RAY TOWNSHIP

64255 WOLCOTT, RAY TWP, MI 48096
586-749-5171 ext. 203 / FAX 586-749-6190
COMPLETE ORDINANCE AVAILABLE AT WWW.RAYTWP.ORG

Monday thru Thursday 9:00 a.m. to 5:00 p.m.

REQUIREMENTS FOR INGROUND POOL PERMIT

1. BUILDING APPLICATION FORM COMPLETED AND SIGNED

2. CERTIFICATE OF ZONING COMPLIANCE APPLICATION COMPLETED AND SIGNED

3. THREE (3) SETS OF MANUFACTURES SPECIFICATIONS ON STRUCTURAL INTEGRITY TWO (2) SETS FOR ABOVE GROUND POOLS.

4. THREE (3) SITE PLANS indicating size, shape, and distance from property lines and easements, residence, out buildings, septic, and well.
   TWO (2) FOR ABOVE GROUND POOLS.

5. HOMEOWNER'S PERMIT (Estoppel Certificate) or BUILDERS LICENSE REQUIRED FOR BUILDER'S. Builder to furnish: Federal I.D. #, M.E.S.C. Employer #, Worker's Compensation Insurance Carrier, Driver's License #, and Birth date.

6. Electrical Permit (required) and Mechanical Permit may be required for some pools. Obtain at the Township office.

7. CZC/PLAN REVIEW FEE: $50.00 due with application. (non-refundable)

7. $500.00 PERFORMANCE BOND required when permit is issued on **INGROUND POOLS.** Bonds will be refunded at time of final building approval if (I) building permit has not expired.

9. PERMIT FEE: Required when permit is issued. Fee schedule, attached.

SECTION 217 SWIMMING POOLS.

All swimming pools erected in the Township greater than twenty-four (24) inches in depth shall comply with all applicable Building Codes as well as the following requirements:

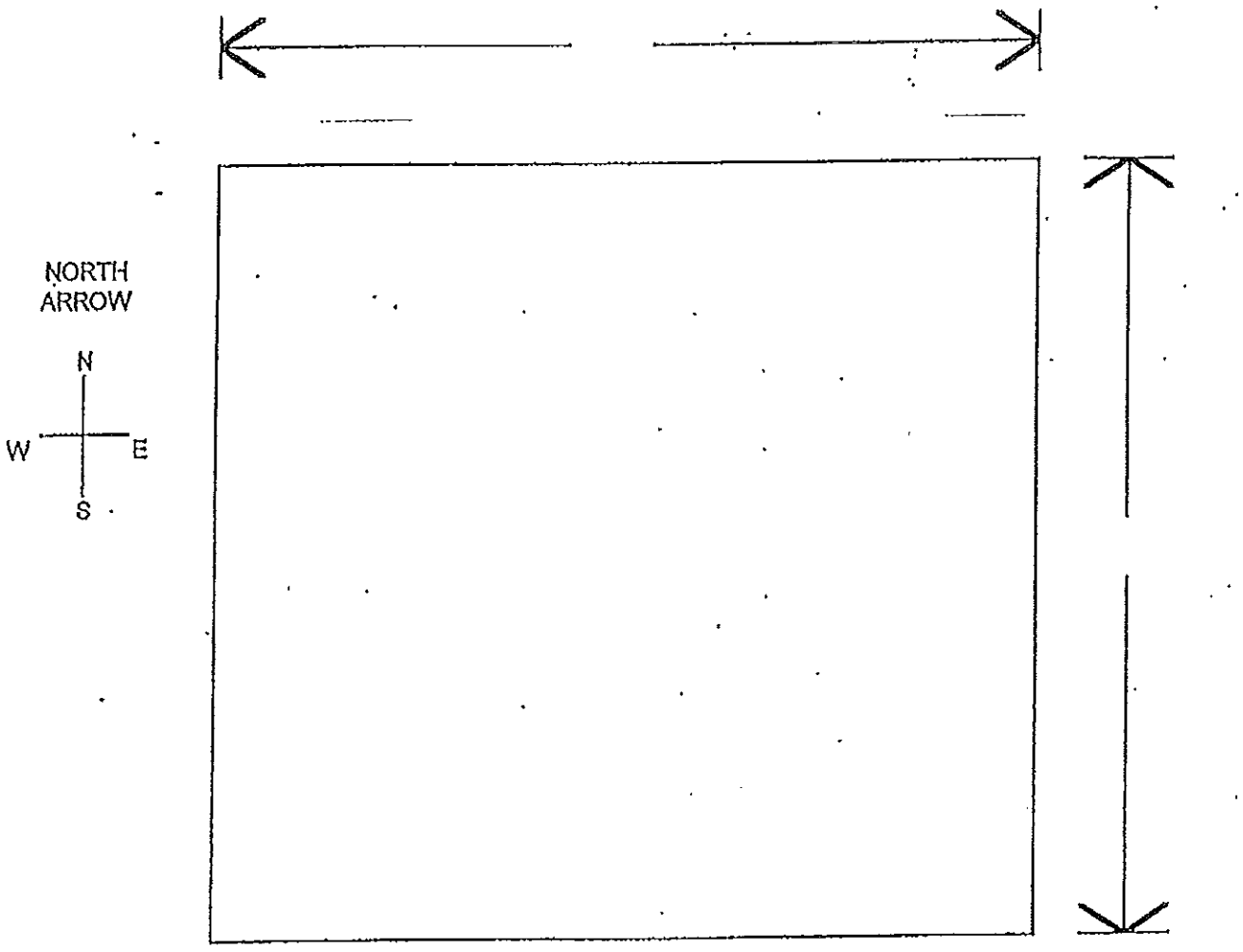
A. Pool Location. The pool or its fence must not be built within (as measured from the wall/edge of the pool):

1. The required front yard or required corner lot side yard.
2. Ten (10) feet of the side property line,
3. Ten (10) feet of the rear property line,
4. Ten (10) feet of any building on the lot.

B. For the protection of the general public, all swimming pools shall be completely enclosed by a fence or other means of access control as required in the Building Code.

PLEASE INDICATE:

1. Size and shape of pool.
2. Distance from property lines and any easements.
3. Residence and any out buildings.
4. Location of septic field and well.
5. Location of Fence including relation to the pool.



ADDRESS: _____

4. An attachment device shall attach each barrier section at a height not lower than 45 inches (1143 mm) above grade. Common attachment devices include, but are not limited to, devices that provide the security equal to or greater than that of a hook-and-eye-type latch incorporating a spring-actuated retaining lever such as a safety gate hook.
5. Where a hinged gate is used with a mesh fence, the gate shall comply with Section 305.3.
6. Patio deck sleeves such as vertical post receptacles that are placed inside the patio surface shall be of a nonconductive material.
7. Mesh fences shall not be installed on top of onground *residential* pools.

305.2.5 Closely spaced horizontal members. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the pool or spa side of the fence. Spacing between vertical members shall not exceed $1^3/_4$ inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed $1^3/_4$ inches (44 mm) in width.

305.2.6 Widely spaced horizontal members. Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, the interior width of the cutouts shall not exceed $1^3/_4$ inches (44 mm).

305.2.7 Chain link dimensions. The maximum opening formed by a chain link fence shall be not more than $1^3/_4$ inches (44 mm). Where the fence is provided with slats fastened at the top and bottom which reduce the openings, such openings shall be not more than $1^3/_4$ inches (44 mm).

305.2.8 Diagonal members. Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be not more than $1^3/_4$ inches (44 mm). The angle of diagonal members shall be not greater than 45 degrees (0.79 rad) from vertical.

