



## **NEW LODGING FACILITY OR CHILDCARE ABOVEGROUND OR ONGROUND POOL DESIGN CHECKLIST**

**Instructions:** A Maine Licensed Professional Engineer may use this checklist to ensure that a new aboveground pool at a lodging or childcare facility meets all of the “Class C Pool” design criteria required by the Maine Rules Relating to Public Pools and Spas, 10-144 CMR, Chapter 202, Section 2.B.

Reference: ANSI/NSPI-4 1999: American National Standard for Aboveground/Onground Residential Swimming Pools.

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

### **NEW LODGING FACILITY OR CHILDCARE ABOVEGROUND POOL DESIGN CHECKLIST**

#### **SCOPE**

This checklist describes certain criteria for the design, manufacturing, testing, care and use of aboveground/onground residential {Type-O} non- diving swimming pools and their components.

Aboveground/onground residential swimming pools are for swimming and wading only. No diving boards, slides or other equipment are to be added to an aboveground/onground pool that in any way indicates that an aboveground/onground pool may be used or intended for diving purposes.

This checklist does not apply to public/commercial pools, permanently-installed residential pools, competitive pools, hot tubs, and other pools or spas such as those operated for medical treatment, physical therapy, or other special purposes.

Other standards are referenced in this standard for items not covered.

#### **MATERIALS OF MANUFACTURE**

\_\_\_\_ The materials of components and accessories used for aboveground/onground residential pools shall be compatible with man and the environment in which they are installed. These materials shall be capable of fulfilling the design, installation and intended use requirements in this standard.

\_\_\_\_ The selection of all materials and manufacturing processes for components and accessories to be used for aboveground/onground residential pools shall be such that all parts with external surfaces

and edges that may come in contact with the user are assembled, arranged, and/or finished (deburred, polished, etc.) so that they will not constitute a cutting, pinching, puncturing or abrasion hazard.

\_\_\_\_ All paints and finishes shall comply with the U.S. Code of Federal Regulations (CFR) 1303.1 et. Seq. (1997).

## **DIMENSIONAL DESIGN**

\_\_\_\_ Perimeter Shape: This standard is not intended to regulate the shape of the swimming pool other than to take into account the effect a given shape will have on the safety of the occupants and the minimum required level of circulation will be maintained to ensure sanitation.

\_\_\_\_ There shall be construction tolerances allowed on all dimensional designs. Overall length, width and depth may vary plus or minus two inches ( $\pm 2''$ ) [ $\pm 5.08$  cm], unless otherwise specified.

\_\_\_\_ Aboveground/onground pool shall have a minimum water depth of thirty-six inches (36") [91.44 cm] and shall have a maximum water depth of forty-eight inches (48") [121.92 cm] at the wall.

\_\_\_\_ Floor Slopes: Floor slopes shall be uniform and comply with Articles 3.2.1 through 3.2.4.

\_\_\_\_ The slope of the floor from the shallow wall towards the deep area shall not exceed one foot in seven feet (1':7') [30 cm:213 cm] to the point of the first slope change.

\_\_\_\_ The slope of the floor from the point of the first slope change towards the deepest point shall not exceed one foot in three feet (1':3') [30 cm:91 cm].

\_\_\_\_ The slope adjacent to the shallow area shall have a maximum slope of one foot in three feet (1':3') [30 cm:91 cm] and the slope adjacent to the side walls shall have a maximum slope of one foot in one foot (1':1') [30 cm:30 cm].

\_\_\_\_ The point of the first slope change shall be defined as the point at which the shallow area slope exceeds one foot in seven feet (1':7') and be at least six feet (6') [182.88 cm] from the shallow end wall of the pool.

\_\_\_\_ Water Depth: Water depths at the shallow area of the swimming pool shall be a minimum of thirty-six inches (36") [91.44 cm] and a maximum of forty-eight inches (48") [121.92 cm].

\_\_\_\_ DIMENSIONALLY SPECIFIED CONTOURED DEEP AREA: Pools designated Type-O with a manufactured dimensionally- specified contoured deep area and a water depth that exceeds sixty inches (60") shall be for swimming only.

## **POOL AND COMPONENT DESIGN**

\_\_\_\_ Design and Materials: The structural design and materials used shall be in accordance with accepted structural engineering practices.

\_\_\_\_\_ All primary structural members shall have a minimum factor of safety of 1.7 (yield strength) and, when used, aluminum structures shall have a minimum factor of safety of 1.85 (yield strength).

\_\_\_\_\_ In climates subject to freezing temperatures, the pool shell, water containment device and appurtenances, piping, hoses, filter system, pump and motor, and other components shall be designed and constructed to facilitate protection from damage due to freezing.

\_\_\_\_\_ Construction Tolerances: There shall be construction tolerances allowed on all dimensional designs. Overall length, width and depth may vary plus or minus two inches (+2") [+5.08 cm], unless otherwise specified.

\_\_\_\_\_ Aboveground/Onground Vinyl Liners: Aboveground/onground residential pool vinyl liners, including replacement liners, shall identify the vinyl liner manufacturer and shall conform to Articles 4.3.1 through 4.3.5.

\_\_\_\_\_ Liners shall be sealed to produce a membrane to contain the water in a watertight envelope. The manufacturer's Identification Number shall be permanently affixed to the liner.

\_\_\_\_\_ Materials used to fabricate standard-grade vinyl liners shall not physically crack when tested at zero degrees Fahrenheit (0°F) [-17.78°C] per ASTM D1790 1994 "Tested Method for Brittleness Temperature of Plastic Film by Impact" or the latest approved edition.

\_\_\_\_\_ Materials used to fabricate winterized vinyl liners shall not physically crack when tested at [-28.89°C] per ASTM D-1790 1994 "Test Method for Brittleness Temperature of Plastic Film by Impact" or the latest approved edition.

\_\_\_\_\_ Stated liner thickness shall be plus or minus ten percent (±10%) of the thickness recommended by the manufacturer and measured in accordance with ASTM Test D-1593 "Non-Rigid Vinyl Chloride Plastic Sheeting" or the latest approved edition.

\_\_\_\_\_ Liner Carton Label Requirements: The vinyl liner manufacturer shall apply a label on the liner carton that describes its contents.

\_\_\_\_\_ The label shall include, but not be limited to:

- Pattern/design
- Size
- Type of liners (beaded, overlay or beaded extrusion, expanded, hopper or dimensionally-contoured)
- Thickness of liner shall be designated in inches, mil or millimeters (wall and bottom)
- Grade of Liner (winterized or standard)

#### Aboveground/Onground Residential Pool Walls

\_\_\_\_\_ Where wall sections or wall ends are joined together their joints shall be capable of withstanding the maximum stress applied to the wall. (See Article 4.1.1) The means of closure shall be described in easy-to understand diagrams and or language in the assembly instructions.

## INSTRUCTIONS, SAFETY FEATURES, USAGE AND MAINTENANCE

**INSTRUCTION MANUAL:** Manufacturers/suppliers shall advise the following in their instruction manuals:

\_\_\_\_\_ The manufacturer's name and address.

\_\_\_\_\_ Component manufacturers shall supply a parts list; a self-explanatory, illustrated set of instructions for assembly, installation, maintenance and use.

\_\_\_\_\_ The use of artificial pool lighting is at the discretion of the pool owner. Lighting, when installed shall, be in accordance with Article 680 of the National Electrical Code 1999 (NEC) or its latest approved edition and in consultation with a licensed electrical professional.

\_\_\_\_\_ During nighttime pool use, artificial lighting shall be used to illuminate all safety signs, ladders, steps, deck surfaces and walks.

\_\_\_\_\_ The floor of the pool shall be visible at all times from the outside perimeter of the pool.

\_\_\_\_\_ In the written instructions and manuals for the pool, safety-related information shall have the appropriate signal word in bold type, twice the size of normal type, and shall be contained in a bordered area. (See Appendices B and H).

**INSTALLATION** – Manufacturer/suppliers shall advise in the following their instruction manuals:

\_\_\_\_\_ Components such as the filtration system, pumps and heater shall be positioned so as to prevent their being used as a means of access to the pool by young children. (See ANSINSPI-8 1996 "Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs" or the latest approved edition).

\_\_\_\_\_ The installer shall follow written instructions provided for operation of the circulation systems.

\_\_\_\_\_ Local building codes may require obtaining a building or electrical permit. Installer shall follow regulations on setback, barriers, devices and other conditions.

\_\_\_\_\_ Decks shall meet local codes and comply with ANSINSPI-8 1996 "Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs" or the latest approved edition.

\_\_\_\_\_ Any after-market or home-built deck, if construction of such is allowed by the manufacturer, shall comply with the local building code, including load capacity and fencing requirements.

\_\_\_\_\_ All electrical components shall be installed in accordance with Article 680 of the National Electrical Code 1999 (NEC) "Swimming Pools, Fountains and Similar Installations" or its latest approved edition.

\_\_\_\_\_ Submersible pool lighting to illuminate the water for the user shall comply with the

applicable sections of Article 680 of the National Electrical Code 1999 (NEC”) or its latest approved edition “Underwater Lighting Fixtures.”

\_\_\_\_\_ Underwater lights having front access shall be installed and removed only with the use of tools.

\_\_\_\_\_ The installer of the vinyl liner shall affix on the original or replacement liner, or on the pool structure, all safety signs in accordance with the manufacturer’s instructions. The safety signs shall be placed above the water line.

**SAFETY FEATURES-** Manufacturers/suppliers shall advise the initial pool purchaser/owner of the following:

\_\_\_\_\_ Warn against diving into an aboveground/onground pool.

\_\_\_\_\_ Recommendations for the location and affixing of safety signs.

\_\_\_\_\_ Safety signs shall comply with requirements of ANSI 2535 1998 Series of Standards for Safety Signs and Colors or the latest approved edition. (For examples of safety signs, see Appendix B. For letter size information on signs, see Appendix C).

\_\_\_\_\_ The signal word(s) (Danger, Warning or Caution) shall be written in bold type, a minimum of twice the size of the normal type used in the instructions, and is contained in a bordered area.

\_\_\_\_\_ Swimming pool barriers, which restrict access to the pool by children under five years of age. Advise that a barrier is necessary to provide protection against potential drowning and near drowning and that barriers are not a substitute for the constant supervision of children (see ANSINSPI-8 1996 “Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs” or the latest approved edition).

\_\_\_\_\_ Post a list of emergency telephone numbers such as the nearest available police, fire, ambulance and/or rescue unit. These numbers are to be kept near the telephone, which is closest to the pool.

\_\_\_\_\_ Toys, chairs, tables or similar objects that a young child could climb shall be at least four feet (4’) [121.92 cm] from the pool. (See “ANSI/NSPI-8 1996 Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs” or the latest approved edition).

\_\_\_\_\_ Publications which describe the risk of both drowning and diving accidents. Available publications related to pool safety include National Spa and Pool Institute (SPI) booklets entitled: “The Sensible Way To Enjoy Your Aboveground/ Onground Swimming Pool”, “Children Aren’t Waterproof”, “Pool and Spa Emergency Procedures For Infants”, “Layers of Protection”, and the ANSI/NSPI-8 1996 “Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs” or the latest approved edition.

\_\_\_\_\_ Basic lifesaving equipment, including one of the following, be on and at all times:

\_\_\_\_\_ A light, strong, rigid pole (shepherds crook) not less than twelve feet (12 ’) [365.76 cm] long.

