluent, returning water to the pool or spa.

Reverse Circulation: The name given to a water circulation system in which water is taken from the surface and returned through inlets at the bottom of the pool or spa.

Rimflow Overflow System: Perimeter overflow system in which the overflow rim is at the same elevation as the deck.

Ring Buoy: A ring-shaped floating buoy capable of supporting a user. Usually attached to a throwing line.

Risk: The possibility of suffering harm or loss.

Rope and Float Line: A continuous line not less than one-fourth inch (1/4") (6.35 millimeters) in diameter that is supported by buoys and attached to opposite sides of a pool to separate the deep and shallow ends.

Runout: That part of a waterslide where riders are intended to decelerate and/or come to a stop. The runout is a continuation of the waterslide flume surface.

Salinity: The salt content of water.

Sand Filter: A filter using sand or sand and gravel as a filter medium.

Saturation Index: A number that indicates whether water will have a tendency to deposit calcium carbonate from a solution, or whether it will be potentially corrosive. Five factors are used in the computation: pH, total alkalinity, calcium hardness, temperature, and TDS. When correctly balanced, the water will be neither scale-forming nor corrosive.

Scale: The precipitate that forms on surfaces in contact with water when the calcium hardness, pH, or total alkalinity levels are too high.

Screed: In cement masonry flatwork, the wood or metal straightedge used to strike off or level newly placed concrete.

Sealant: A substance that is applied on a surface or between surfaces to prevent the entry of moisture.

Seat (Underwater): An underwater ledge that is placed completely inside the perimeter shape of the pool; generally located in the shallow end of the pool. BENCH (UNDERWATER).

Secondary Structural Members: Any part of the aboveground/onground pool structure that is not subject to load caused by water pressure.

Sediment Trap: A device used on gas piping and other systems to collect sediment and moisture.

Self Priming: A rating given to centrifugal pumps indicating that the pump is capable of operating above pool water level, after initial filling with water.

Septum: Part of a diatomite-type filter element consisting of cloth, wire screen, or other porous material on which filter aid is deposited.

Sequestering Agent: A chemical that combines with metals keeping them in solution and preventing them from depositing on and staining pool surfaces. Some sequestering agents are chelating agents.

Service Factor: The degree to which an electric motor can be operated above its rated horsepower without danger of overload failure.

Shallow Areas: Portions of a pool or spa with water depths less than five feet (5') (1.52 meters).

Shock Treatment: The practice of adding significant amounts of an oxidizing chemical to water to destroy inorganic and organic contaminants in water.

Shotcrete: 1. Shotcrete wet is a pneumatically applied mixture of sand, cement, aggregate and water and pumped wet through a nozzle where air is added. 2. Shotcrete dry is a mixture of sand and cement, blown through a nozzle where water is added. Both methods are used as a method of building the concrete floors and walls of swimming pools or water features. **Shut-Off Head:** The pressure developed in a centrifugal or axial flow pump when there is zero flow through the system; the amount of head against which the pump can no longer circulate water. **CUT OFF HEAD.**

Sight Barrier: A fence system that prevents entry but allows visual observation. See **Barrier.** **Signal Word:** A visual alerting device in the form of a decal or label placard or other marking such as an embossing, stamping, etching, or other process that advises the observer of the nature and degree of the potential hazard(s) that can cause property damage, injury, or death. It can also provide safety precautions or evasive actions to take, or provide other directions to eliminate or reduce the hazard. Aquatic safety signage shall conform to specifications as described in the ANSI Z-535 series of standards on product safety signs and labels.

Signal word: to convey the gravity of the risk **Consequences:** what are likely to happen if the warning is not heeded **Instructions:** appropriate behavior to reduce or eliminate the hazard

CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

DANGER: Danger indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING: Warning indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

Silica Fume: A fine particulate that is used as an additive to improve the strength and abrasion resistance in concrete products. Silica fume is a byproduct of the reduction of high-purity quartz with coal in electric furnaces in the production of silicon and ferrosilicon alloys.