305.2.9 Clear zone. There shall be a clear zone of not less than 36 inches (914 mm) between the exterior of the barrier and any permanent structures or equipment such as pumps, filters and heaters that can be used to climb the barrier.

305.2.10 Poolside barrier setbacks. The pool or spa side of the required barrier shall be not less than 20 inches (508 mm) from the water's edge.

305.3 Gates. Access gates shall comply with the requirements of Sections 305.3.1 through 305.3.3 and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the pool or spa, shall be self-closing and shall have a self-latching device.

305.3.1 Utility or service gates. Gates not intended for pedestrian use, such as utility or service gates, shall remain locked when not in use.

305.3.2 Double or multiple gates. Double gates or multiple gates shall have at least one leaf secured in place and the adjacent leaf shall be secured with a self-latching device. The gate and barrier shall not have openings larger than $^1/_2$ inch (12.7 mm) within 18 inches (457 mm) of the latch release mechanism. The self-latching device shall comply with the requirements of Section 305.3.3.

305.3.3 Latches. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from grade, the release mechanism shall be located on the pool or spa side of the gate not less than 3 inches (76 mm) below the top of the gate, and the gate and barrier shall not have openings greater than $^1/_2$ inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the barrier and where doors or windows provide direct access to the pool or spa through that wall, one of the following shall be required:

1. Operable windows having a sill height of less than 48 inches (1219 mm) above the indoor finished floor and doors shall have an alarm that produces an audible warning when the window, door or their screens are opened. The alarm shall be *listed* and *labeled* as a water hazard entrance alarm in accordance with UL 2017. In dwellings or structures not required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located 54 inches (1372 mm) or more above the finished floor. In dwellings or structures required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the finished floor.
2. A *safety cover* that is *listed* and *labeled* in accordance with ASTM F 1346 is installed for the pools and spas.
3. An *approved* means of protection, such as self-closing doors with self-latching devices, is provided. Such means of protection shall provide a degree of protection that is not less than the protection afforded by Item 1 or 2.

305.5 Onground residential pool structure as a barrier. An onground *residential* pool wall structure or a barrier mounted on top of an onground *residential* pool wall structure shall serve as a barrier where all of the following conditions are present:

1. Where only the pool wall serves as the barrier, the bottom of the wall is on grade, the top of the wall is not less than 48 inches (1219 mm) above grade for the entire perimeter of the pool, the wall complies with the requirements of Section 305.2 and the pool manufacturer allows the wall to serve as a barrier.

2. Where a barrier is mounted on top of the pool wall, the top of the barrier is not less than 48 inches (1219 mm) above grade for the entire perimeter of the pool, and the wall and the barrier on top of the wall comply with the requirements of Section 305.2.
3. Ladders or steps used as means of access to the pool are capable of being secured, locked or removed to prevent access except where the ladder or steps are surrounded by a barrier that meets the requirements of Section 305.
4. Openings created by the securing, locking or removal of ladders and steps do not allow the passage of a 4-inch (102 mm) diameter sphere.
5. Barriers that are mounted on top of onground *residential* pool walls are installed in accordance with the pool manufacturer's instructions.

305.6 Natural barriers. In the case where the pool or spa area abuts the edge of a lake or other natural body of water, public access is not permitted or allowed along the shoreline, and required barriers extend to and beyond the water's edge not less than 18 inches (457 mm), a barrier is not required between the natural body of water shoreline and the pool or spa.

305.7 Natural topography. Natural topography that prevents direct access to the pool or spa area shall include but not be limited to mountains and natural rock formations. A natural barrier approved by the governing body shall be acceptable provided that the degree of protection is not less than the protection afforded by the requirements of Sections 305.2 through 305.5.

SECTION 306
DECKS

306.1 General. Decks shall be designed and installed in accordance with the *International Residential Code* or the *International Building Code*, as applicable in accordance with Section 102.7.1, except as provided in this section.

306.2 Slip resistant. Decks, ramps, coping, and similar step surfaces shall be slip resistant and cleanable. Special features in or on decks such as markers, brand insignias, and similar materials shall be slip resistant.

306.3 Step risers and treads. Step risers for decks of public pools and spas shall be uniform and have a height not less than $3^3/_4$ inches (95 mm) and not greater than $7^1/_2$ inches (191 mm). The tread distance from front to back shall be not less than 11 inches (279 mm). Step risers for decks of *residential* pools and spas shall be uniform and shall have a height not exceeding $7^1/_2$ inches (191 mm). The tread distance from front to back shall be not less than 10 inches (254 mm).

306.4 Deck steps handrail required. Public pool and spa deck steps having three or more risers shall be provided with a handrail.

306.5 Slope. The minimum slope of decks shall be in accordance with Table 306.5 except where an alternative drainage method is provided that prevents the accumulation or pooling of water. The slope for decks, other than wood decks, shall be not greater than $^1/_2$ inch per foot (1 mm per 24 mm) except for ramps. The slope for wood and wood/plastic composite decks shall be not greater than $^1/_4$ inch per 1 foot (1 mm per 48 mm). Decks shall be sloped so that standing water will not be deeper than $^1/_8$ inch (3.2 mm), 20 minutes after the cessation of the addition of water to the deck.

306.6 Gaps. Gaps shall be provided between deck boards in wood and wood/plastic composite decks. Gaps shall be consistent with *approved* engineering methods with respect to the type of wood used and shall not cause a tripping hazard.

306.6.1 Maximum gap. The open gap between pool decks and adjoining decks or walkways, including joint material, shall be not greater than $^3/_4$ inch (19.1 mm). The difference in vertical elevation between the pool deck and the adjoining sidewalk shall be not greater than $^1/_4$ inch (6.4 mm).

306.7 Concrete joints. Isolation joints that occur where the pool coping meets the concrete deck shall be water tight.

306.7.1 Joints at coping. Joints that occur where the pool coping meets the concrete deck shall be installed to protect the coping and its mortar bed from damage as a result of the anticipated movement of adjoining deck.

306.7.2 Crack control. Joints in a deck shall be provided to minimize visible cracks outside of the control joints caused by imposed stresses or movement of the slab.

306.7.3 Movement control. Areas where decks join existing concrete work shall be provided with a joint to protect the pool from damage caused by relative movement.

306.8 Deck edges. The edges of decks shall be radiused, tapered, or otherwise designed to eliminate sharp corners.

TABLE 306.5
MINIMUM DRAINAGE SLOPES FOR DECK SURFACES

SURFACE	MINIMUM DRAINAGE SLOPE (INCH PER FOOT)
Carpet	$^1/_2$
Exposed aggregate	$^1/_4$
Textured, hand-finished concrete	$^1/_8$
Travertine/brick-set pavers, public pools or spas	$^3/_8$
Travertine/brick-set pavers, residential pools or spas	$^1/_8$
Wood	$^1/_8$
Wood/plastic composite	$^1/_8$

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

306.9 Valves under decks. Valves installed in or under decks shall be accessible for operation, service, and maintenance. Where access through the deck walking surface is required, an access cover shall be provided for the opening in the deck. Such access covers shall be slip resistant and secured.

306.9.1 Hose bibbs. Hose bibbs shall be provided for rinsing down the entire deck and shall be installed in accordance with the *International Plumbing Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1, and shall be located not more than 150 feet (45 720 mm) apart. Water-powered devices, such as water-powered lifts, shall have a dedicated hose bibb water source.

Exception: *Residential* pools and spas shall not be required to have hose bibbs located at 150-foot (45 720 mm) intervals, or have a dedicated hose bibb for water-powered devices.