\_\_\_\_\_ A minimum one-fourth inch (1/4") [6.35 mm] diameter rope as long as one and one half (1-1/2) times the maximum width of the pool or fifty feet (50') [ 15.24 meters], whichever is less, which has been firmly attached to a Coast Guard-approved ring buoy having an outside diameter of approximately fifteen inches (15") [38.1 cm], or a similarly approved flotation device.

\_\_\_\_\_ Pool covers used for safety barriers, shall comply with ASTM F-1346-91 "Standard Performance Specifications for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs" or the latest approved edition.

\_\_\_\_\_ Entrapment Avoidance: There shall be no protrusions or other obstruction in the swimming area, which may cause entrapment or entanglement of the user.

**MAINTENANCE** - Manufacturers/suppliers shall advise the following in their instruction manuals:

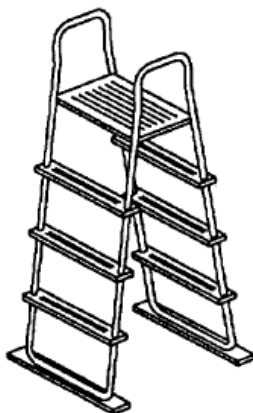
\_\_\_\_\_ The pool is subject to wear and deterioration. If not maintained properly, certainty types of excessive or accelerated deterioration can lead to failure of the pool structure that might release large quantities of water that could cause bodily harm and property damage.

\_\_\_\_\_ The maintenance of all structural and component pool parts and the maintenance of circulation systems, as described in the instruction manual(s).

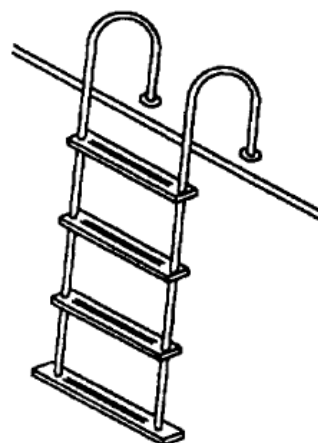
## **ABOVEGROUND/ONGROUND POOL LADDERS AND STAIRCASES**

\_\_\_\_\_ All pools shall have a means of entry/exit consisting of at least one (1) ladder or a ladder and staircase combination (depending upon the pool/deck configuration). A ladder and staircase combination may consist of Types C + D, or Types C + E and F. Ladder Types A and B are constructed for entry/exit. For more information, see "Ladder" in the Glossary.

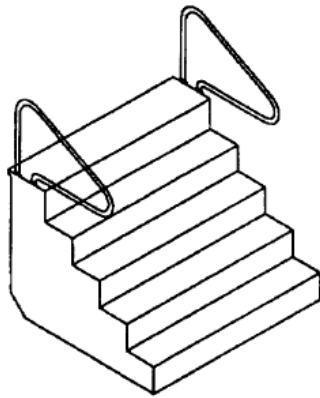
Examples of available ladders and staircases:



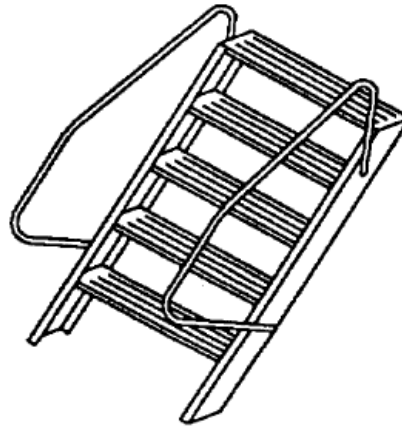
**TYPE A-FRAME LADDER**  
Type A - Double Access  
Type B - Limited Access



**TYPE D - TYPICAL IN-POOL LADDER**



**TYPICAL IN-POOL STAIRCASE LADDER**  
Type E – Protruding  
Type F – Recessed



**TYPE C- TYPICAL STAIRCASE LADDER**

Ladders and staircases shall conform to the following:

- \_\_\_ All ladder and staircase treads, which are integral to or permanently attached, shall have a minimum static slip-resistance coefficient of 0.6 wet.
- \_\_\_ Ladders and staircases shall be made of corrosion-resisting materials.
- \_\_\_ Ladders shall provide two (2) handrails/ handholds that serve all treads.
- \_\_\_ Staircases shall provide a minimum of one (1) hand-rail-hand-hold that serves all treads.
- \_\_\_ Welded assemblies shall be free from structural defects.
- \_\_\_ Riveted assemblies shall be free from structural defects.
- \_\_\_ The ladder shall be adequately designed to withstand the test requirements as stated in the “Test Requirements” section directly below.
- \_\_\_ Written instructions for proper assembly and use of all ladders shall include the following messages:

“Locate ladder on a solid base.”

“One person on the ladder at a time.”

“The ladder shall be installed per manufacturer’s instructions.”

“Manufacturer shall provide instructions which states face the ladder at all times.”

**Portable ladders:**

\_\_\_ A double access ladder (Type A) shall have a safety sign affixed stating “Remove and secure ladder when pool is not occupied.”

\_\_\_ A limited access ladder (Type B) shall have a safety sign affixed stating “Secure ladder when pool is not occupied”.

\_\_\_\_\_ Manufacturers shall include in the instructions and on the shipping carton for in-pool ladders, a-frame ladders, staircase ladders, protruding or recessed staircases. "This ladder is designed and manufactured for a specific pool wall height and/or deck of the pool."

\_\_\_\_\_ The manufacturer shall identify the carton by labeling "This ladder is designed and manufactured for a specific pool wall height and/or deck of the pool."

\_\_\_\_\_ The manufacturer shall provide the following statement in the instructions. "For entry/exit of pool, face the ladder at all times".

#### Test Requirements for Types A, B, C, D and E Ladders:

\_\_\_\_\_ All tests shall be conducted as if the assembled ladder is installed on the pool, in a dry condition on a hard level surface using a "C" side grade or better plywood sheet to provide a uniform surface.

\_\_\_\_\_ All ladders shall be designed for a minimum-working load of 224 pounds [101.6 kg] with the following ultimate load and factor of safety:

Step Test. 672 lbs. [304.8 kg] 3:1

\_\_\_\_\_ Compression Test: A compression test shall be performed on the assembled ladder in the operating position with the test load of 672 pounds [304.8 kg] applied over a three and one-half inch (3-1/2") [118.89 cm] tread length at the center of the step or platform, whichever is higher. The assembled ladder shall not exhibit failure or permanent deformation.

\_\_\_\_\_ Step Test: The strength of each step shall be tested by applying a 672 pound [304.8 kg] test load on a three and one-half inch (3-1/2") [8.89 cm] wide pad located on the centerline of each step. Each step shall withstand the test load without failure or permanent deformation.

\_\_\_\_\_ Shear Test: The shear strength of the step-to-step rail joint is measured by applying the test load of 448 pounds [203.2 kg] over three and one-half inches (3 1/2") [8.89 cm] of tread length as near to the joint as possible. On removing the load, there shall be no indication of failure in the fastener or in any other component.

\_\_\_\_\_ Stability Test: The stability test of the assembled ladder shall be set in the level operating position with the vertical test load of 224 pounds [101.6 kg] applied successfully at the center and side of the top step. During this test, the ladder base shall remain on the floor and be assembled and affixed per manufacturing instructions.

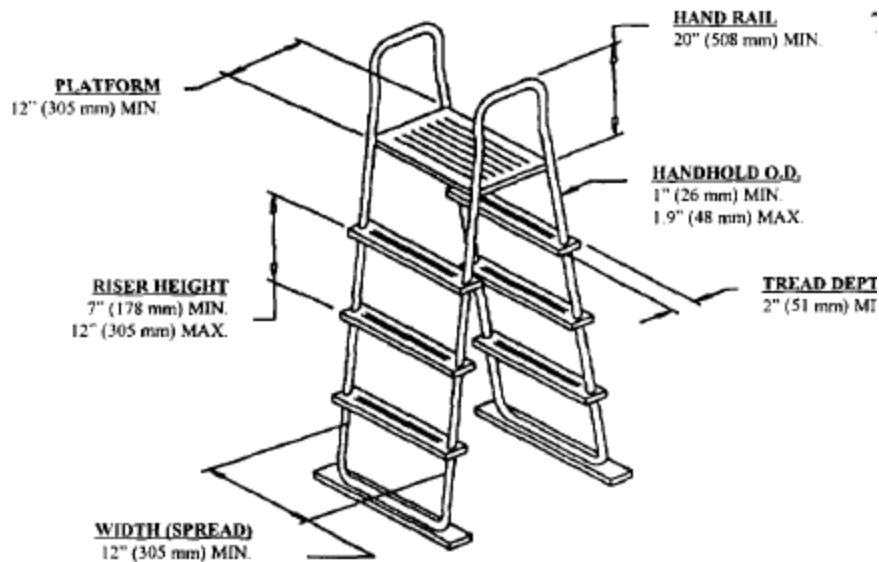
Outside Front Stability: 60 pounds[27.2 kg]

Side Stability: 30 pounds[ 13.6 kg]

Rear Stability: 60 pounds [27.2 kg]

#### TYPE A (DOUBLE ACCESS) "A-FRAME LADDERS AND TYPE B (LIMITED ACCESS)





**TYPICAL A-FRAME LADDER**

Type A – Double Access

Type B – Limited Access

\_\_\_\_ “A-frame” ladders shall have two hand-rails-hand-holds that serve all treads.

\_\_\_\_ “A-frame” ladders shall have two handrails/handholds with a minimum height of twenty inches (20”) [50.8 cm] above the platform or uppermost tread, whichever is higher.

\_\_\_\_ The outside diameter of handrails handholds shall be a minimum of one-inch (1”) [2.54 cm] and a maximum of one and nine-tenth inches (1.9”) [4.826 cm] in diameter.

\_\_\_\_ Ladder treads shall have a minimum horizontal uniform depth of (2”) [5.08 cm] two inches.

\_\_\_\_ The clear distance between ladder handrails shall be a minimum of (12”) twelve inches [30.48 cm].

\_\_\_\_ There shall be a uniform distance between ladder treads, with a seven inches (7”) [17.78 cm] minimum and twelve inches (12”) [30.48 cm] maximum.

\_\_\_\_ Type B “A-frame” ladders shall have affixed the following or similar safety sign stating “No Diving” in a readable position above the water level on both the in-pool and entry side of the ladder.

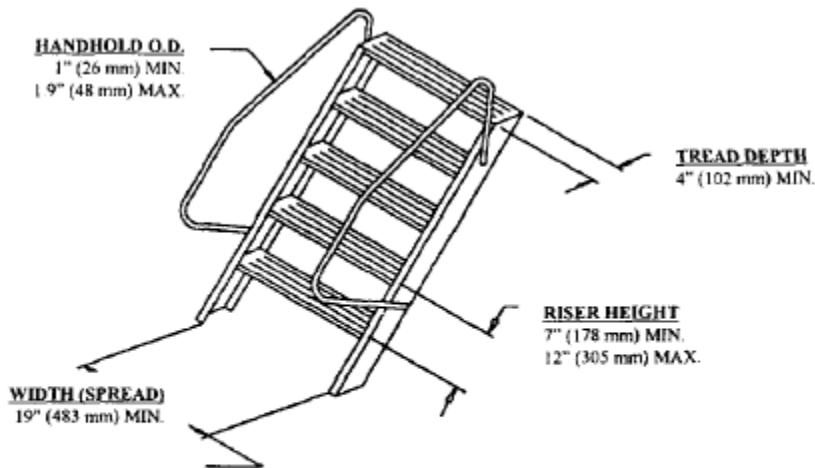
\_\_\_\_ Type B “A-frame” ladders shall have affixed the following or similar safety sign stating “No Jumping - No Diving -” in a readable position above the water level on both the in-pool and entry side of the ladder. It is the manufacturer’s discretion to apply their signal word of choice.