Single-Phase Current: Electrical alternating current flow that reaches one peak in each direction per cycle.

Skimmer: A device installed in the pool or spa that permits the removal of floating debris and surface water to the filter.

Skimmer Cover: A removable lid to close deck opening to the skimmer housing.

Skimmer Equalizer Pipe: Connection from skimmer housing to the pool, spa, or hot tub below the weir and sized to satisfy pump demand and prevent air lock or pump loss of prime.

Skimmer Equalizer Valve: A device on the equalizer line that operates to draw water from the equalizer line when water level inside the skimmer body drops below operating level.

Skimmer Housing: Structure that attaches to or contains skimmer weir, strainer basket, float valve, and other devices used in the skimming operation.

Skimmer Weir: Part of a skimmer that adjusts automatically to small changes in water level to ensure a continuous flow of water to the skimmer.

Slip Resisting: A surface that has been so treated or constructed to significantly reduce the chance of a user slipping. The surface shall not be an abrasion hazard.

Slope: An inclined surface.

Slump: A measurement of water in concrete. A low-slump concrete has a stiff consistency. **Slurry:** A free-flowing, pumpable suspension of fine, solid material in liquid.

Smooth: Having a surface free from irregularities, roughness, or projections. **EVEN.**
Soda Ash: See Sodium Carbonate.

Sodium Bicarbonate (NaHCO₃): Also baking soda or sodium hydrogen carbonate. A white powder (pH = 8.3) used to raise total alkalinity in water.

Sodium Bisulfate (NaHSO₄): Also known as dry acid. A granule used to lower pH and/or total alkalinity in water.

Sodium Carbonate (Na₂CO₃): A white powder used to raise pH of the water.

Sodium Dichlor (Sodium Dichloro-Isocyanurate) (C₃N₃O₃Cl₂Na): Contains between 56% and 64% available chlorine. Sanitizer product that is self-stabilizing due to

release of free available chlorine and cyanuric acid when they dissolve. SODIUM DICHLORO-STRIAZINETRIONE.

Sodium Hypochlorite (NaCl): A clear liquid form of an inorganic chlorine compound obtainable in concentrations of 5% to 16% available chlorine. LIQUID CHLORINE, BLEACH.

Sodium Thiosulfate (Na₂S₂O₃): A chemical used to neutralize chlorine.

Soft Water: Water that has a low calcium and magnesium content.

Solar Panel: See Collector.

Soot: A black, powdery, carbonaceous substance created by improper air-fuel mixture in combustion of fossil fuels. Soot is a by-product of incomplete combustion.

Spa: A warm water reservoir permanently installed with hydromassage jets that are constructed out of concrete (gunite, shotcrete, etc.). Spas may or may not be attached to a pool.

Permanent Residential Spa: A spa in which the water heating and water-circulating equipment is not an integral part of the product. The spa shall be intended as a permanent plumbing fixture and shall not be intended to be moved. (Refer to ANSI/IAF-3, Standard for permanently installed residential spas, latest edition.)

Public Spa: Any spa other than a permanent residential spa or hot tub that is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/IAF-2, Standard for public spas, latest edition.)

Hydrotherapy Spa: A unit having a therapeutic use, but that is not drained, cleaned, or refilled for each individual. It includes, but is not limited to hydrotherapy jet circulation, hot water, cold water mineral baths, air induction bubbles, or any combination thereof. Industry terminology for a spa includes, but is not limited to (1) a therapeutic pool, (2) a hydrotherapy pool, (3) a whirlpool, (4) a hot spa, etc. IAF standards exclude facilities used by or under direct supervision and control of licensed medical personnel.

Spalling (Concrete or Plaster): The separation of the top layer of cement-rich material, exposing the underlying aggregate layer.

Spa User: Any person using a spa and adjoining deck area for the purpose of water activity or other related activity.

Special Purpose Pool: A pool intended to be used exclusively for a specific activity, such as instruction diving, competition, or medical treatment.