SECTION 307
GENERAL DESIGN

307.1 General. The provisions of this section apply to all pools and spas.

Exception: The provisions of Sections 307.3 through 307.6 do not apply to *listed* and *labeled* portable *residential* spas and *listed* and *labeled* portable *residential* exercise spas.

307.2 Glazing in hazardous locations. Hazardous locations for glazing shall be as defined in the *International Building Code* or the *International Residential Code*, as applicable in accordance with Section 102.7.1 of this code. Where glazing is determined to be in a hazardous location, the requirements for the glazing shall be in accordance with those codes, as applicable.

307.3 Materials. Pools and spas and appurtenances thereto shall be constructed of materials that are nontoxic to humans and the environment; that are generally or commonly regarded to be impervious and enduring; that will withstand the design stresses; and that will provide a watertight structure with a smooth and easily cleanable surface without cracks or joints, excluding structural joints, or that will provide a watertight structure to which a smooth, easily cleaned surface/finish is applied or attached. Material surfaces that come in contact with the user shall be finished, so that they do not constitute a cutting, pinching, puncturing or abrasion hazard under casual contact and intended use.

307.3.1 Beach pools. Clean sand or similar material, where used in a beach pool environment, shall be used over an impervious surface. The sand area shall be designed and controlled so that the circulation system, maintenance, safety, sanitation, and operation of the pool are not adversely affected.

307.3.2 Compatibility. Assemblies of different materials shall be chemically and mechanically compatible for their intended use and environment.

307.4 Materials and structural design. Pools and spas shall conform to one or more of the standards indicated in Table 307.4. The structural design of pools and spas shall be in accordance with the *International Building Code* or the *International Residential Code*, as applicable in accordance with Section 102.7.1 of this code.

TABLE 307.4
RESERVOIRS AND SHELLS

MATERIAL	STANDARD
Fiberglass reinforced plastic	IAPMO Z124.7
Plastic	IAPMO Z124.7
Stainless steel (Types 316, 316L, 304, 304L)	ASTM A 240
Tile	ANSI A108/A118/A136.1
Vinyl	ASTM D 1593

307.4.1 Installation. Equipment for pools and spas shall be supported to prevent damage from misalignment and settling and located so as to allow access for inspection, servicing, removal and repair of component parts.

307.5 Freeze protection. In climates subject to freezing temperatures, outdoor pool and spa shells and appurtenances, piping, filter systems, pumps and motors, and other components shall be designed and constructed to provide protection from damage from freezing.

307.6 Surface condition. The surfaces within public pools and spas intended to provide footing for users shall be slip resistant and shall not cause injury during normal use.

307.7 Colors and finishes. The colors, patterns, or finishes of the pool or spa interior shall not obscure objects or surfaces within the pool or spa.

Exception: *Residential* pools and spas.

307.8 Roofs or canopies. Roofs or canopies over pools and spas shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1 and shall be constructed so as to prevent water runoff into the pool or spa.

307.9 Accessibility. An accessible route to public pools and spas shall be provided in accordance with the *International Building Code*. Accessibility within public pools and spas shall be provided as required by the accessible recreational facilities provisions of the *International Building Code*. Accessibility for pools and spas accessory to detached one- and two-family dwellings and townhouses not more than three stories in height shall be provided where required by the *International Residential Code*.

SECTION 308
DIMENSIONAL DESIGN

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

Exception: Portable *residential* spas and portable *residential* exercise spas.

308.2 Walls. Walls shall intersect with the floor at an angle or a transition profile. Where a transitional profile is provided at water depths of 3 feet (914 mm) or less, a transitional radius shall not exceed 6 inches (152 mm) and shall be tangent to the wall and is permitted to be tangent to or intersect the floor.

Exceptions:

1. Portable *residential* spas and portable *residential* exercise spas.
2. *Onground storable pools*.

308.3 Shape. This code is not intended to regulate the shape of a pool or spa other than to take into account the effect that a given shape will have on the safety of the occupants and to maintain the minimum required level of circulation to ensure sanitation.

308.4 Waterline. The *design waterline* shall have a maximum construction tolerance at the time of completion of the work of plus or minus $^1/_4$ inch (6.4 mm) for pools and spas with adjustable weir surface skimming systems, and plus or minus $^1/_8$ inch (3.2 mm) for pools and spas with nonadjustable surface skimming systems.

SECTION 309
EQUIPMENT

309.1 Electrically operated equipment. Electrically operated equipment shall be *listed* and *labeled* in accordance with applicable product standards.

Exception: Portable *residential* spas and portable *residential* exercise spas *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.

309.2 Treatment and circulation system equipment. Treatment and circulation system equipment for public pools and spas shall be *listed* and *labeled* in accordance with NSF 50 and other applicable standards.

SECTION 310
SUCTION ENTRAPMENT AVOIDANCE

310.1 General. Suction entrapment avoidance for pools and spas shall be provided in accordance with APSP 7.

Exceptions:

1. Portable spas and portable exercise spas *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.
2. Suction entrapment avoidance for wading pools shall be provided in accordance with Section 405.

SECTION 311
CIRCULATION SYSTEMS

311.1 General. The provisions of this section shall apply to circulation systems for pools and spas.

Exceptions:

1. Portable *residential* spas and portable *residential* exercise spas.
2. *Onground storable pools* supplied by the pool manufacturer as a kit that includes circulation system equipment that is in accordance with Section 704.

311.2 System design. A circulation system consisting of pumps, piping, return inlets and outlets, filters, and other necessary equipment shall be provided for the complete circulation of water. Wading pools and spas shall have separate dedicated filtering systems.

Exception: Separate filtering systems are not required for *residential* pools and spas.

311.2.1 Turnover rate. The equipment shall be sized to turn over the volume of water that the pool or spa is capable of containing as specified in this code for the specific installation.

311.2.2 Servicing. Circulation system components that require replacement or servicing shall be provided with access for inspection, repair, or replacement and shall be installed in accordance with the manufacturer's specifications.

311.2.3 Equipment anchorage. Pool and spa equipment and related piping shall be designed and installed in accordance with the manufacturer's instructions.

311.3 Water velocity. The water velocity in return lines shall not exceed 8 feet (2.4 m) per second. The water velocity in suction piping shall be as required by Section 310.

311.4 Piping and fittings. Plastic pipe and fittings used in circulation systems shall be nontoxic and shall be able to withstand the design operating pressures and conditions of the pool or spa. Plastic pipe shall be *listed* and *labeled* as complying with NSF 14. Circulation system piping shall be *listed* and *labeled* as complying with one of the standards in Table 311.4.

TABLE 311.4
CIRCULATION SYSTEM PIPE MATERIAL STANDARD

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 1527
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2846; CSA B137.6
Copper or copper-alloy tubing	ASTM B 88; ASTM B 447
Polyvinyl chloride (PVC) hose	ASTM D 1785; ASTM D 2241; ASTM D 2672; CSA B137.3
Polyvinyl chloride (PVC) plastic pipe	ASTM D 1785; CSA B137.3
Stainless steel pipe, Types 304, 304L, 316, 316L	ASTM A 312

809.6 Beach and sloping entries. The slope of beach and sloping entries used as a pool entrance shall not exceed 1 unit vertical in 7 units horizontal (14-percent slope).

809.7 Steps and sloping entries. Where steps and benches are used in conjunction with sloping entries, the vertical riser distance shall not exceed 12 inches (305 mm). For steps used in conjunction with sloping entries, the requirements of Section 809.6 shall apply.