\_\_\_\_ Type B “A-frame” ladders which utilize swing-up, or slide-up sections to limit accessibility shall have affixed the following or similar safety sign: “When pool is not occupied, swing-up and secure, lift-off, or slide-up and secure. (For Examples of Safety Signs, See Appendix B.) It is the manufacturer’s discretion to apply their signal word of choice.

\_\_\_ Type B “A-frame” ladder shall have affixed on the pool side of the ladder the following or similar safety sign stating “To Prevent Entrapment or Drowning Do Not Swim Through, Behind or Around Ladder”. (For Examples of Safety Signs, See Appendix B.)

\_\_\_ The manufacturer shall provide the following statement in the instructions, “For entry/exit of pool, face the ladder at all times.

### TYPE C (GROUND TO DECK) STAIRCASE LADDERS



#### TYPE C – TYPICAL STAIRCASE LADDER

\_\_\_ Staircase ladders shall have a minimum of two (2) handrails/handholds that serve all treads.

\_\_\_ The outside diameter of handrails/handholds shall be a minimum of one-inch (1") [2.54 cm] and a maximum of one and one nine-tenth inches (1.9") [4.826 cm] in diameter.

\_\_\_ Ladder treads shall have a minimum horizontal uniform depth of (4") [10.16 cm] four inches.

\_\_\_ All ladders and staircase treads, which are integral to or permanently attached, shall have a minimum static slip-resistance of 0.6 wet.

\_\_\_ There shall be a uniform distance between ladder treads, with a seven inches (7") [17.78 cm] minimum and a twelve inches (12") [30.48 cm] maximum.

\_\_\_ All steps shall have a minimum unobstructed spread of nineteen inches (19") [48.26cm] between the side rails.

\_\_\_ Staircase ladders which swing up to secure or to be removed to secure shall have the following or similar safety sign affixed stating: "When not in use swing-up and secure or remove." (For Examples of Safety Signs, See Appendix B.)

\_\_\_ When using a staircase ladder with decks, the top step shall be flush with the deck, or be

between seven inches (7") [17.78 cm] to twelve inches (12") [30.48 cm] below the deck level.

\_\_\_\_\_ The manufacturer shall identify the carton by labeling "This ladder is designed and manufactured for a specific pool wall height and/or deck height of the pool".

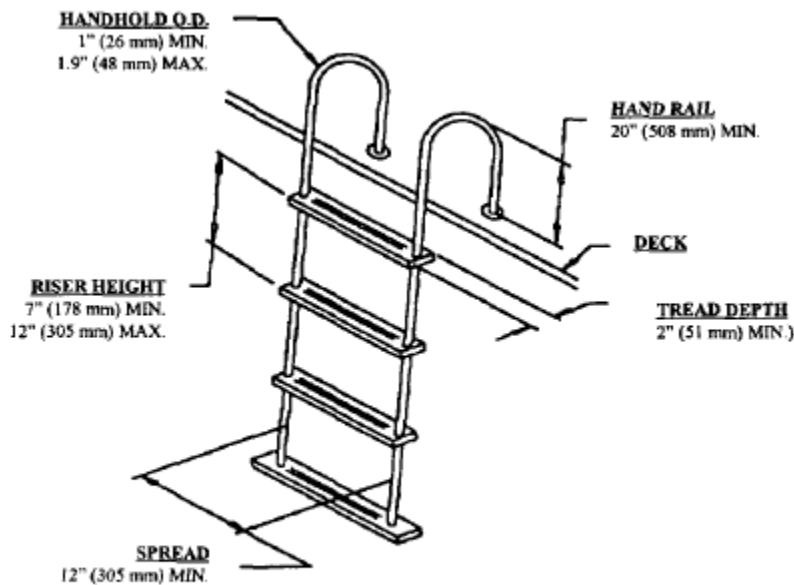
\_\_\_\_\_ The manufacturer shall provide in the instructions the statement "For entry/exit of pool, face the ladder at all times."

#### TYPE D IN-POOL LADDER

\_\_\_\_\_ Ladders shall provide two (2) handrails/handholds, which extend above the platform or deck for a minimum of twenty inches (20") [50.8 cm].

\_\_\_\_\_ All ladders and staircase ladders shall have slip resisting tread surfaces of a coefficient of 0.6 wet.

\_\_\_\_\_ There shall be a minimum clearance of six inches (6") [15.24] between the wall of the pool and the innermost surface of assembled ladder.



#### **TYPE D – TYPICAL IN-POOL LADDER**

\_\_\_\_\_ The clear distance between ladder handrails shall be a minimum of twelve (12") [30.48 cm] inches.

\_\_\_\_\_ There shall be a uniform distance between ladder treads, with a seven inches (7") [17.78 cm] minimum and twelve inches (12") [30.48 cm] maximum.

\_\_\_\_\_ Ladder treads shall have a minimum horizontal uniform depth of two inches (2") [5.08 cm].

\_\_\_\_\_ In-pool ladders shall have affixed the following or similar safety sign stating " No Diving" in a readable position above the water ladder.

\_\_\_\_ In-pool ladders shall have affixed the following or similar safety sign stating "Warning: To Prevent Entrapment or Drowning, Do Not Swim Through, Behind or Around ladder." (For example of Safety signs, see Appendix B.)

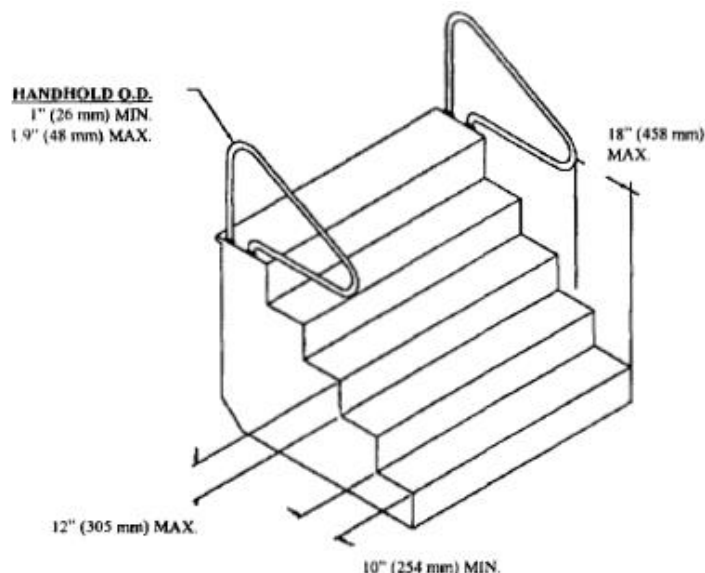
\_\_\_\_ The outside diameter of handrails/handholds shall be a minimum of one inch(1") [2.54 cm] and a maximum of one and nine-tenths inch (1.9") [4.826 cm] in diameter.

\_\_\_\_ There shall be a clearance of three inches (3") [7.62 cm] minimum and six inches (6") [15.24 cm] maximum between the pool wall and the ladder.

\_\_\_\_ The manufacturer shall identify the carton by labeling "This ladder is designed and manufactured for a specific pool wall height and/or deck of the pool."

\_\_\_\_ The manufacturer shall provide the following statement in the instructions, "For entry/exit of pool, face the ladder at all times".

TYPE E IN-POOL STAIRS, the design and construction of protruding and recessed pool stairs shall conform to the following.



**TYPICAL IN-POOL STAIRCASE LADDER**

Type E - Protruding  
Type F - Recessed

\_\_\_\_ Treads shall have a minimum unobstructed horizontal depth of ten inches (1 0") [254 mm] at all points and a minimum unobstructed surface area of two-hundred-forty square inches (240 sq. ') [1548cmz].

\_\_\_\_ Risers at all points, except for the bottom riser, shall have a maximum uniform height of twelve inches (12") [305 mm].

\_\_\_\_ The vertical distance from the pool coping and deck or step surface to the uppermost tread shall be a maximum of twelve inches (12") [30.48 cm] and be slip resisting

Handrails shall conform to the following:

\_\_\_\_\_ Handrails, if removable, shall be installed in such a way that they cannot be removed without the use of tools.

\_\_\_\_\_ The leading edge of handrails facilitating stairs and pool entry/exit shall be no more than eighteen inches (18") [45.72 cm] plus or minus three inches (+/- 3") [+/- 7.62 cm], horizontally from the vertical plane of the bottom riser (where applicable).

\_\_\_\_\_ The outside diameter of handrails/handholds shall be a minimum of one inch (1") [2.54 cm] and maximum of one and nine-tenths inches (1.9") [4.826 cm] diameter.

Applicable safety signs shall be affixed.

\_\_\_\_\_ Written instructions for proper assembly of in-pool stairs shall include the following messages:

"Locate in-pool staircase on a solid base."

"One person at a time in the pool staircase."

"The in-pool staircase shall be installed per manufacturer's instructions."

"Manufacturer shall provide instructions which states face the ladder at all times."

TYPE F IN POOL STAIRS, the design and construction of recessed pool stairs shall conform to the following:

\_\_\_\_\_ Treads shall have a minimum unobstructed horizontal depth of ten inches (10") [254mm] at all points and a minimum unobstructed surface area of two-hundred-forty square inches (240 sq. inches) [1548 sq. cm].

\_\_\_\_\_ Risers, at all points, except for the bottom riser, shall have a maximum uniform height of twelve inches (12") [30.48 cm].

\_\_\_\_\_ The vertical distance from the pool coping and deck or step surface to the uppermost tread shall be a maximum of twelve inches (12") [3.48 cm] and be slip resisting.

If handrails are used, they shall conform to the following:

\_\_\_\_\_ Handrails, if removable, shall be installed in such a way that they cannot be removed without the use of tools.

\_\_\_\_\_ The leading edge of handrails facilitating stairs and pool entry/exit shall be no more than eighteen inches (18") [45.72 cm] plus or minus three inches (+/- 3") [+/- 7.62 cm] horizontally from the vertical plane of the bottom riser (where applicable).

\_\_\_\_\_ The outside diameter of handrails/handholds shall be a minimum of one inch (1") [2.54 cm] and maximum of one and nine-tenths inches (1.9") [4.826 cm] diameter.

\_\_\_\_\_ Applicable safety signs shall be affixed.