Splash Pool: A pool having a water depth not exceeding 18 inches (18") (0.46 meters) that has as its intended primary use random play by small children. The pool could include constructed play devices including small flume type water slides and other play devices. CHILDREN'S ACTIVITY POOL. See Catch Pool.

Splasher (Wader) Pools: A splasher pool shall have a maximum water depth of thirty-six inches (36") (0.91 meters). These pools are not intended to be covered within the scope of IAF standards.

Spray Pool: A pool or basin occupied by constructed features that spray water in various arrays for the purpose of wetting the persons playing in the spray streams. Maximum depth of accumulated water in the pool or basin area is six inches (6") (15.24 centimeters).

Springline: A line from which the pool wall breaks from vertical and begins its radius arc of the curvature.

Stabilizer: See Cyanuric Acid.

Stairs: A series of steps, each consisting of a riser and a tread.

Static Head: Head resistant caused by the weight of a standing water column to be moved. It is encountered on both the suction and discharge side.

Static Suction Head: The vertical distance in feet (meters) between the pump centerline and the level of the liquid being pumped when the liquid is below the impeller centerline, expressed in feet of head.

Static Suction Lift: Vertical distance in feet (meters) from center line of the pump impeller to pool water level.

Steps: See Stairs.

Story Pole: A pole marked to measure vertical heights during construction and to set elevations.

Strainer Basket: Readily removable, perforated, or otherwise porous container used in the pump lint strainer to catch coarse material.

Structural Crack: A break or split that weakens the structural integrity of the pool.

Suction Head: The head, in feet, that a pump must provide on the inlet side to raise the liquid from the pool/spa supply well to the level of the pump.

Suction Outlet: The aperture or fitting, other than a skimmer, on the side wall of a swimming pool or spa through which the water under negative pressure (vacuum) is drawn from the pool or spa to the pump or circulation system.

Suction Piping (Influent): The piping that is connected to the suction side of the pump.

Superchlorination: The practice of adding a sufficient amount of a chlorinating compound to reduce cloudy water, slime formation, musty odors, algae and bacteria counts, and/or improve the ability to maintain sanitizer residuals.

Surface Checks: Spider-webbing pattern in a surface. Not all the way through, not an open crack.

Surface Crack: A repairable break in the surface, not major, not self-curing.

Surface Skimming System: A device or system installed in the pool/spa that permits the removal of floating debris and surface water to the filter.

Surge: Displacement of water in a pool — static and dynamic. WAVE ACTION.

Surge Capacity: The storage volume in a surge chamber, gutter, and plumbing lines. See System Capacity.

Surge Chamber: A storage vessel within the pool recirculating system used to absorb the water displaced by bathers. SURGE PIT.

Swimmer Load: See Bather Load.

Swimming Area: Area of pool in excess of three feet (3') (0.91 meters) in depth that is devoted to swimming.

Swimout: An underwater seat area that is placed completely outside of the perimeter shape of the pool. When located at the deep end, swimouts are permitted to be used as the deep-end means of entry/exit of the pool. LOVE SEAT.

System Surge Capacity: The total storage, including surge chamber, gutter system and piping, within the pool recirculating system used to absorb the water displaced by bathers.

Tamperproof: Requiring tools to alter or remove portions of the equipment. VANDAL-PROOF.

Tangent: Straight line or curve that contacts an arc or curve at one point only.

Temperature Factor (TF): Used when determining the saturation index.

Temperature Rise: The difference between the desired water temperature and the temperature of the body of water. 10/20 Rule: A pool or aquatic facility shall be provided with a qualified lifeguard or a number of lifeguards trained and stationed in a manner that will permit them to identify an incident or trauma within ten (10) seconds of its initiation. Upon identification of the incident or trauma, the guard shall be able to respond to and initiate indicated protocol appropriate to the circumstance within twenty (20) additional seconds.

Test Kit: Equipment used to determine specific chemical residual and physical properties of water.

Texture: The visual or tactile condition of a surface.