809.8 Architectural features. Surfaces of architectural features shall not be required to comply with the 1 unit vertical in 7 units horizontal (14-percent slope) slope limitation.

809.9 Maximum depth. The horizontal surface of underwater seats, benches and swimouts shall be not greater than 20 inches (508 mm) below the design waterline.

SECTION 810
CIRCULATION SYSTEMS

810.1 Turnover rate. The circulation system equipment shall be sized to provide a turnover of the pool water not less than once every 12 hours. The system shall be designed to provide the required turnover rate based on the manufacturer's specified maximum flow rate of the filter, with a clean media condition of the filter.

810.2 Strainer required. Pressure filter systems shall be provided with a strainer located between the pool and the circulation pump.

SECTION 811
SAFETY FEATURES

811.1 Rope and float. In pools where the point of first slope break occurs, a rope and float assembly shall be installed across the width of the pool. The rope assembly shall be located not less than 1 foot (305 mm) and not greater than 2 feet (610 mm) towards the shallow side of the slope break. Rope anchoring devices shall be permanently attached to the pool wall, coping or deck. Rope ends shall attach to the rope anchor devices so that the rope ends can be disconnected from the rope anchor device.

American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs And Catch Basins

1 Scope

1.1 General. This standard covers design and performance criteria for circulation systems including components, devices, and related technology installed to protect against entrapment hazards in residential and public swimming pools, wading pools, inground spas, infinity edge basins, (infinity edge type pools) and catch Pools, and Aquatic Recreation Facilities.

1.1.1 Portable Factory Built Electric Spas/Hot Tubs. Suction entrapment avoidance guidelines for portable electric spas/hot tubs are not covered by this standard they are covered by UL 1563, Electric Spas, equipment Assemblies, and Associated Equipment.[6]

1.1.2 This standard applies to new and, when retrofitting, existing installations.

1.1.3 DANGER! SUCTION ENTRAPMENT HAZARD: To avoid serious injury or death, the pool or spa shall be closed to bathers if any suction outlet cover/grate is missing, broken, or incorrectly installed. There is no backup for a missing, damaged or incorrectly installed suction outlet cover/grate. See Appendix C.

1.2 Alternative methods. The provisions of this standard are not intended to prevent the use of any alternative material, system, or method of construction, provided any such alternative meets the intent and requirements of this standard, follows manufacturer's product specific instructions and is approved by the authority having jurisdiction.

2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of this standard.

ANSI/APSP-16 2011, Suction fittings for swimming and wading pools, spas, hot tubs and whirlpool bathtub appliances[1]

ANSI/ASME A112.19.17-2010, Manufactured safety vacuum release systems (SVRS) for residential and commercial swimming pool, spa, hot tub and wading pool suction systems[2]

ASTM F 2387-12, Standard specification for manufactured safety vacuum release systems, swimming pools, spas and hot tubs[3]

IAPMO SPS-4 2009, Special use suction fittings for swimming pools, spas and hot tubs (for suction side automatic swimming pool cleaners)[4]

NFPA 70-2011, National Electrical Code, Article 680, Swimming pools, fountains, and similar installations[5]

UL 1563 2009, Electric Spas, Equipment Assemblies, and Associated Equipment.[6]

3 Definitions

alternative method: A substitute way of achieving the same goal or purpose.

anti-entrapment cover: See CERTIFIED SUCTION OUTLET COVER/GRATE.

anti-vortex cover: An outlet cover designed to prevent air entrainment from the surface of the water. This term is no longer used to describe CERTIFIED SUCTION OUTLET COVER/GRATE.

approved safety outlet cover: See CERTIFIED SUCTION OUTLET COVER/GRATE.

automatic pump shut-off system (APSS): A pump motor control or other device capable of turning off, stopping, or otherwise incapacitating a pump(s) in response to a condition (i.e., high vacuum, low flow, low current, etc.) that would indicate that a suction entrapment event has occurred.

branch piping: All pipe and fittings, including the "run" of the junction tee, located between multiple suction outlets fitting (see *Figures 1* and *9–14*).

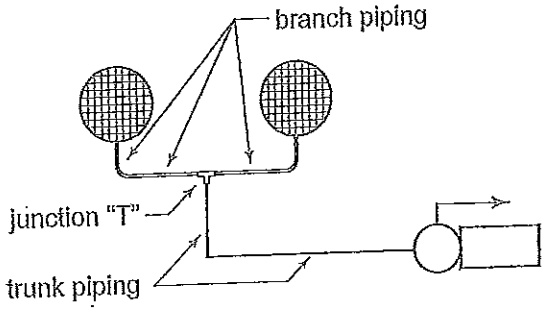


Figure 1. Branch piping

1. Association of Pool & Spa Professionals (APSP) , 2111 Eisenhower Avenue, Alexandria, VA 22314 (703) 838-0083, www.APSP.org.
2. American Society of Mechanical Engineers (ASME), 3 Park Avenue, 20th Floor, New York, NY 10016, (212) 591-8562, www.asme.org
3. ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, (610) 832-9500, www.astm.org
4. International Association of Plumbing and Mechanical Officials (IAPMO), 5001 E. Philadelphia St., Ontario, CA 91761. (909) 472-4100, www.iapmo.org
5. National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, (617) 770-3000, www.nfpa.org
6. Underwriters Laboratories Inc. (UL), 333 Pfingston Road, Northbrook, IL 60062-2096. (847) 272-8800, www.ul.com

catch pool: The pool at the discharge of a waterslide or similar aquatic facility or a body of water supplied by gravity overflow from another pool or vessel.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

certified: The published certification by an ILAC approved laboratory that a device, system, or alternate method has been tested and certified to be in conformance with the full intent of a standard.

certified automatic pump shut-off system APSS: An automatic pump shut-off system tested and certified in accordance with Section 4.3.2 of this standard which requires compliance with ANSI/ASME A112.19.17 or ASTM F2387.

certified safety cover: See CERTIFIED SUCTION OUTLET COVER/GRATE.

certified safety outlet cover: See CERTIFIED SUCTION OUTLET COVER/GRATE.

certified suction outlet cover/grate: A manufactured suction outlet or field fabricated outlet that has been Certified in accordance with Section 4.3.1 of this standard which requires compliance with ANSI/APSP-16[7].

certified SVRS: A manufactured safety vacuum release system tested and certified in accordance with Section 4.3.2 of this standard which requires compliance with ANSI/ASME A112.19.17 or ASTM F 2387.

check valve: A mechanical device in a pipe that permits the flow of water in one direction only.

closed pool: A pool in which access to bathers is prohibited. This may be accomplished by locking gates and doors, by posting notices, conspicuously placed "Barricade" tape. Pool circulation systems may be in operation when closed.

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

debris removal system: A system comprised of a large opening suction outlet, large diameter pipe and a debris collection basket, typically located in the deck or the pump basket. Because of unique challenges passing debris through the suction outlet cover/grate and suction piping, these systems are designed specifically for debris removal and are commonly sold as kits with detailed installation requirements to address suction safety.

drain: See MAIN DRAIN.