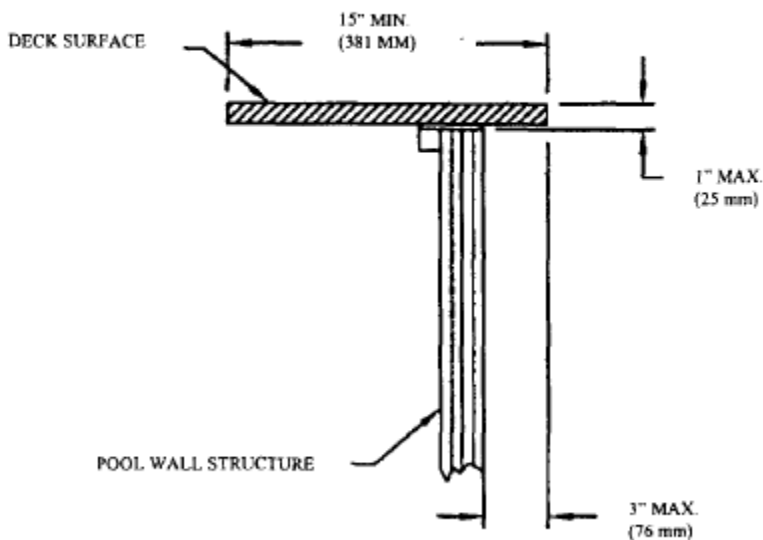
## **ABOVEGROUND/ONGROUND RAISED DECKS AND RAISED FENCING**

\_\_\_\_\_ Deck Structure: Cantilever style deck structure relies on the pool for support, hence, it must be ascertained from the pool manufacturer that the pool structure is capable of supporting the deck.

\_\_\_\_\_ The deck shall be designed to support a liveload of a minimum of 40 lbs. per square foot [195.3 kg/m<sup>2</sup>] of the total deck area, based upon accepted engineering practices.

\_\_\_\_\_ In a cantilever type deck where the deck structure relies on the pool structure for support, the walking surface of the deck shall not exceed one inch (1 ") [2.54 cm] above the pool wall at the pool wall. (See Figure 1.)

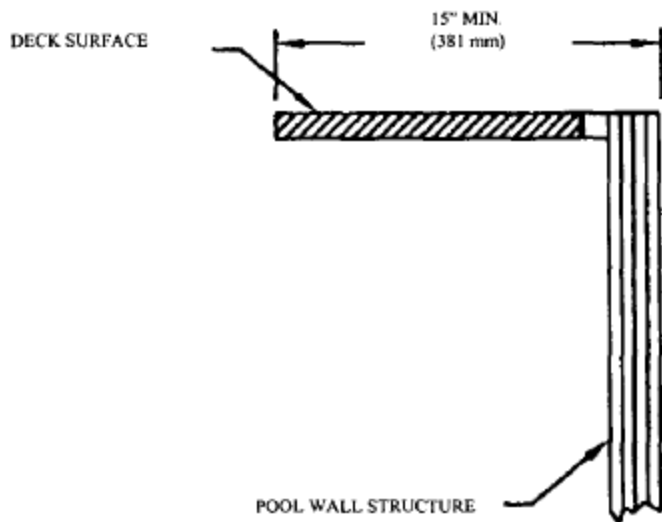
### **CANTILEVER DECK SUPPORT**



**Figure 1**

\_\_\_\_\_ If a deck structure is a freestanding deck, which does not rely on the pool structure, the deck shall not exceed the height of the pool wall. (See Figure 2).

## **FREE STANDING DECK SUPPORT**



**Figure 2**

The deck walking surface:

\_\_\_\_\_ Decks that are installed flush with the top rail of the pool shall have all gap openings between the deck and top rails closed-off or capped. Should the deck extend inside the top rail of the pool, it shall extend no more than three inches (3") [117.62 cm] beyond the inside of the top rail of the pool and be of a smooth finish.

\_\_\_\_\_ The deck and deck surface shall be manufactured from materials that will provide slip resistant surfaces. As a guide it is recommended that the deck and deck surface have a minimum static slip resistance coefficient of 0.6 wet. Recommended test criteria should include live skin against the deck surface in standing water consisting of droplets/puddles and not flowing water.

\_\_\_\_\_ Fence Top Rail: The top rail of the pool wall fence, deck fence, patio fence and walk-around fence mounted on top of the pool structure or deck of an aboveground/onground pool shall be a minimum of thirty-six inches (36") [91.44 cm] above the deck surface. (See ANSI/NSPI-8 1996 "Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs" or the latest approved edition).

\_\_\_\_\_ Open-air spacing between pickets shall not exceed four inches (4") [10.16 cm] between all vertical pickets and support posts. A sphere greater than four inches (4") [10.16 cm] shall not pass through openings in the fence. (See ANSI/NSPI-8 1996 "Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs" or the latest approved edition).

\_\_\_\_\_ Where a picket-type fence is provided maximum openings between the top rail of the pool and the lower horizontal bottom rail of the fence shall not exceed four inches (4") [10.16 cm]. A sphere greater than four inches (4") [10.16 cm] shall not pass through the openings in the fence. (See ANSI/NSPI-8 1996 "Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs" or the latest approved edition.)

\_\_\_\_\_ Where fencing is required and/or provided with the pool or deck, the fencing shall have at least 65% open area to allow visibility to the pool area and shall be constructed as to eliminate or discourage climbing by young children.

\_\_\_\_ Materials: Deck and deck surfaces shall be of nontoxic materials. As a guide, it is recommended that the following standards be referenced. American Wood Preservers Bureau Quality Control and Inspection Procedures For:

LP-2-88 Softwood Lumber, Timber and Plywood Pressure Treated with Waterborne Preservatives for Above Ground Use.

FDN-88 Softwood Lumber, Timber and Plywood Pressure Treated with Waterborne Preservatives for Ground Contact Use in Residential and Light Commercial Foundations.

Federal Hazardous Substances Act 16CFR, Ch. 11 - See Appendix J.

\_\_\_\_ Signage: The deck/fence package manufacturer shall supply a safety sign to address "NO Diving" to be affixed at point of entry. (For examples of Safety Signs, See Appendix B.)

\_\_\_\_ Walk-Around Decks: Walk-around (patio) decks shall be a minimum level distance of fifteen inches (15") [38.1 cm] wide of level walking surface, measured from the inside edge of the pool top rail to the outside of the pool walk-around and shall be fitted with a fence consistent with the requirements of Article VIII.

### **Aboveground/Onground Swimming Pool Circulation Components and Related Equipment**

\_\_\_\_ A circulation system consisting of pumps, hoses, tubing, piping, return inlets, suction outlets, filters, and other related equipment which provide for circulation of water throughout the pool shall be located as to prevent their being used as a means of access to the pool by young children. (See ANSUNSPI-8 1996 "Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs" or the latest approved edition.)

\_\_\_\_ In climates subject to freezing, circulation system equipment shall be designed and fabricated to drain the pool water from the equipment, together with exposed piping, by removal of drain plugs and manipulating valves or by other methods. Refer to manufacturer's instruction for specific information on draining the system.

\_\_\_\_ The equipment shall be sized to provide a turnover of the pool water at least once every twelve (12) hours. The system shall be designed to give the proper turnover rate based on the manufacturer's specified maximum flow rate of the filter, in clean media condition of the filter. Water clarity shall be maintained. Clarity is a function of proper filtration and maintenance of proper chemical operational parameters. (See Appendix A,) When standing at the pool's edge at the deep end, the deepest portion of the pool floor shall be visible.

\_\_\_\_ Circulation system components, which require replacement or servicing, shall be accessible for inspection, repair, or replacement, and shall be installed according to the manufacturer's instructions.

\_\_\_\_ Circulation equipment shall be installed per manufacturer's instructions to provide proper mounting and support, to prevent damage from misalignment, settlement, and vibration, and to minimize the potential for the accumulation of debris and moisture.

\_\_\_\_ Water Velocity: The water velocity in the pool piping shall not exceed ten feet (10') [3.048 m] per



second for pressure piping and eight feet (8') [2.4384 m] per second for suction piping.

\_\_\_\_\_ Piping and Fittings: The circulation system composed of hoses, tubing, piping and fittings, shall be considered to be process piping and shall be made of non-toxic material and be able to withstand operating at 1-1 /2 times the rated pressure of the pump.

\_\_\_\_\_ The suction piping shall not collapse when there is complete shutoff of flow on the suction side of the pump.

## Filters

\_\_\_\_\_ Filters shall be designed so that after cleaning per manufacturer's instructions, the system can provide the water clarity noted in Article 9.1.2 and Appendix A.

\_\_\_\_\_ Internal Pressure: Pressure-type filters shall provide an automatic internal or a manual external means to relieve accumulated air pressure inside the tank. Filter tanks composed of upper and lower tank lids, that are held in place by a perimeter clamp, shall provide a slow and safe release of air pressure before the clamp disengages the lids.

\_\_\_\_\_ Any filter, incorporating an automatic internal air relief as its principal means of air release shall have a means to provide a slow and safe release of pressure as a part of its design.

\_\_\_\_\_ As a part of its design, any separation tank used in conjunction with any filter tank shall have a manual means of air release or a means to provide a slow and safe release of pressure as it is opened.

\_\_\_\_\_ Instructions: Pressure filter shall have operation instructions permanently installed on the filter. Filters with manual air release shall include a precautionary statement or warning not to start up the system without first opening the air release. The statement shall be visible and noticeable within the area of the air release.

\_\_\_\_\_ Filter tanks shall be designed for a pressure equal to the rated head of the pump with a minimum 4:1 safety factor.

\_\_\_\_\_ Pressure or Vacuum Gauge: A pressure or vacuum gauge or other means of indicating system conditions shall be provided in the circulation system in an easily readable location.

## Pumps

\_\_\_\_\_ Swimming pool pumps shall be tested and approved by a nationally recognized testing laboratory. Pumps rated five horsepower (5 hp) or less shall comply with the latest edition of ANSI/UL 1081 "Standard for Swimming Pool Pumps, Filters and Chlorinators" or the equivalent.

\_\_\_\_\_ Horsepower Rating: Pump horsepower rating and labeling shall not exceed the brake horsepower of the motor.

\_\_\_\_\_ A pump and motor shall be provided for circulation of the pool water. Performance of all pumps shall meet or exceed the conditions (if applicable) of flow required for filtering and cleaning the filters against the total dynamic head developed by the complete system. System flow shall not exceed the filter manufacturer's maximum flow rate.

\_\_\_\_\_ 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.

\_\_\_\_\_ Pump(s) and motor(s) shall be accessible for inspection and service as per manufacturer's specifications.

\_\_\_\_\_ The design and construction of the pump(s) and its component parts shall provide safe operation that is not hazardous to the operator or maintenance personnel.

\_\_\_\_\_ 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.

\_\_\_\_\_ All motors shall have as minimum an open drip-proof enclosure, as defined by the latest National Electrical Manufacturer's Association (NEMA) Standards Publication No. M G1-1993 "Motors and Generators" or the equivalent, and shall be constructed electrically and mechanically to perform satisfactorily and safely under the conditions of load and environment normally encountered in swimming pool installation.

\_\_\_\_\_ Motor(s) shall be capable of operating the pump(s) under full load with a voltage variation of plus or minus ten percent (+/-10%) from the nameplate. The nameplate Full Load Amps (FLA) shall not be exceeded by more than ten percent (10%).

\_\_\_\_\_ All motors shall have thermal or current overload protection, either built in or in the line starter, to provide locked rotor and running protection.

\_\_\_\_\_ When the pump is below the waterline, valves or other means of shutoff shall be installed on permanently connected suction and discharge liners, located in an accessible place outside the walls of the pool, where they shall be readily and easily accessible for maintenance and removal of the pump.