Therm: A unit of thermal measurement equal to 100,000 BTUs.

Thermostat: A temperature-controlling device that cycles the heater on and off to maintain the desired temperature.

Three-Phase Current: Current flow that reaches a peak in each direction three times during a cycle.

Time Clock: A device that automatically controls the periods that a pump, filter, heater, blower, and other electrical devices are in operation.

Titration: A method for measuring alkalinity, hardness, available chlorine or other such chemical parameters by measured addition of reagents that yield a foreseeable end point as indicated by a change in color.

Top Coat: See Plaster.

Top Rail: The part of the frame located on top of or adjacent to the outer edges of the aboveground/ onground pool wall.

Total Alkalinity: A measure of the pH buffering capacity of water. Alkalinity is generally expressed in terms of the equivalent concentration of calcium carbonate in mg/L (or ppm).

Total Alkalinity (TA) Factor: Used when determining the saturation index.

Total Chlorine: The sum of both the free available and combined chlorines.

Total Dissolved Solids (TDS): The measure of the total amount of dissolved matter in water.

Total Dynamic Head: See Feet Of Head.

Toxic: A substance having an adverse physiological effect on human beings or other living organisms.

Transfer System: A device, or combination of devices, that include a platform, steps, and other structures to facilitate user access to a pool.

Transition: Any point(s) on the floor of a pool where the angle/slope changes.

Tread Contact Surface: Foot contact surfaces of a ladder, step, stair, or ramp.

Trichloro: A form of organic chlorine, most commonly found in compressed form (tablets or sticks).

Trichloro-Iso-Cyanurate (C₃N₃O₃Cl₃): Sanitizer product that is self-stabilizing due to release of free available chlorine and cyanuric acid when it dissolves. A form of organic chlorine that reacts with water to form 90% available chlorine and cyanuric acid. TRICHLORO-STRIAZINETRIONE. See Isocyanurates.

Tsunami Pool: A wave pool designed to generate a single transitional wave in each cycle. These pools are characterized by strong cross currents and counter currents after the passage of each wave. The operating pattern for the Tsunami pool produces a single wave form at frequencies ranging from several seconds to several minutes.

Tube Ride: A gravity flow attraction found at a waterpark designed to convey riders on an inner tube-like device through a series of chutes, channels, flumes, or pools.

Turbidity: Cloudy condition of water due to the presence of extremely fine particulate materials in suspension that interfere with the passage of light.

Turnover Rate: The period of time (usually in hours) required to circulate a volume of water equal to the pool or spa capacity.

Two-Speed Pump: A centrifugal pump that has a motor that operates at two different speeds.

Ultra-Violet Light: A component of sunlight and can be generated artificially. Ultra-violet light stimulates many types of organic molecules to become chemically reactive and can decompose a variety of chemical species. UV light-generating devices may be used as a supplemental sanitizer to inactivate microorganisms. UV light is often characterized as UV-A, UV-B, or UV-C, indicating wave lengths of 315 – 400 nanometers (nm), 290 – 315 nm, and 220 – 290 nm, respectively.

Underwater Ledge: A narrow shelf projecting from the side of a vertical structure whose dimensions are defined in the appropriate standard.

Underwater Light: A fixture designed to illuminate from beneath the water surface.

Wet Niche Light: A watertight and watercooled light unit placed in a submerged niche in a pool, spa, or hot tub wall and accessible only from the interior.

Dry Niche Light: A light unit placed behind a watertight window in the pool, spa, or hot tub wall.

Upper Distribution System: Those devices designed to distribute the water entering a permanent medium filter in a manner to prevent movement or migration of the filter medium. Also collects water during filter backwashing unless other means are provided.

Upright Support: That portion of the frame that is adjacent to the aboveground/ onground wall in a vertical position that supports the top rail and braces the wall.

Usable Perimeter: The perimeter of a pool that is available for ingress and egress. Perimeter areas available only to staff or for emergency situations are not included.