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

engineer: A Licensed Professional Engineer (P.E.).

equalizer line: 1. A pipe with a Certified suction outlet cover/grate located below the waterline and connected to the body of a skimmer to prevent air from being drawn into the pump if the water level drops below the skimmer weir. 2. A pipe connecting two bodies of water with Certified Suction Outlet Fitting Assemblies to equalize water levels.

feet of head: The measure of 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 = 43 pounds per square inch).

field built sump: A sump built below or behind the suction outlet cover/grate of a design specified by the cover/grate manufacturer to control flow distribution through the open area of the cover/grate. Field built sumps may be formed, cut or carved out of the gunite or concrete material of the pool structure. They are to be constructed so as to accommodate suitable fastening means to attach the cover/grate. They must conform to the requirements of APSP/ANSI-16.

field fabricated outlet(s): These are site specific unblockable suction outlet fitting assemblies defined per ANSI/APSP-16 as being intended as but not limited to a single suction outlet and are limited to 1.5 ft/sec *(0.46 m/s)* of flow velocity through the open area of the cover/grate unless rated at a lower flow rate by the Registered Design Professional. They are to be of such a size that the 18 in. × 23 in. × 4 in. corner radii *(457 mm × 584 mm × 102 mm)* blocking element will not cause a differential pressure that could cause body entrapment.

flow rate: The quantity of water flowing through a pipe within a specified time, such as the number of gallons flowing past a point in one minute; abbreviated as GPM or *liters/minute, Lpm* (1 GPM = *3.7854 L/min*).

flow rating: The maximum allowable flow rate through a cover/grate.

GPM: Abbreviations for gallons per minute.

gravity drainage: See VENTED RESERVOIR.

gutter: Overflow trough at the perimeter wall of a pool or at the bottom of a vanishing edge wall of a pool that is a component of the circulation system or flows to waste.

hydrostatic relief valve: A valve to allow rising groundwater to enter an empty pool to prevent flotation.

incorrectly installed: not installed in strict conformance with manufacturers product specific instructions.

infinity edge basin: a basin designed to receive the water that flows over the "infinity edge" of a pool and/or spa during the circulation pump cycle and/or feature pump operational time.

influent: The water entering a filter or other device

inlet: See RETURN INLET.

junction tee: A tee between suction outlet fittings, which joins their flow into a trunk line to the pump.
NOTE: This usage is different from the standard usage in the piping industry. The trunk line is connected to the single branch of the tee fitting and the two branch lines from the outlets are connected to the run of the tee fitting.

main drain: An obsolete term for suction outlet, which is a fitting, fitting assembly, cover/grate, and related components that provide a localized low-pressure area for the transfer of water from a swimming pool, wading pool, spa, or hot tub.

manifold: A branch pipe arrangement that connects several influent pipes into one chamber or pump, or one chamber into several effluent pipes.

7. The Consumer Product Safety Commission has voted unanimously to approve ANSI/APSP-16 2011 as the successor standard to the ANSI/ASME A112.19.8 suction outlet cover standard mandated by the Virginia Graeme Baker Pool and Spa Safety Act. The Commission determined that the new standard, ANSI/APSP-16 2011, was in the public interest, and incorporated this standard into its regulations. This means that, effective September 6, 2011, suction outlet covers manufactured, distributed, or entered into commerce in the United States must conform to the requirements of ANSI/APSP-16 2011.

maximum system flow rate: For purposes of this suction entrapment avoidance standard, maximum system flow rate is defined as the maximum potential flow when all available system flow is directed through the submerged suction outlet(s). See Section 4.4.9 for specific procedures required to determine the system specific, maximum system flow rate.

operating point: The condition at which the pump will operate. It is the intersection of the pump curve and system curve.

overflow system: An outlet with flow across a fixed or movable weir and where there is a free surface interface with atmosphere.

P.E.: See ENGINEER.

parallel: A piping arrangement allowing flow through multiple paths.

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

pump curve, pump performance curve: A graph that represents the pressure rise of a pump plotted against flow rate. See SYSTEM CURVE AND OPERATING POINT.

Registered Design Professional: an individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

retrofit: The act of adding a component or accessory to the pool and spa that was not part of the original installation—for example, replacing a non-certified suction outlet cover/grate with one that is Certified. See also Section 6.5.

return inlet: The aperture or fitting through which the water under pressure returns into the pool or spa.

safety drain cover: See CERTIFIED SUCTION OUTLET s/GRATE.

safety vacuum release system (SVRS): A system capable of providing vacuum release at a suction outlet in case of a high vacuum occurrence due to a suction outlet flow blockage. Methods may include, but are not necessarily limited to, venting the suction line to atmosphere and/or turning off the circulation pump, or reversing the circulation flow.

secured control system: Any means that reasonably prevents unauthorized access to pump and valve control systems by persons who could make adjustments resulting in flow rates above which the system has been stamped and sealed in accordance with this standard by the Registered Design Professional responsible for this system.
NOTE: Secured control systems include, but are not limited to; equipment rooms not accessible to unqualified persons, control systems that are protected by passwords not available to unqualified persons, and valves with adjustment handles locked.

single outlet, alternative suction systems: A single Certified suction outlet cover/grate and an alternative suction system, including a venturi-driven system, turbine driven system, or any other mechanical means of circulating water without the use of a centrifugal pump.

skimmer: A device installed in the wall of a body of water that permits the removal of floating debris and surface water.

static lines: Piping that connects two bodies of water to maintain equal levels (example—a static line from a collector tank to a pool so that the auto-fill device in the collection tank can be adjusted to maintain the proper water level in the pool.)

suction: The flow of fluid into a partial vacuum or region of lower pressure. The gradient between this region and the ambient pressure will propel matter towards the low-pressure area.

suction-limiting gravity flow systems: See VENTED RESERVOIR.

suction-limiting system: A safety vacuum release system, vent system, gravity drainage/flow system, vented reservoir, automatic pump shut-off system, properly spaced multiple suction outlets, or other methods capable of limiting the duration of a high-vacuum occurrence and/or the magnitude of the vacuum at a suction outlet cover/grate in case of suction flow blockage.

suction outlet: Indicates a fitting, fitting assembly, cover/grate, sump, and related components that provide a localized low-pressure area for the transfer of water from a swimming pool, wading pool, spa, or hot tub. See also CERTIFIED SUCTION OUTLET COVER/GRATE.

suction system piping: All piping on the suction side of the system between the pool and the pump.

sump: The vessel between the suction outlet cover/grate and suction outlet piping. This may be manufactured or field built.

sumps in series: An arrangement of outlets such that effluent of one sump is influent to another sump. It is commonly used in piping submerged suction outlet(s) to skimmer body(ies).

swim jet system: Combination fitting or fittings that incorporate(s) a suction outlet and inlet designed to move a large volume of water at high velocity in a single direction.

system curve: A graph that shows the pressure difference required to induce flow through the entire piping system. It is plotted with head pressure on the vertical axis of the chart and flow rate on the horizontal axis of the chart (see *Figure 2*).

tee: A fitting in the shape of a "T" used to connect branch pipes. The trunk pipe is perpendicular to the two branch pipes.

testing: For the purposes of this standard, "testing" means the physical activity of performing an evaluation in accordance with the procedures and protocols defined by this standard and/or a referenced standard.

total dynamic head (TDH): The sum of the difference in elevation between the source and destination and the friction losses in a piping system. It has units of pressure (such as psi) but is commonly given in feet of head. Since friction losses depend on flow rate, TDH must be specified for a particular flow rate.

trunk line: piping from a junction tee to a suction source, such as a pump or vented reservoir.