## Surface Skimmer Systems

\_\_\_\_\_ A surface skimming system shall be provided on all residential swimming pools, and shall be designed and constructed to skim the pool surface when the water level is maintained within the operational parameters of the systems' rim or weir device.

\_\_\_\_\_ Skimming devices shall be designed and installed so as not to constitute a hazard to the user.

\_\_\_\_\_ When automatic surface skimmers are used as the sole overflow system, at least one (1) surface skimmer shall be provided for each eight hundred square feet (800 sq.ft.) [74.32 sq. m.] or fraction thereof of the water surface area. When skimmers are used, they shall be located to optimize skimming action over the surface of the pool.

## Return Inlets and Suction Outlets

\_\_\_\_\_ Suction outlets and return inlets shall be provided and arranged to produce a uniform circulation of water and maintain the distribution of sanitizer residual throughout the pool.

\_\_\_\_\_ The circulation system shall be designed to accommodate 100% of the turnover flow rate.

\_\_\_\_\_ Flow rates through out the circulation system shall not exceed ten feet (10') [3.048 m] per second for discharge piping, six feet (6') [1.8288 m] per second for suction piping, and one and one-half feet (1 1/2') [45.72 cm] per second through openings in suction grates unless it complies with the specifications the latest edition of ASME/ANSI A112.19.8M "Suction Fittings for Use in Swimming Pools, Wading Pools, Hot Tubs and Whirlpool Bathtub Appliances" or the latest approved edition.

\_\_\_\_\_ Suction System Flow through the main drain and skimming systems shall be designed to accommodate a minimum of two-thirds (2/3) of the circulation turn over rate through each system independently.

\_\_\_\_\_ Suction systems optionally designed to flow in excess of the two thirds (2/3) required minimums shall not exceed six feet (6') [1.8288 m] per second for suction piping, and one and one-half feet (1 UT) [45.72 cm] per second as specified in the latest ASME/ANSI A 112.19.9 M Suction Fittings for Use in Swimming Pools, Spas, Hot Tubs, Wading Pools and Whirlpool Bathtub Appliances.

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

\_\_\_\_\_ Timing/Electronic and Related Devices: The circulation system shall be capable of maintaining water clarity and water chemistry requirements. Time clocks and or other related devices are permitted to set the operating period of the circulation devices.

\_\_\_\_\_ When appurtenant devices such as chemical/sanitizer feeders, heaters, and other devices are used they shall be electrically tied into a timing or electronic device (where applicable) when they are dependent upon circulation pump flow. (See manufacturer's specifications.)

## Heaters

\_\_\_\_\_ This section pertains to appliances using either fossil fuels such as natural gas, propane (LPG), #2 fuel oil, or electric heating equipment for heating pool water.

\_\_\_\_\_ Heaters shall be tested and shall comply with the requirements of ANSI 221.56a-1996 "Gas Fired Pool Heaters" or the latest approved edition and/or ANSI/UL 1261 "Electrical Water Heaters for Pool and Tubs," or the latest approved edition or the equivalent. Heat pumps shall comply with the latest ANSI/UL 559 "Heat Pumps" or the latest approved edition and shall be accepted by a recognized testing facility.

\_\_\_\_\_ Owner/operator shall routinely check the in pool water to ensure that the temperature does not exceed 104°F [40°C]. If adjustments are necessary, those adjustments shall be performed in accordance with manufacturer's instructions or by a qualified technician.

\_\_\_\_\_ Sizing: For efficient and economical operation, it is important that the heater be properly sized. Determine the proper size heater by first determining the area of the swimming pool in square feet. Then select from the manufacturer's charts the heater that is properly sized for that particular pool.

\_\_\_\_\_ Installation: The heater(s) shall be installed in accordance with all federal, state, and local codes as well as the manufacturer's recommendations.

\_\_\_\_\_ Support: Heaters 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 level after plumbing, gas, and/or electrical connections are completed.

\_\_\_\_\_ Combustible Surfaces: If a heater requires a non-combustible surface per the manufacturer, it shall be placed on a cement or other accepted surface per ANSI Z39.1-1996 "Gas Fired Pool Heaters" or the latest approved edition or as per federal, state, or local codes.

\_\_\_\_\_ Clearances: When installing a heater, adequate clearances shall be maintained on all sides and over the top of the unit. Consult a manufacturer's instructions for proper clearance.

\_\_\_\_\_ Ventilation: The heater shall have adequate ventilation in order to insure proper operation, and in accordance to manufacturer's instructions.

\_\_\_\_\_ Make Up Air: When installing a fossil fuel heater indoors, proper openings to the room are a necessity. The heater shall be installed in accordance with federal, state or local codes and the manufacturer's specifications.

## Heating Energy Source

\_\_\_\_\_ Natural Gas Energy Supply: The heater gas supply piping shall comply with manufacturer's specifications and NFPA 54-1996 "National Fuel Gas Code" or the latest approved edition or the equivalent.

\_\_\_\_\_ IMPORTANT SAFETY NOTE: Install a gas cock, properly sized and readily accessible outside the jackets, to stop the flow of natural gas at the heater for service or emergency shutdown.

\_\_\_\_\_ Propane Energy Supply: Whenever a propane (LPG) appliance is installed, special attention shall be given to ensure that the storage tank, supply piping, and regulator shall be adequately sized to ensure operating fuel pressures as specified by the appliance manufacturer. Consult the fuel supply company and ensure that the system is installed in accordance with the NFPA 54 ANSI Z223.1 or the latest approved edition "National Fuel Gas Code" or the latest approved edition, ANSI/NFPA 58-1995 "Storage and Handling of Liquefied Petroleum Gases" or the latest approved edition or the equivalent.

\_\_\_\_\_ IMPORTANT SAFETY NOTE: Propane gas is heavier than air and therefore can create an extreme hazard of explosion or suffocation if the heater is installed in a pit or enclosed area. NFPA 54 ANSI Z223.1 "National Fuel Gas Code" or the latest approved edition, NFPA 58-1995 "Storage and Handling of Liquefied Petroleum Gases" contain a

provision to install valves and other controls in pits and similar areas or the latest approved edition.

\_\_\_\_\_ IMPORTANT SAFETY NOTE: Install a gas cock, properly sized and readily accessible outside the jacket, to stop the flow of propane (LPG) at the heater for service or emergency shutdown.

\_\_\_\_\_ Electrical Energy Supply: Electric heating appliances shall be installed in accordance with the latest revision of Article 680 of the National Electrical Code 1999 (NEC“) or its latest approved edition and any federal, state, or local codes, or the equivalent.

\_\_\_\_\_ IMPORTANT SAFETY NOTE: Grounding and Bonding – The requirements for grounding and bonding are particularly important and shall be adhered to, to reduce the hazard of electrical shock.

\_\_\_\_\_ Heater circulation system water flow through the heater, any bypass plumbing installed, any back-siphoning protection, and the use of CPVC SCH-80, or heat sinks or the equivalents shall be in accordance with the manufacturer’s specifications and local codes.

\_\_\_\_\_ SPECIAL CONSIDERATION: Some manufacturers recommend that the heater be turned off prior to stopping the water flow. Mechanisms such as a “fireman’s switch”, adapted to the timing or electronic device that will turn the heater off long enough for it to cool down before the time clock, turns the pump off.

NOTE: The “fireman’s switch” does not protect against a manual override or a system shut down in the event of power failure.

\_\_\_\_\_ Heaters shall be so located as to prevent their being used as a means of access to the pool by young children and in accordance with the latest edition of ANSIMSPI-8 “Model Barrier Code for Residential Swimming Pools, Spas and Hot Tub” or the latest approved edition.

## **WATER SUPPLY**

\_\_\_\_\_ Treatment: The water supply serving the pool, which come from a variety of sources, shall meet the requirements of Appendix A before the bather uses the pool.

\_\_\_\_\_ Backflow: No direct mechanical connection shall be made between the potable water supply and the pool, chlorinating equipment, or the system of piping for the pool, unless it is protected against backflow and back-siphonage in a manner approved by the state or local authority or through an air gap meeting the latest ANSI A112.1.2 (R1991) “Air Gaps in Plumbing Systems” or the latest approved edition or other equivalent means approved by the state or local authority.

## **WASTE WATER DISPOSAL**

\_\_\_\_\_ Backwash water may be permitted to discharge into a sanitary sewer through an approved air gap, or into an approved surface disposal system or by other means approved by state or local authority.

## **Sanitizing Equipment, Oxidation Equipment and Chemical Feeders**

\_\_\_\_ Compliance: When used, the sanitizer equipment shall be capable of introducing a sufficient quantity of an approved sanitizing agent, oxidation agent, or other chemicals to maintain the appropriate recommended guidelines.

\_\_\_\_ Electrically operated sanitizing equipment, oxidation equipment, and chemical feeders shall be tested and approved by a national recognized testing laboratory.

\_\_\_\_ Chemical Feeders: Manufacturer's specifications shall be used in installing and maintaining chemical feeders. The installation and use of chemical feeders shall conform to Articles the following:

\_\_\_\_ Chemical feeders, if used, shall be installed downstream from the filter and heater unless the equipment is designed to feed to the suction side of the pump e.g., slurry or coagulant feeders.

\_\_\_\_ If the chemical feeder is equipped with its own pump, it shall be installed so it introduces the sanitizer or oxidizer downstream from the heater and at a position lower than the heater outlet fitting.

\_\_\_\_ Chemical feed pumps shall be wired so they cannot operate unless the filter pump is running. If the device has an independent timer, the filter and chemical feed pump timers shall be interlocked.

\_\_\_\_ Floating chemical dispensers shall not be used in aboveground pools.

\_\_\_\_ Ozone-Generating Equipment: The installation of ozone-equipment shall be limited to low ozone output generating equipment. The installation and use of ozone generating equipment shall conform to the following:

\_\_\_\_ Installation of ozone-generating equipment shall allow for indications of operation or malfunction to be easily observed. The equipment shall be installed in a manner such that a malfunction will not endanger operators or pool users.

\_\_\_\_ Ozone-generating equipment shall be used in conjunction with other chemical treatments to meet the chemical operating parameters. Normal maintenance and monitoring of water chemistry shall be followed.

\_\_\_\_ If the equipment is capable of exposing maintenance or service personnel to ozone concentrations exceeding 0.3 ppm(see 1. below), a self-contained breathing apparatus approved for ozone usage shall be provided. If a distinct, pungent odor is smelled when the ozone generating equipment is operating, the equipment shall be shut down and the area shall be ventilated. The equipment shall be inspected and repaired as necessary by qualified service personnel.

1. The Permissible Exposure Limit to ozone, as specified by the US. Occupational Safety & Health Administrations (OSHA), is 0.1 ppm, timed - weighted over an 8 hour day, with Short Term (up to 15 minutes) Exposure Limit of 0.3 ppm. Ref: Federal Register 54(12):2519 (January 19, 1989).

## **ELECTRICAL REQUIREMENTS**

\_\_\_\_ All electrical components installed in and/or adjacent to an aboveground/onground residential

swimming pool shall comply with the requirements of Article 680 of the latest revision of the National Electrical Code 1999 (NECW) and any state or local code. To apply the NEC's interpretation of electrical requirements for pools, see the following:

\_\_\_\_\_ The National Electrical Code 1999 defines a Storable Swimming or Wading Pool as those that are constructed on or above the ground and are capable of holding water to a maximum depth of forty-two inches (42") [1.07 m], or a pool with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimensions.