User: Any person engaging in water activities or related activities at a pool, spa, or hot tub, including the adjoining deck.

User Load: The total number of persons permitted in the pool/spa complex at any given time. See Bather Load.

Vacuum: The reduction of atmospheric pressure within a pipe, tank, pump, or other vessel. Vacuum is measured in inches of mercury. One inch of mercury is equivalent to 1.13 Feet of Head. One inch of mercury is also equivalent to 345.3 kilograms per square meter.

Vacuum Filter: A filter through which water is pulled by a pump mounted on the effluent side of the filter.

Valve: Any device in a pipe that will partially or totally obstruct the flow of water (such as a ball, gate, globe, or butterfly valve) or permit flow in one direction only (as with a check or foot valve).

Vanishing Edge: Water-feature detail in which water flows over the edge of at least one of the pool walls and is collected in a catch basin. NEGATIVE EDGE.

Velocity: The speed at which a liquid flows between two specified points, expressed in feet per second. One foot per second is equivalent to 0.30 meters per second.

Velocity Head: When applied to a hydraulic system, a measurement of resistance or pressure that is equal to the height of a column of water than would cause the same pressure or resistance. $\text{Velocity head} = v^2/(2g)$. The principal factors of "head" are vertical distances and resistance due to friction of the flow of water against the walls of a pipe or vessel.

Venting (Heaters): The system responsible for the introduction of air for combustion and for dispersal of the flue products.

Venturi Jet: See Hydrotherapy Jet.

Venturi Tube: A tube mounted in a circulation line so as to cause restrictions of flow. The restriction causes a pressure differential that is used to measure flow rate or to operate hydraulic chemical feeders such as sanitizers, clarifiers, etc.

Vertical Wall: A wall that may slope outward up to 11° (eleven degrees) from plumb.

Vinyl Liner: A suitable material constructed of vinyl or vinyl compounds that acts as a container for water when used in conjunction with a structural support system.

Voltage: The measure of electrical potential or electromotive force in units called volts.

Volume: The capacity of a specified container (e.g., a pool or spa) expressed in gallons or liters. One U.S. gallon is equivalent to 3.79 liters.

Wading Pool: A pool that has a shallow depth used for wading.

Waler: A horizontal bracing member used in form construction. RANGER, WHALER.

Wall: The surface of a vertical barrier.

Wall Closure: The fastening device(s) that connect the aboveground wall ends together.

Warning: See Signal Word.

Waste Water Disposal System: All water disposal systems approved by the authority having jurisdiction, such as a storm sewer, sanitary sewer, open pit, leach field, or irrigation system.

Waterline: The waterline shall be defined in one of the following ways: 1. Skimmer System: The waterline shall be at the midpoint of the operating range of the skimmers when there are no users in the pool or spa. 2. Overflow System: The waterline shall be at the top of the overflow rim.

Water Pressure Switch: See Pressure Switch.

Watt: The measure of electrical power computed by multiplying voltage times current (volts x amperes). Equal to 1/746 of one horsepower unit.

Watt Density: The amount of watts generated in a heating element per inch. The lower the amount of watts per square inch, the lower the density. One square inch is equivalent to 6.45 square centimeters.

Wave Pool Caisson: A large chamber used in wave generation. This chamber houses pulsing water and air surges in the wave generation process and is not meant for human occupancy.

Weir: See Skimmer Weir.

Wet Niche Light: See Underwater Light.

White Coat: See Plaster.

Winterized Liner: A vinyl liner that is manufactured with sufficient plasticizers to withstand exposure to its rated lowest temperature or -20°F (-28.89 degrees Celsius) per ASTM standard D-1790-99, Standard test method for brittleness temperature of plastic sheeting by impact, 2001, or latest edition. Winterizing: Preparation of pools and spas for cold or freezing weather.

Wrinkle: A small ridge or crease in an otherwise smooth vinyl liner.

Zero Entry: See Beach Entry.

Maine Professional Engineer
Stamp, Signature, and Date :

Signature: _____

Date: _____