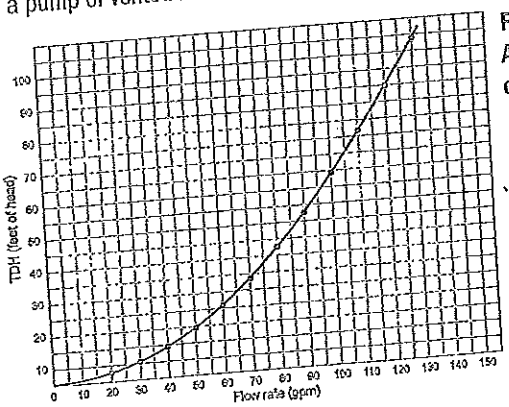


Figure 2. A system curve

unblockable: A suction outlet defined as all components, including the sump and/or body, cover/grate, and hardware such that its perforated (open) area cannot be shadowed by the area of the 18 × 23 in. *(457 × 584 mm)* Body Blocking Element of ANSI/APSP-16, and that the rated flow through the remaining open area cannot create a suction force in excess of the removal force values in *Table 1* of that standard. All suction outlet covers, manufactured or field-fabricated, are to be certified as meeting the applicable requirements of the ANSI/APSP-16 (see *Figures 3a* and *3b*).

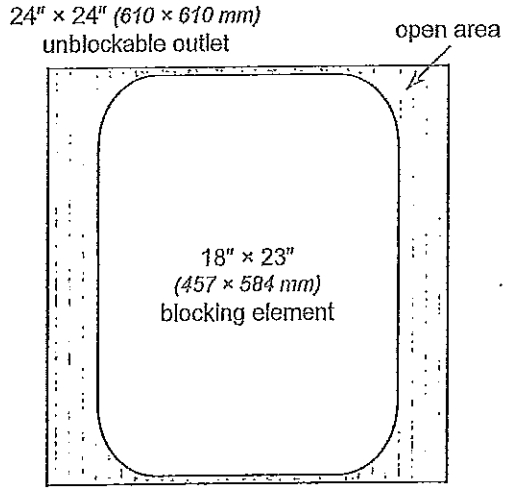


Figure 3a. Example of unblockable suction outlet

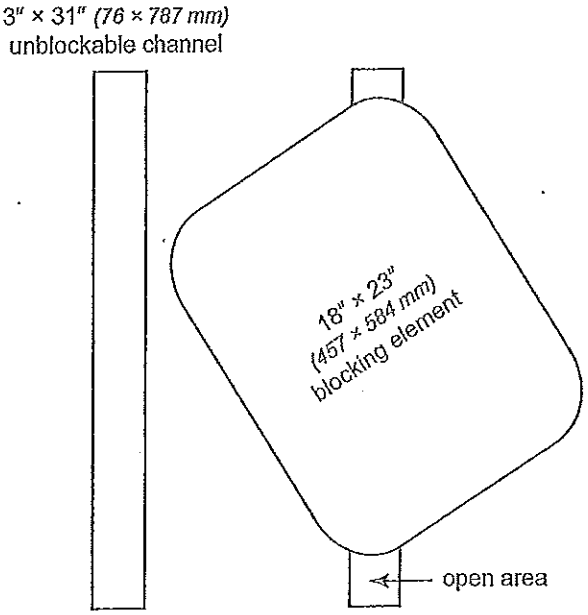


Figure 3b. Example of unblockable suction outlet

vacuum: A condition in which the pressure inside an outlet or suction pipe is lower than pool pressure.

vanishing edge: A design feature incorporated into a pool wall wherein the water flows over the wall (edge) into a catch gutter or catch pool, creating the illusion that the water vanishes.

vent: A vent to the atmosphere that connects to the suction pipe between the pool and the pump. When a high vacuum event occurs, air from the vent pipe replaces the water in the suction pipe thereby breaking the vacuum.

vented reservoir: A receptacle or container incorporated as part of a circulation system that is vented to atmosphere and receives water from the pool/spa or water feature by force of gravity, from which the pump draws its water supply. Systems including vented reservoirs are commonly referred to as *gravity flow systems, gravity feed systems,* or *gravity drainage systems.* Vented reservoirs include, but are not limited, to the following: catch pools, surge tanks, collector tanks, skimmers open to the atmosphere, atmospheric vent, gutters, overflow gutters, or perimeter gutter systems.

wading pool: A separate pool designed for use by small children with an independent circulation system and a maximum water depth of 18 in. *(457 mm).*

wall vacuum fitting: A fitting in the wall of a pool intended to provide a point of connection of suction for suction side cleaners.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

4 General requirements for suction entrapment avoidance systems and components

4.1 DANGER! To avoid serious injury or death, the pool or spa shall be closed to bathers if any suction outlet cover/grate is missing, broken, or incorrectly installed. There is no backup for a missing, damaged or incorrectly installed suction outlet cover/grate.

4.2 Codes. Pools and spas covered by this standard shall be constructed and operated to comply with all applicable codes governing safety and environmental regulations.

4.2.1 Electrical components. All associated electrical components installed in and/or adjacent to the circulation system shall comply with the requirements of the *National Electrical Code,* Article 680, Swimming pools, fountains, and similar installations, or the applicable revision and any state or local codes.

4.3 Certifications

4.3.1 Suction outlet certification

4.3.1.1 Manufactured suction outlet fitting assembly(ies). When used, fully submerged suction outlet fitting assembly(ies) including cover/grate and associated fittings, fasteners and components shall be tested and certified by a third-party test lab accredited by the International Laboratory Accreditation Cooperation (ILAC) to test and certify products as conforming to ANSI/APSP-16.

4.3.1.2 Field fabricated suction outlet(s). When used, field fabricated suction outlet cover/grate, sump, fasteners and assemblies shall be Certified by a Registered Design Professional as conforming to ANSI/APSP-16.

4.3.2 Manufactured Safety Vacuum Release Systems (SVRS) and Automatic Pump Shut-off Systems (APSS). When used, SVRS and APSS devices shall be tested and certified by a third-party test lab accredited by the International Laboratory Accreditation Cooperation (ILAC) to test and certify products as conforming to ASME/ANSI A112.19.17, ASTM F 2387 or any successor standards recognized by the U.S. Consumer Product Safety Commission (CPSC).

NOTE: As of the publication date of this standard, automatic pump shut-off systems do not have a performance standard to which they can be certified, as a result the U.S. Consumer Product Safety Commission (CPSC) states APSS are to be tested and certified in accordance with one of the SVRS standards.

NOTICE: Operating conditions. Systems are tested for operation, in accordance with current standards, at room temperature. For substantially varying environmental conditions, including freezing, heat, salt spray, and humidity, confirm suitability with the SVRS manufacturer prior to installation and use.

CAUTION: Incompatible configurations. Some suction vacuum release systems may be incompatible with certain system configurations. The designer or installer shall confirm suitability with the SVRS manufacturer prior to installation and use. Incompatible configurations may include check valves; two or more suction outlets, hydrostatic relief valves, skimmers, solar systems, elevated or submerged pump suction, multilevel bodies of water, and water features.

4.4 Performance requirements for suction outlets and suction-limiting systems

NOTE: Suction-limiting systems protect against body entrapment but are not considered "backup" systems as there is no known suction-limiting system that will completely protect against the remaining four (evisceration, limb, hair, mechanical) of the five known hazards and presenting suction-limiting systems as "backup" systems would promote a false sense of security among the users of these devices/systems.

4.4.1 Submerged suction outlets are optional. Fully submerged suction outlets (main drains) are not required in pools and spas. Surface skimming or overflow systems shall be permitted to provide 100 percent of the flow.

4.4.2 Field built sumps. Field built sumps shall be built in accordance with the suction outlet fitting assembly manufacturer's instructions or as may be site specific designed by a Registered Design Professional.

Figure 4. Single unblockable channel outlet to single pump.