\_\_\_\_\_ The National Electrical Code 1999 defines Permanently Installed Swimming, Wading and Therapeutic Pools as pools that are constructed in the ground or partially in the ground, and all others capable of holding water in a depth greater than forty-two inches (42") [ 1.07 m], and all pools installed inside of a building, regardless of water depth, whether or not served by electrical circuits of any nature.

## **NSPI GLOSSARY OF INDUSTRY TERMS**

The following is a list of definitions used by the aboveground/onground swimming pool industry. Some of the definitions listed may not apply to this particular standard.

**ABRASION HAZARD** - A surface that presents an unreasonable risk of irritation to the skin upon contact.

**ACCESSIBLE** - Methods providing access to physically challenged users.

**ACID** - A liquid or dry chemical used to lower the pH and or alkalinity of pool or spa water.

**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 which 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 which uses constructed features and devices including lily pad walks, flotation devices, small slide features and similar attractions.

**ADULT SUPERVISION** - Supervision of a person of reasonable intelligence and ability, at least eighteen (18) years of age, or, if less than eighteen (18) years old, with training in supervision such as Red Cross Life Guard.

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

**AGGRESSIVE WATER** - Water which 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. See Air Induction System.

**AIR CONTROL** - A means for spas and hot tubs to regulate air flow in the air induction system, increasing or decreasing hydrotherapy action.

**AIR INDUCTION SYSTEM (Air Blower)** - A system whereby a volume of air is introduced into hollow ducting built into a spa floor, bench, or other location. A separate air power unit (blower) activates the air channel.

**AIR SWITCH SYSTEM** - An isolated device which utilizes a pulse of air sent down a tube to remotely operate electrical equipment.



ALGAE - Microscopic plant-like organisms that contain chlorophyll.

ALGICIDE (Also spelled ALGAECIDE) - Any chemical or material which kills algae.

ALGISTATIC - Able to inhibit the growth of algae.

ALKALI - A term applied to bases, usually carbonates and hydroxides, which raise the pH and alkalinity when added to water.

ALKALINE - Having a pH above 7.0.

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).

ALUM (aluminum sulfates) - A compound used to cause suspended solids in the water to form filterable masses (floculate).

AMMONIA - (NH<sub>3</sub>) 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 bromines.

AMP (AMPERE) - 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 base.

ANCILLARY FACILITY - Area used in conjunction with, or 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.

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 suspected injuries to the spinal column.

BACKPRESSURE - 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 flow water through the filter media per unit of area (U.S. gallons/minute/sq. feet).

**BACTERIA** - Single-celled microorganisms of various forms, some of which cause infections or disease.

**BACTERICIDE** - Any chemical or material which 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.

**BAI ZRIER** - A means to limit, delay, or restrict access to a pool, spa, or hot tub. (Refer to ANSIMSPI-8 Model Barrier Code for Residential Swimming Pools, Spas, and Hot Tubs.)

**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 dropwise 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. Also USER.

**BATHER LOAD** - The number of persons in the pool/spa at any given moment, or during any stated period of time. Also USER LOAD.

**BEACH ENTRY OR ZERO (0) ENTRY** – Sloping entry starting above water line at deck level and ending below water line. (Does not refer to sand only.)

**BEGINNER'S AREA** - Those water areas in pools that are three feet (3') or less in water depth.

**BLEACH** - Sodium hypochlorite (NaOCl), also called liquid chlorine. A chlorine source that typically has between 5 and 16% available 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 that is continuously added to the filter element during the course of a filter run to help maintain filter porosity.

**BOND FAILURE (delamination)** - Failure of plaster or other surfaces to adhere to the underlying subsurface.

**BONDING (electrical)** - The joining of metallic parts to form an electrically conductive path which will assure electrical continuity.

**BOOSTER PUMP SYSTEM** - A pump which 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 above ground pool frame used as a structural retainer for aboveground pool wall.

**BREAKPOINT CHLORINATION** - The addition of a sufficient amount of chlorine to water to destroy the combined inorganic chlorine present. Normally, the amount added is usually ten times the combined chlorine concentration.

**BREAK IN GRADE** - Occurs when the slope of the pool floor changes to a greater slope.

**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 into 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 bromide ( $\text{Br}^-$ ) ion. Bromide becomes hypobromous acid when reacted with oxidizers such as chlorine, ozone, or persulfates.

**BROMINE ( $\text{Br}_2$ )**, - 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.

**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.

**BUFFER** - Chemicals which when dissolved in water, will resist pH change. Also a chemical solution to calibrate pH instrument.

**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** - An insoluble calcium compound that is the major component of scale. Occurs normally in limestone, marble, various eggshells, seashells, etc.

**CALCIUM CHLORIDE** - 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 HYPOCHLORITE** - A solid white form of chlorine found in both granular and tablet forms (65-75% available chlorine).

**CARBON DIOXIDE** - A common gas found in air; can be used to lower pH in a pool.

**CARDIOPULMONARY RESUSCITATION (CPR)** - A lifesaving technique involving both chest compressions to circulate blood and mouth-to-mouth breathing, to restart a non-beating heart.

**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.

**CAUSTIC** - Sodium hydroxide, lye: used in pools, an extremely high pH alkalizer; referring generally to high PH.

**CAUSTIC SODA** - Sometimes called caustic, sodium hydroxide or lye. A highly alkaline substance sometimes used to raise pH. signal word **CAUTION** - Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices. (Reference ANSI 2535 Series of Standards for Safety Signs and Colors.)

**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 a shaft-mounted impeller, powered by an electric motor or gasoline engine. The centrifugal force of the spinning impeller creates the flow through the pump.

**CFM** - Cubic feet per minute (of air).

**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.

**CHECKS (surface)** - Spider webbing pattern in a surface. Not all the way through, not an open crack.

**CHECK VALVE** - A valve allowing flow in one direction and obstructing flow in the other direction.

**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).

**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** - Also known as combined chlorine. 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 odors and low sanitizing capability.

**CHLORINATOR** - A device to add or deliver a chlorine sanitizer at a controllable rate.

**CHLORINE GAS** - A gaseous form of chlorine used to sanitize pools and spas. (See chlorine compounds – Calhypo, chlorine gas, sodium dichloro, sodium hypo, trichloro, liquid chlorine)

**CHLORINE DEMAND** - The amount of chlorine that will be consumed by readily oxidizable impurities in pool or spa water.

**CHLORINE GENERATOR** - An electrolytic device used to generate free available chlorine or total bromine from either chloride or bromide salts. (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 over current level, thus providing protection to the wiring and electrical components.

**CIRCULATION EQUIPMENT** - The components of a circulation system.

**CIRCULATION SYSTEM** - An arrangement of mechanical equipment and or components designed to ensure even distribution of heat, chemicals, and filtration of water throughout the pool. Includes filters, heaters, pumps, chlorinators, piping, inlets, drains, skimmers, and other appurtenances.

**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.

**COAGULANT** - (See Flocculant or Clarifier)

**COLIFORM BACTERIA** - Bacteria found in the intestines and fecal matter of warm-blooded animals. The detection of coliforms is used to indicate the possible presence of disease-causing bacteria.

**COLIFORM INDICATOR** - The difference between the measurements of total available chlorine and free available chlorine. Licensed to Nathan Saunders. ANSI store order # X\_741672. Downloaded 07/14/2021. Single user license only. Copying and networking prohibited.

**COMBINED CHLORINE** - Also known as combined available chlorine. (See Chloramines)

**CONCRETE SHELL** - Various forms of concrete that together with the steel form the structure.

**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. It may be used as part of the system that secures a vinyl liner to the top of the pool wall.

**COVE** - The transitional area that joins the floor and wall of a pool/spa.

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

Safety cover - ASTM in 1346-1991, Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs, 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 which 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.

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.

**CRACK (surface)** - A repairable break in the surface, not major, not self-curing.

**CRACK (structural)** - A break or split which weakens the structural integrity of the pool.

**CRAZE** - See Checks.

**CROSS CONNECTION** - A connection between domestic water supply and a non-potable water, where a contamination of the domestic system could occur.

**CYANURIC ACID (Also called STABILIZER, ISOCYANURIC ACID, CONDITIONER, or TRIAZINETRIONE)** - A chemical that reduces the loss of chlorine in water due to the ultraviolet rays of the sun.

signal word **DANGER** - 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 which advises the observer of

the nature and degree of the potential hazard(s) which 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 ANSI 2535 specifications.

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.

**DANGER** - Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the extreme situations.

**WARNING** - Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION** - Caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**DEAD LOAD** - The weight of all permanent structural and non-structural 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 ( 5 ) feet 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').

**DESIGN RATE OF FLOW** - The rate of flow used for design calculations in a system.

**DIATOMACEOUS EARTH FILTER** - A filter that utilizes a coating of diatomaceous earth (DE) over a porous fabric as its filter medium.

**DIATOMACEOUS EARTH** - A white powder used as a filtering medium composed of microscopic fossil skeletons.

**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.

**DIFFUSER** - A device whose function is to reduce velocity and increase static pressure of a fluid passing through a system.

**DISINFECTANT** - See SANITIZER.

**DIVE** - A free fall entry into water from a planned acrobatic maneuver into a designed diving area of a pool.

DIVING AREA - The area of a swimming pool that is designed to be used for diving.

DIVING BOARD - A flexible board secured at one end used for diving.

DIVING EQUIPMENT, COMPETITIVE - Competitive diving equipment includes diving boards and adjustable fulcrum-setting diving stands intended for competitive diving.

DIVING PLATFORM - Stationary platform designed for diving.

DIVING STAND - Any supporting device for a springboard or diving board.

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

DRY ACID - Most commonly used in kits to measure free chlorine, total chlorine and total bromine.

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.

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

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 (1/4) inch wide contacting the septum during filtration.

Sand Filtration Tyoe - The top surface area of the filter medium within the filter.

EFFLUENT - The outflow of water from a filter, pump, or pool.

EGRESS - Means of exit.

ELECTROLYTIC CHLORINATOR - See Chlorine Generator.

ELECTROLYTIC CHLORINEBROMINE

GENERATOR - An electrolytic device used to generate free available chlorine or total bromine from either chloride or bromide salts. (See Chlorine Generator)

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.



**EQUIPMENT AREA** - Area used to house recirculation and disinfecting equipment and related appurtenances.

**EROSION** - Act of destroying or dissolving by slow disintegration or wearing away. 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 (marcite).

**EVAPORATION** - Conversion of liquid molecules into vapor.

**EXERCISE BAR** - A tubular device installed in the wall as a handhold.

**EXPANSIVE SOIL** - Clay soils that absorb moisture and swell, creating the potential for structure damage.

**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 4.3 pounds per square inch). The total dynamic head is the sum of all resistances in a complete operating system.

**FERRIC IRON** - Iron III is generally insoluble in water, commonly precipitating as rust.

**FERROUS IRON** - Iron II is found in ground water. 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** - Finespun filaments of glass, which 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, spa, and related equipment.

**FILTER** - A vessel that removes undissolved particles from water by re-circulating the water through a porous substance (a filter medium or elements).

Permanent medium-filter - A filter that utilizes a filter medium (sand).