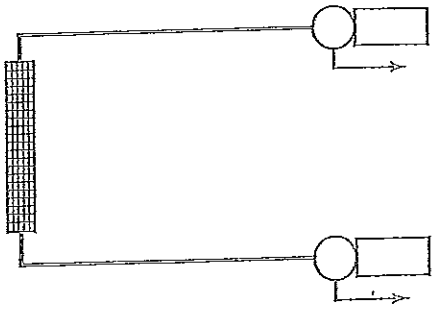


Figure 5. Single unblockable channel outlet to two pumps.

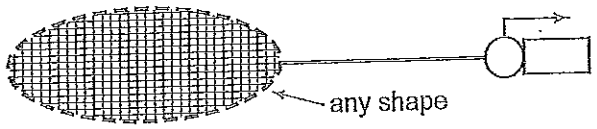


Figure 6. large unblockable outlet of any shape to single pump.

4.4.3 Unblockable outlets–single. A fully submerged unblockable outlet shall have a flow rating equal to or greater than the maximum system flow as determined in accordance with Section 4.4.9 (see *Figures 4, 5,* and *6*).

4.4.4 Unblockable outlets–multiple. Fully submerged unblockable outlets shall have a combined flow rating equal to or greater than the maximum system flow as verified in accordance with Section 4.4.9.

4.4.5 Blockable outlets–dual. When the secondary source of water for a blockable outlet is another submerged suction outlet assembly, each shall have a flow rating equal to or greater than the maximum system flow as determined in accordance with Section 4.4.9.

4.4.6 Blockable outlets–three, or more. When the secondary source of water for a blockable outlet is two or more submerged suction outlet assemblies, the flow rating of the set shall be determined by combining the flow rating of all outlets, minus the flow rating of one. The combined flow rating of the set shall be equal to or greater than the maximum system flow as determined in accordance with Section 4.4.9. If the flow ratings of all outlets are not equal, subtract the flow rating of the outlet with the highest flow rating.

4.4.7 Blockable outlets–multiple separation. For new construction see Section 5.3. For existing pools and spas see Section 6.9.

4.4.9 Maximum system flow rate. The maximum system flow rate shall be determined according to control system type where facilities with unsecured control systems use the options in 4.4.9.1 and facilities with secured control systems use the options in 4.4.9.2:

4.4.9.1 Maximum system flow rate–unsecured control systems. The maximum system flow rate is the pump's flow rate at the highest user selectable speed while the system is configured to operate at the lowest achievable system TDH when all flow is from the submerged suction system (skimmers off), the filter(s) is clean (when included), and all pressure-side valves are in the open (maximum flow) position. This operating point is determined by one of the following:

- Measuring with flow meter accurate to ±10% and installed according to the manufacturers specification, or
- Computing using complete system TDH calculations and then looking up the flow rate using the manufacturers certified pump curve, or
- Measuring system TDH at the pump's drain plugs and then looking up the flow rate using the manufacturer's certified pump curve.

4.4.9.2 Maximum system flow rate–secured control systems. The maximum system flow rate is the flow rate for the pump at its highest operating speed with the lowest operating system resistance as defined by the Registered Design Professional. It applies to new or replacement pumps. Measurements shall be made with a properly sized flow meter accurate to ±10% and installed according to manufacturer's instructions.

NOTE: The flow meter must be installed in accordance with the manufacturer's specific instructions. Careful consideration must be given to pipe diameter and the required straight pipe distances between the flow meter and other fittings such as, but not limited to, elbows, tees, valves etc.
No offset or estimation is to be allowed for flow. meters that are not installed in accordance with the manufacturer's instructions. The manufacturer's claims must be NIST[8] traceable and verified by a third party.

4.5 Skimmers. Skimmers shall be vented to the atmosphere through openings in the lid, or through a separate vent pipe (see *Figure 7*).

4.5.1 Skimmer equalizer lines. Skimmer equalizer lines shall not be used on new construction. Existing equalizer(s) shall comply with all submerged suction outlet requirements of this standard (see *Figure 8*).

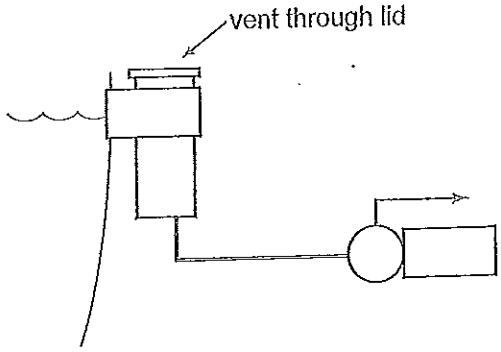


Figure 7. Skimmer, vent through lid

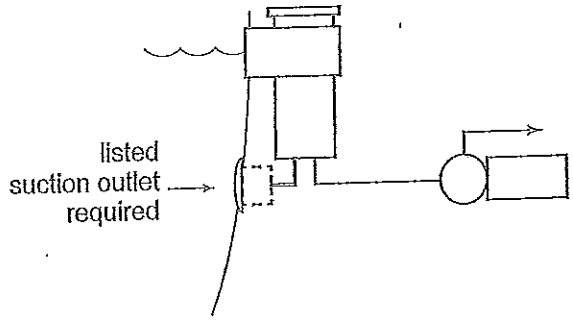


Figure 8. Skimmer with equalizer

4.6 Wall vacuum fitting(s). When used, vacuum cleaner fitting(s) shall be located in an accessible position(s) no greater than 12 inches *(305 mm)* below the water level and the self closing, self latching fitting shall comply with IAPMO SPS 4. In addition, the vacuum piping shall be equipped with a valve to remain in the closed position when not in use.

NOTICE: SPS-4 requires tools to remove, but due to incompatible components; there have been multiple cases of removal upon each usage, sometimes resulting in loss of components, and the essential safety feature. Make sure that the attachment of a vacuum hose in normal usage never leads to removal of the self-closing self-latching feature.

5 New construction

5.1 General. Methods to avoid entrapment in circulation systems, swim jet systems, alternative suction systems, and debris removal systems are shown in Sections 5.2 through 5.5.

5.2 Submerged suction outlets are optional. See Section 4.4.1.

5.2.1 Wading Pools. Due to the unique hazard presented by submerged suction outlets in wading pools, submerged suction outlets are prohibited in wading pools in all areas accessible to the bather.

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5.3 Submerged suction outlets. When used, fully submerged suction outlet fitting assemblies and systems shall be certified in accordance with Section 4.3.1. Dual or multiple outlets piped in a single suction system through a common suction line to a pump(s) shall not be capable of being isolated by valves.

5.3.1 Blockable outlets–dual separation. Dual outlets shall be separated by a minimum of 3 feet *(914 mm)* measured from center to center of the suction outlet cover/grate (see *Figures 9, 10,* and *11)* or located on two (2) different planes, i.e., one (1) on the bottom and one (1) on the vertical wall, or one (1) each on two (2) separate vertical walls. (See *Figures 12* and *15*). Suction outlets shall not be installed in seating areas.

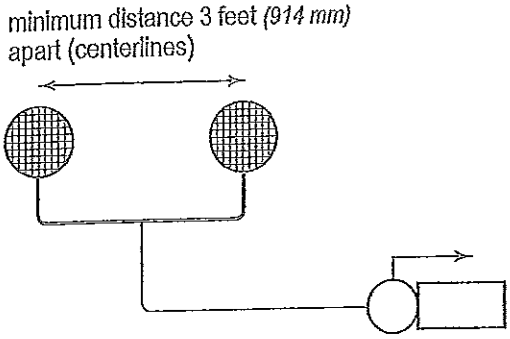

Figure 9. Dual outlets in parallel to one pump

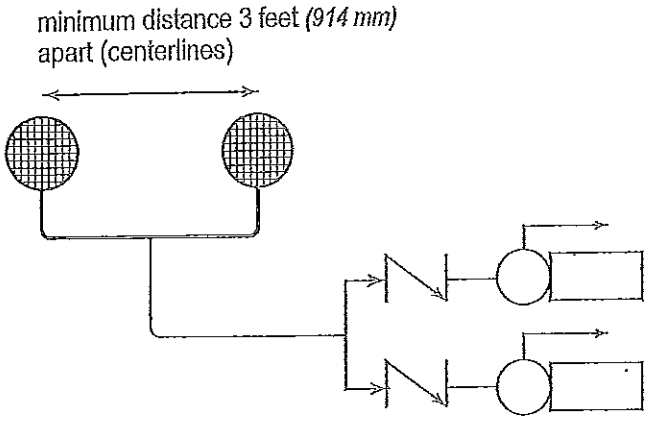

Figure 10. Dual outlets in parallel to dual pumps

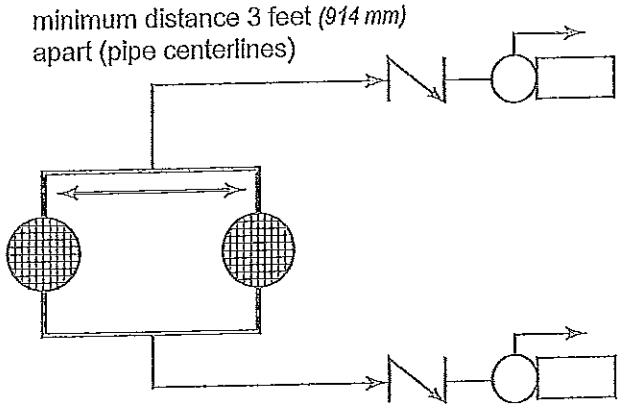

Figure 11. Dual parallel outlets to two pumps

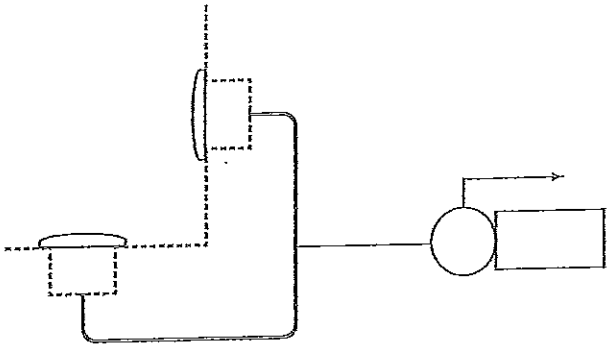

Figure 12. Dual outlets on different planes

5.3.2 Multiple Blockable Separation. Three or more submerged outlets are subject to the separation requirement of 5.3.1 only on the most widely spaced of the group. (See *Figure 13* or *14.*)

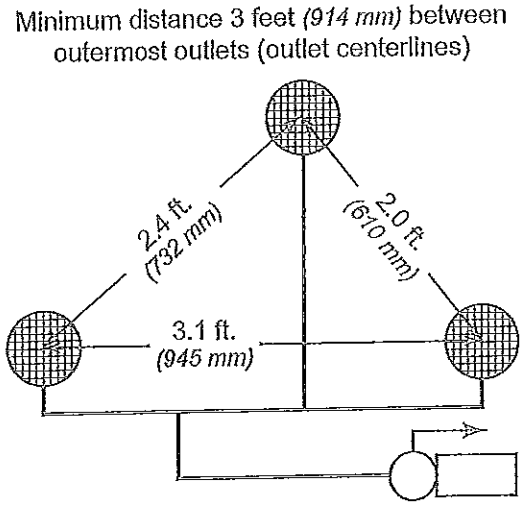

Figure 13. Three or more outlets to (a) single pump(s)

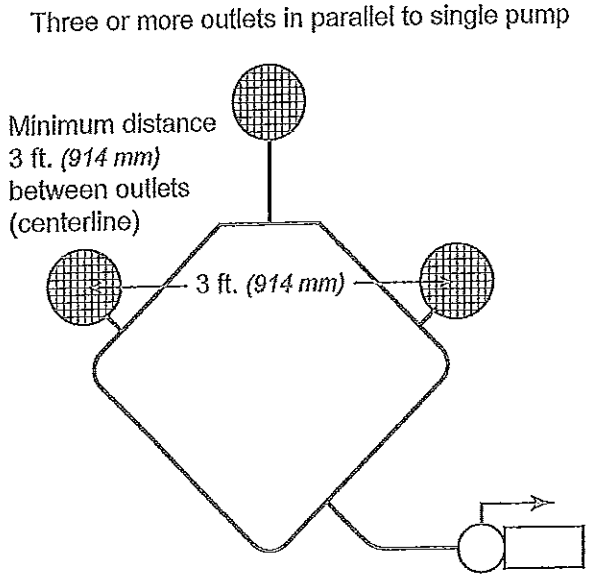

Figure 14. Three or more outlets in parallel, looped piping

5.4 Outlet sumps in series. Two manufactured sumps or field-fabricated sumps, with certified suction outlet covers/grates, piped in series, are typically intended for debris removal. Between the debris suction outlet and the pump, there shall be one of the options certified (see *Figure 15*). The manufacturer of such debris removal systems shall test and approve for the purpose at least one of these.

5.4.1 One (1) additional suction outlet (not in series) with Certified suction outlet cover/grate located a minimum of 18 inches *(457 mm)* from the suction outlet fitting assembly in the suction line to the pump(s); or

5.4.2 Engineered suction-limiting vent system; or

5.4.3 Certified manufactured SVRS or APSS.

5.5 Other means. See Section 1.2.

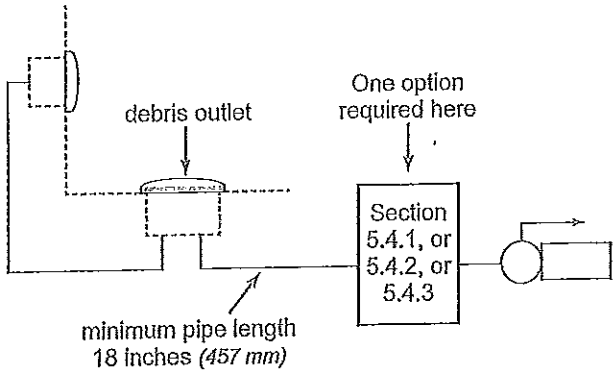

Figure 15. Sumps in series

6 Existing pools and spas

6.1 DANGER! To avoid serious injury or death, the pool or spa shall be closed to bathers if any suction outlet cover/grate is missing, broken, or incorrectly installed. There is no backup for a missing, damaged or incorrectly installed suction outlet cover/grate. See Appendix C.

6.2 Certified Suction Outlet Covers/Grates. When used, fully submerged suction outlet fitting assemblies, cover/grate and associated fitting, fasteners and assemblies shall be certified in accordance with Section 4.3.1, not exceed their installed life in years as indicated by the Certified manufactured or field fabricated outlet documentation, and located in accordance with Section 5.3.

6.3 Wading Pools. Due to the unique hazard presented by submerged suction outlets in wading pools, it is recommended that, whenever possible, the submerged suction outlet(s) be permanently disabled, or converted to a return fitting(s) in accordance with 6.6.1, provided the system piping and skimmer(s)/overflow gutters are capable of handling the required full system flow

6.4 Evaluation for compliance. All suction outlets, suction entrapment avoidance systems, and related components shall be evaluated and brought into compliance by a person who is licensed or qualified by the authority having jurisdiction.