Diatomaceous earth filter - A filter that utilizes a thin coating of diatomaceous earth (DE) over a porous fabric as its filter medium.

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

**FILTER AGITATION** - The mechanical or manual movement to dislodge the filter aid and dirt from the filter element.

**FILTER AID** - Powder-like substances such as diatomaceous earth or volcanic ash used to coat septum 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 materials used in sand filters as the media.

**FILTRATION** - The process of removing undissolved particle 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.

**FILTRATION RATE** - The rate of water flowing through a filter during a given period, expressed in US. gallons per minute per square foot of effective filter area. Also known as filtration flow rate.

**FIREBOX** - A chamber in the pool/spa heater where combustion takes place.

**FIREBRICK** - A refractory brick capable of sustaining high temperatures.

**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 rates of the movement of water, typically in gallons per minute.

**FLOW BALANCE VALVE** - Valve that regulates the effluent 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 period. Usually expressed as US gallons per minute (GPM) or gallons per hour (GPH).

**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 heater from firing if there is not adequate water flow through the system.

**FLUME** - A trough-like tubular structure generally recognized as a water slide which directs the path of travel and the rate of descent by the rider.

**FLUME SLIDE** - Slides of various configurations which are characterized by having deep riding channels, vertical and lateral curves, high water flows and can accommodate riders using or not using mats, tubes, rafts, and other transport vehicles. This includes, but is not limited to, family raft rides, inner-tube rides, body slides, speed slides, etc.

**FRAME** - The structure that defines and/or supports the outline or shape of the aboveground pool wall.

**FREE AVAILABLE CHLORINE (HOC<sub>0</sub>)** – That portion of the total that is not combined with chlorine and is available as sanitizer.

**FREEZE-THAW CYCLE** - Seasonal weather and temperature changes that can cause stress to a surface.

**FRICTION** - Resistance created by the liquid passing the inner surface of the conductor pipe and fittings.

**FRICTION HEAD** - Head specifically caused by friction or drag.

**GALLONAGE** - A specific quantity of fluid in terms of gallons.

**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 polyester-resin material applied in liquid form, which hardens to a smooth, durable form when, applied over a mold.

**GPD** - Gallons per day.

**GPH** - Gallons per hour.

**GPM** - Gallons per minute.

**GRAB BAR/RAIL** - Rails used to enter or leave a pool or spa.

**GROUNDING** - Connecting to or providing a conducting path to the earth or to some conducting body that serves in place of the 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, which is a component of the circulation system.

**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 active chemical element fluorine, chlorine, bromine, and iodine, used as sanitizer or oxidizers.

**HANDHOLD MANDRAIL** - 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.

**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".

**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.

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

Direct electric - Uses resistive heating element placed in line with the circulation system.

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 ultraviolet and ambient heat from the sun to heat the collector or through the blanket to heat the water.

Heat exchanger - Indirectly circulates steam or hot water inside a heat exchanger in the heater to the pool/spa water.

**HEAT EXCHANGER** - A device with coils, tubes, and plates that takes heat from any fluid, 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, which 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.

**HERTZ** - The measure of the frequency of alternating current. One Hertz means one cycle per second.

**HIGH LIMIT SWITCH** - A temperature control switch which can deactivate a control circuit at a preset temperature. They are normally preset at the factory and are non-adjustable. Must be manually reset.

**HIGH PERMEABILITY ELEMENT** – Mechanically interlocked, non-woven filter material designed to remove suspended solids.

**HOOP** - A circumferential constraint that provides the structural bonding of staves of a hot tub to prevent separating.

**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.

**HYDROCHLORIC ACID** - Also called muriatic acid when diluted. A strong acid used in pools/spas for pH control and cleaning needs.

**HYDROGEN PEROXIDE** - Compound consisting of hydrogen and oxygen usually supplied in an aqueous solution, used as a 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 of an empty pool.

**HYDROSTATIC RELIEF VALVE** - A fitting installed in the bottom of the pool 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.

**HYDROTHERAPY SPA** - A unit having a therapeutic use, but which is not drained, cleaned or refilled for each individual use.

**HYPOBROMOUS ACID** - A chemical compound that acts as a sanitizer and algaecide 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.

**HYPOCHLOROUS ACID** - The most powerful sanitizer form 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 which allows water to enter a pool, spa, or hot tub.

INTERMEDIATE POOL -Any section of a quiescent water flow between the entry and landing pools in attractions at a water park that utilize a series of pools.

INTERMITTENT IGNITION DEVICE - An electrical spark device used to ignite a gas heater.

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

IONIZER - A device which electro-chemically generates metal ions such as silver and or copper ions from anodes of these metals.

IRON - See Ferric or Ferrous.

ISOCYANUFUTES (also ISOS) - Families of pool sanitizer products that reacts with water to form free available chlorine and cyanuric acid.

JUMP BOARD - A pre-manufactured diving board that has a coil spring, leaf spring, or comparable device located beneath the board which is activated by the force exerted by jumping on the board's end.

KILOWATT - A unit of power equal to 1000 watts.

KILOWATT HOUR - A unit of work or energy equal to that expended by one kilowatt in an hour.

LADDER - A structure for ingress/egress that usually consists of two long parallel side pieces joined at intervals by crosspieces (treads).

Type A "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.

Type A Double Access Ladder - An "A-Frame" 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.

Type B Limited Access Ladder - An "A-Frame" ladder that straddles the pool wall of an aboveground onground pool wall and is removable with built-in entry limiting provision for making entry inaccessible when a pool is not in use.

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

Type E "in-pool" staircase ladder is 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.

**LANGLIER INDEX** - A numerical calculation based on the Langlier water balance equation, which indicates whether the water may be corrosive or scale forming. See also SATURATION INDEX.

**LEACHING** - The extraction 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.

**LINER** - Plastic membrane constructed of vinyl or other compounds that act as a one-piece container for the pool water.

**LIQUID ACID (HCl)** - Chemical used to lower pH and total alkalinity, most commonly MURIATIC ACID (HCl).

**LIQUID CHLORINE** - Also known as bleach. See SODIUM HYPOCHLORITE.

**LIQUID PROPANE GAS** - The liquid form of propane gas, a heavy hydrocarbon occurring naturally in petroleum.

**LITHIUM HYPOCHLORITE** - A white solid used as a sanitizer and oxidizer in pools and spas, typically containing 35% free 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 (under-drain).

**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 re-circulating pump.

**MAKE-UP WATER** - Water used to fill or refill a pool/spa. Also SOURCE WATER.

**MANOMETER** - An instrument, which measures, vacuum or pressure.

**MARCITE** - Another name for plaster. 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.

**MICRON** - One millionth of a meter. Used to describe the size of particles that filters are capable of trapping.

**MICROORGANISMS** - 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 (PILOT FLAME) - Heat from a continuous pilot is used to generate electrical energy that opens and closes the main gas valve and operates the systems safety controls.

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 which spins the rotor and shaft to drive a pump impeller.

MOTTILING - 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.

MULTIPOINT 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.

NATURAL GAS - Admixture of gaseous hydrocarbons, chiefly methane, occurring naturally underground, often in association with petroleum products.

NON-SWIMMING AREA - Any portion of a pool where water depth, offset ledges or other irregularities prevent normal swimming activities.

OHM - A unit of measure of electrical resistance.

OHM'S LAW - An electrical relation between volts, amperes and ohms, which can be expressed as follows:  $\text{amps} = \text{volts/ohms}$ , or  $\text{current} = \text{voltage/resistance}$ , or  $I = E/R$ .

ORGANICMATTER - Carbon based substances, generally originating from living organisms, often introduced to pools or spas by bathers and the environment.

ORIFICE - An opening in a device, usually calibrated in size, through which water flows.

ORIFICE PLATE - A disc, placed in a water flow line, with a concentric, sharp-edged circular opening in the center which creates a differential pressure to measure flow and to operate feeders and instruments or other hydraulic equipment.

ORP (OXIDATION-REDUCTION POTENTIAL) – A measure of the oxidation-reduction potential of species in water relative to hydrogen electrodes. It is generally measured in millivolts by means of an electronic meter and depends upon the types and concentrations of oxidizing and reducing species in the water.

ORTHOTOLIDINE - Also known as OTO. A colorless reagent that reacts with chlorine or bromine to produce yellow-to-orange colors which 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.

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



**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** - Surface water collection systems of various design and manufacture.

**OXIDIZERS** - Products used to destroy organic and inorganic contaminants in water.

**OZONE (O<sub>3</sub>)** - 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 which 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)** - A unit of concentration equivalent to milligrams of dissolved substance per kilogram of solution, and roughly equivalent in water to milligrams per liter (mg/L) in water.

**PASS THROUGH** - Referring to opening between vertical pickets of a fence.

**PATHOGENS** - Disease-causing microorganisms.

**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 test kit reagent that is used to measure pH.

**pH METER** - An electronic device that measures pH by means of a pH electrode immersed in the water to be tested.

**PINCHING HAZARD** - Any configuration of component that may pinch the user.

**PLASTER** - a type of interior finish (a mixture of white cement and aggregate, which will accept a tint or color) which is applied to a concrete pool or spa. Also called Marcite or Marblite.

**POINT OF THE FIRST SLOPE CHANGE**- The point of the first slope change shall be at a minimum water depth of two feet and nine inches (2'9") and be at least six feet from the shallow end, except as stated otherwise in this checklist (See Aboveground/onground Safety Signs on "No Diving").

**POOLS:**

Type O - Any residential pool where the installation of diving equipment is prohibited.

Aboveground Pool-Type O - A removable pool of any shape that has a minimum water depth of thirty-six inches (36") and a maximum water depth of forty-eight inches (48") at the wall. The wall is located on the surrounding earth and may be capable of being disassembled or stored and reassembled to its original integrity. Diving and the use of a water slide are prohibited (Refer to ANSUNSPI-4 Standard for Aboveground Residential Swimming Pools).

Ongound Residential Swimming Pool-Type O – A removable pool package whose walls rest fully on the surrounding earth and has an excavated area below the ground level where diving and the use of a water slides are prohibited. (Refer to ANSINSPI-4 Standard for Aboveground Swimming Pools). 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.

Residential Pool - A residential pool shall be defined as any constructed pool, permanent or non-portable, that is intended for noncommercial use as a swimming pool by not more than three (3) owner families and their guests and that is over twenty-four inches (24") in water depth, and have a volume over 3,250 gallons. (Refer to ANSVNSPI-5 Standard for Residential Swimming Pools).

Inground Swimming Pool - Any pool whose sides rest in partial or full contact with the earth. (Refer to ANSINSPI-5 Standard for Residential Swimming Pools, as applicable).

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 (refer to ANSIMSPI-5 1995 Standard for Residential Inground Swimming Pools as applicable).

Residential pools shall be further classified into types as an indication of the suitability of a pool for use with diving equipment.

Type I-V: Residential pools suitable for the installation of diving equipment by type. Diving equipment classified at a higher type is not prohibited from being used on a pool of lesser type (i.e., Type III equipment on a type II pool).

Commercial/Public Pool - Any pool, other than a residential pool, which 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. References within the standard to various types of public pools (refer to ANSUNSPI- 1 Standard for Public Swimming Pools) are defined by the following categories:

Class A: Competitive Pool - Any pool intended for use for accredited competitive aquatic events such as Federation Internationale De Natation (FINA), US. 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, splashers pools, kiddie pools and play areas. These pools are not intended to be covered within the scope of NSPI standards.

Public Pools may be diving or non-diving. 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-XI Public pools suitable for the installation of diving equipment by type. Diving equipment classified at a higher type is not prohibited from being used on a pool of lesser type (i.e., Type VIII equipment on a Type VI pool).

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

Splasher (Wader) Pools - A splasher pool shall have a minimum water depth of twenty-four inches (24") and a maximum water depth of thirty-six inches (36").

Wading Pool - A pool that has a shallow depth used for wading. There are no requirements for residential pools. (Refer to NSPI-1 Standard for Public Swimming Pools for public wading pools).

**POOL UPRIGHT SUPPORT** - The portion of the frame that is adjacent to the aboveground pool wall in a vertical position, which supports the top rail and braces the wall.

**POTABLE WATER** - Water that is safe and satisfactory for drinking and cooking.

**POTASSIUM MONOPERSULFATE (KHSO<sub>5</sub>)** – Also known as potassium peroxymonosulfate. A solid oxidizer used to prevent the buildup of contaminants in pool and spa water.

**PRECIPITATE** - A non-dissolved solid in water.

**PRE-COAT** - The coating of filter aid on the septum of a diatomaceous earth filter at the beginning of each filter cycle.

**PRE-COAT FEEDER** - A chemical feeder designed to inject diatomaceous earth into a filter in sufficient quantity to coat the filter septum at the start of a filter run.

**PRESSURE CHECK** - A test for the rate of water flow; also a test for leaks in a system.

**PRESSURE DIFFERENTIAL** - The difference in pressure between two parts of a hydraulic system, such as the influent and effluent of a filter.

**PRIMARY STRUCTURAL MEMBERS** - Any part of the aboveground 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.

**PSI** - An abbreviation for pounds per square inch.

**PUMP** - A mechanical device, usually powered by an electric motor, which 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 and spas.

**PUNCTURE HAZARD** - Any surface or protrusion that is capable of puncturing a user's skin under casual contact.

**QUATERNARY AMMONIUM (QUAT)** – Organic compound of ammonia used as an algistat and an algicide.

**RATE OF FLOW** - The quantity of water flowing past a designated point within a specified time, such as the number of gallons flowing in one minute (gpm).

**RATED PRESSURE** - The pressure that is equal to or less than the designed pressure and appears on the data plate of the equipment.

**REAGENTS** - The chemical used to test various aspects of water quality.

**REHABILITATION** - The activity of restoring all or part of a pool or spa structure, and its component parts, back into good condition, including the rebuilding and/or replacing of worn and broken parts or components.

**REMOVABLE** - Capable of being disassembled with the use of only simple tools such as a screwdriver, pliers, or wrench.

**RESIDUAL** - The measurable sanitizer present in water.

**RETURN INLET** - The aperture or fitting through which the water under positive pressure returns into a pool/spa.

**RETURN PIPING** - The piping that is referred to as effluent.

**RING BUOY** - A ring-shaped floating buoy capable of supporting a user.

**ROPE AND FLOAT LINE** - A continuous line not less than one-fourth inch (1/4") in diameter, which is supported by buoys and attached to opposite sides of a pool to separate the deep and shallow ends.

**SALINITY** - The salt content of water.

**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. Four factors are used in the computation: pH, total alkalinity, calcium hardness and temperature. When correctly balanced the water will be neither scale forming nor corrosive.

**SCALE** - The calcium precipitate that forms when pH, calcium hardness and/or bicarbonate alkalinity are too high.

**SECONDARY STRUCTURAL MEMBERS** - Any part of the aboveground pool structure that is not subject to load caused by water pressure.

**SEPTUM** - That part of the filter element consisting of cloth, wire screen, or other porous material on which filter medium or 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.

SHALLOW AREAS - Portions of a pool/spa with water depths less than five feet (5').

SHOCK TREATMENT - The practice of adding significant amounts of an oxidizing chemical to water to destroy inorganic and organic contaminants in water.

SHOTCRETE - A mixture of cement and sand, applied onto contoured and supported surfaces to build a pool or spa. Shotcrete is premixed and pumped wet to the construction site.

SIGHT BARRIER - Available opening space in any given or total fence area.

SKIMMER - See SURFACE SKIMMING SYSTEM.

Thru-wall: a device installed in the wall of an inground pool or spa or aboveground/onground pool that permits the continuous removal of floating debris and surface water to the filter.

Over-the-wall: a device installed over the wall of an aboveground/onground pool that allows for continuous removal of debris and surface water to the filter.

SKIMMER WEIR - Part of a skimmer which adjusts automatically to small changes in water level to assure a continuous flow of water to the skimmer. See WEIR.

SLIP RESISTING - A surface that has been so treated or constructed as to significantly reduce the chance of a user slipping. The surface shall not be an abrasion hazard.

SLOPE - An inclined surface.

SODA ASH - Also known as SODIUM CARBONATE.

SODIUM BICARBONATE - Also BAKING

SODA or sodium hydrogen carbonate. A white powder used to raise total alkalinity in water and sometimes pH in spa.

SODIUM BISULFATE - Also known as DRY ACID. A granule used to lower pH and/or total alkalinity in water.

SODIUM CARBONATE - See SODA ASH.

SODIUM DICHLOR (SODIUM DICHLOROISOCYANURATE - Also known as SODIUM DICHLORO-S-TRIAZINETRIONE. An organic chlorinating agent that reacts with water to form between 56% and 64% free available chlorine and cyanuric acid.

SODIUM HYPOCHLORITE - A clear liquid form of inorganic chlorine compound obtainable in concentrations of 5% to 16% available chlorine. Also known as liquid chlorine or bleach.

SODIUM THIOSULFATE - A chemical used to neutralize chlorine.

SOFT WATER - Water that has a low calcium and magnesium content.

SOURCE WATER - Water used to fill a pool/spa. (See MAKE-UP WATER.)

SPA - A hydrotherapy unit of irregular or geometric shell design.

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 ANSVNSPI-3 Standard for Permanently Installed Residential Spas.)

Public Spa - Any spa other than a permanent residential spa or residential portable spa which 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 ANSINSPI-2 Standard for Public Spas.)

Residential Portable Spa- either self-contained or non-self-contained.

Self-Contained Spa - A spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected.

Non-Self-contained Spa - A spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls or they may employ assembled combinations of various components. (Refer to ANSINSPI-6 Standard for Residential Portable Spas.)

STABILIZER - Also called Cyanuric Acid. See CYANURIC ACID.

STEPS, RECESSED STEPS, LADDERS AND RECESSED TREADS - Means of pool and spa ingress and egress. These elements are intended to be used separately or in conjunction with one another.

Steps - A riser/tread or series of risers/treads extending down from the deck and terminating at the pool or spa floor. Included are recessed steps that have the risers located outside of user areas.

Ladders - A series of vertically separated treads or rungs connected by vertical rail members or independently fastened to an adjacent vertical pool wall (see LADDERS for definitions of particular ladder types).

Deck Ladder - A ladder for deck access from outside the pool or spa.

Recessed Treads - A series of vertically spaced cavities in the pool or spa wall creating tread areas for step holes.

SUCTION OUTLET - The aperture or fitting, through which the water under negative pressure is drawn from the pool or spa.

SUCTION PIPING - The piping that is referred to as influent.

SUPERCHLORINATION - The practice of adding a sufficient amount of chlorinating compounds to reduce cloudy water, slime formation, musty odors, algae, and bacteria counts, and/or improve the ability to maintain sanitizer residuals.

**SURFACE SKIMMING SYSTEM** - This term encompasses perimeter-type overflows, surface skimmers, and surface water collection systems of various design and manufacture. See **SKIMMER**.

**TAMPERPROOF** - Meaning that tools are required to alter or remove portions of the equipment.

**TEST KIT** - An equipment used to determine specific chemical residual and physical properties of water.

**TIME CLOCK** - A mechanical device that automatically controls the periods that a pump, filter, heater, blower, and other electrical devices are on.

**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 RAIL** - That frame part located on top of or adjacent to the outer edges of the aboveground pool wall.

**TOTAL ALKALINITY** - See **ALKALINITY**.

**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**.

**TREAD CONTACT SURFACE**- Foot contact surfaces of a ladder, step, stair, or ramp.

**TRICHLORO-ISO-CYANURATE** – Also known as **TRICHLORO-S-TRIAZINETRIONE**. A form of organic chlorine that reacts with water to form 90% available chlorine and cyanuric acid.

**TURBIDITY** - A measure of the cloudiness and or haziness of water.

**TURNOVER RATE** - The period of time(usually in hours) required to circulate a volume of water equal to the pool or spa capacity.

**ULTRAVIOLET LIGHT (UV)** - High energy light, sometimes used to generate ozone, that is generated on site and used as a supplemental contact. See **OZONE**.

**UNDERWATER LIGHT** - A fixture designed to illuminate from beneath the water surface. Types:

Wet niche light - A watertight and water-cooled light unit placed in a submerged, wet niche in the pool or spa wall and accessible only from the pool or spa.

Dry niche light - A light unit placed behind a watertight window in the pool or spa 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. This system shall also properly collect water during filter backwashing unless other means are provided.

**UPRIGHT SUPPORT** - That portion of the frame that is adjacent to the aboveground wall in a vertical position which supports the top rail and braces the wall.

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

**USER LOAD** - The number of persons in the pool/spa area at any given moment, or during any stated period of time.

**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. The typical maximum vacuum is 30 inches of mercury or, 33.9 feet of Head.

**VALVE** - Any device in a pipe that will partially or totally obstruct the flow of water( as in a ball, gate or globe valve) or permit flow in one direction only (as in a check or foot valve).

Bleeder valve - a device that allows air to be vented from a system.

Multi-port valve - a device that allows for the multidirectional control of the passage or flow of water through a system.

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

**VELOCITY** - The speed at which a liquid flows between two specified points, expressed in feet per second.

**VERTICAL WALL** - shall refer to the wall up to a positive 11 deg angle towards the pool's interior from plumb).

**VENTURI JET** - See HYDROTHERAPY JETS.

**VINYL LINER** - A liner constructed of vinyl or vinyl compounds that act as a container for water.

Expandable Liner - A liner that is constructed of a material that has the capability of stretching into a shape other than the original construction dimensions.

Hooper Liner - The liner is used to obtain greater depth by geometrical pattern construction on the liner bottom or floor to fit a predetermined size and shape.

**WALL CLOSURE** - The fastening device(s) that connect the aboveground wall ends together.

**WASTE WATER DISPOSAL SYSTEM** - All water disposal systems approved by (state or local) authority, 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:

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.

Overflow System - The waterline shall be at the top of the overflow rim.



WEIR - The device included with a through-the-wall and over-the-wall skimmer that controls the amount of surface water (flow) drawn into the skimmer and filtration system. Also SKIMMER WEIR.

WET NICHE LIGHT - See UNDERWATER LIGHT.

WINTERIZED LINER - A plastic liner that is manufactured with sufficient plasticizers to withstand exposure to its rated lowest temperature of -20°F.

WINTERIZING - The procedure of preparing pools and spas for cold or freezing weather. Includes chemical treatment of the standing water, plus physical and chemical protection of the pool or spa and its equipment against freezing.