

15A NCAC 18A .2518 CIRCULATION SYSTEM

(a) Public swimming pools shall be equipped with a water circulation system.

(b) The water circulation system shall circulate and filter the entire volume of public swimming pool water four times or more in 24 hours. The water circulation system shall be operated 24 hours per day at no more than the maximum velocity allowed under Paragraph (d) of this Rule during the operating dates set out in the permit.

(c) The water circulation system piping shall be designed and installed so that the flow from the public swimming pool shall be from main drains or the surface overflow system. If both main drains and a surface overflow system are used, the water circulation system piping shall be designed such that the flow of water from the public swimming pool is simultaneous from the surface overflow system and the main drains. Skimmer piping constructed after May 1, 2010 shall be sized to handle 100 percent of the flow rate determined by the Registered Design Professional in the pool design. Perimeter overflow system piping constructed after May 1, 2010 shall be sized to handle 100 percent of the flow rate determined by the Registered Design Professional in the pool design. Main drain piping constructed after May 1, 2010 shall be sized to handle 100 percent of the flow rate determined by the Registered Design Professional in the pool design.

(d) Piping shall be designed to carry water at a maximum velocity not to exceed six feet per second for suction piping and not to exceed 10 feet per second for discharge piping, except for copper pipe where the velocity shall not exceed eight feet per second for discharge piping. Piping shall comply with NSF/ANSI Standard 14 Plastics Piping System Components and Related Materials, incorporated by reference, including any subsequent amendments or editions, and available at <http://webstore.ansi.org/> at a cost of one hundred sixty-five dollars (\$165.00), and be free of visible water leaks. Public swimming pools constructed after the effective date of this Rule shall use plastic pipe made of a minimum of Schedule 40 PVC. Flexible pipe shall not be used, except that flexible PVC hoses that meet the requirements of NSF/ANSI/CAN Standard 50 Equipment and Chemicals for Swimming Pools, Spas, Hot Tubs, and Other Recreational Water Facilities, incorporated by reference, including any subsequent amendments or editions, and available at <http://webstore.ansi.org/> at a cost of five hundred eighty dollars (\$580.00)(hereinafter referred to as "NSF Standard 50"), may be used when affixed to spa shells and rigid pipes do not provide the necessary angles to connect water circulation system components. Exposed pipes and valves shall be identified by a color code with a legend or labels.

(e) The water circulation system shall have a strainer with a basket to prevent hair, lint, and other debris from reaching the pump. The owner of the public swimming pool shall keep a spare strainer basket onsite at the public swimming pool. Strainers shall be designed for use in pools with openings not more than ¼ inch (6.4 mm) in size that provide a free flow area at least four times the cross-section area of the pump suction line and are accessible for daily cleaning.

(f) A swimming pool shall have a vacuum cleaning system to remove debris and foreign material that settles to the bottom of the swimming pool. Integral vacuum ports shall be located on the pool wall at least six inches and no greater than 18 inches below the water level. Skimmer vacuums may be used when connected to two or fewer skimmers that are isolated from the remaining water circulation system piping. Integral vacuum cleaning systems shall have valves and protective caps. Integral vacuum ports constructed after May 1, 2010 shall have self-closing caps designed to be opened with a tool. Portable vacuum equipment may be used to meet the requirements of this Rule.

(g) A flow meter, reading in gallons per minute, shall be installed in accordance with the manufacturer's instructions. The flow meter shall measure flows between the minimum circulation turnover rate required in Paragraph (b) of this Rule and the maximum velocity permitted under Paragraph (d) of this Rule and shall be accurate within 10 percent of true flow.

(h) A public swimming pool shall have a pump or pumps with capacity to recirculate the public swimming pool water four times or more in 24 hours. The pump or pumps shall not need to be primed, shall be self-priming, or shall utilize an automated priming device labeled for use in public pools by the manufacturer. Any single speed pump shall be capable of maintaining required water turnover based on headloss calculations provided by a professional engineer licensed under G.S. Chapter 89C, the measurements of a flow meter installed in accordance with the manufacturer's instructions, or an assumed total dynamic head of 65 feet of water. Any variable speed pump or single speed pump utilizing a variable frequency drive shall be capable of maintaining water turnover as required by Paragraph (b) of this Rule based on a pump performance curve provided by the manufacturer and shall maintain the flow rate determined by the Registered Design Professional in the pool design. Pumps shall be certified by NSF International as meeting NSF Standard 50 or verified by an independent third-party testing laboratory to meet provisions of NSF Standard 50 applicable to pumps. Verification conducted by an independent third-party testing laboratory shall include testing and quality control inspections.

(i) All public swimming pools shall be equipped with water return inlets. The water return inlets shall meet the following requirements:

- (1) The water return inlets shall produce a uniform circulation of water and maintain a uniform disinfectant residual throughout the pool;
- (2) There shall be at least one water return inlet per 20 gallons per minute of return water flow with a minimum of four water return inlets for any swimming pool;
- (3) Water return inlets shall be located so that no part of the swimming pool is more than 25 feet of horizontal distance from the nearest water return inlet; and
- (4) Water return inlets shall be replaced when damaged or missing.

(j) Drains shall not be required in public swimming pools when an alternate method to drain the pool is provided. Public swimming pools constructed without main drains shall be designed with water return inlets positioned to return water uniformly throughout the public swimming pool. Public swimming pools constructed with main drains shall have the main drains installed in accordance with the manufacturer's instructions and meet the following requirements:

- (1) Public swimming pools with main drains shall be provided with one or more unblockable drains or two or more main drains located at the deepest section of the pool on a horizontal plane and connected by symmetrical "T" piping. Except when unblockable drains are used, piping between main drains shall be sized and configured such that blocking any one drain will not result in flow through the remaining drain covers exceeding the manufacturer's flow rating while handling 100 percent of the pump's maximum flow. Dual main drains connected by "T" piping shall be spaced not more than 30 feet apart, and not more than 15 feet away from the side walls of the pool. Main Drains shall be separated by at least three feet measured from the centers of the drain covers or installed with one main drain on a horizontal plane and one main drain on a vertical plane. Main drains with two or more outlets with a common suction line shall not be equipped with valves that allow the outlets to be isolated. Public swimming pools constructed prior to May 1, 2010 with a single drain or multiple drains closer than three feet apart shall protect against bather entrapment with an unblockable drain cover or a secondary method of preventing bather entrapment in accordance with Rule .2539 of this Section.
- (2) Drain outlets shall comply with the ANSI/APSP/ICC-16 2017 American National Standard for Suction Outlet Fittings Assemblies (SOFA) for Use in Pools, Spas, and Hot Tubs, which is hereby incorporated by reference, including any subsequent amendments or editions, and available at <https://webstore.ansi.org/> at a cost of one hundred sixty-five dollars (\$165.00).
- (3) Public swimming pool drains shall comply with ANSI/PHTA/ICC-7 2020 American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs and Catch Basins, which is hereby incorporated by reference, including any subsequent amendments or editions, and available at https://webstore.ansi.org at a cost of one hundred and sixty-five dollars (\$165.00)(hereinafter referred to as "ANSI/PHTA/ICC-7").

(k) Public swimming pools shall have a surface overflow system that is an integral part of the water circulation system and that consists of a built-in-place perimeter overflow system, a pre-fabricated perimeter overflow system, or recessed automatic surface skimmers. The surface overflow system shall comply with the following:

- (1) When a public swimming pool uses a built-in-place perimeter overflow system or a pre-fabricated perimeter overflow system, the public swimming pool may be designed with the operating water level, perimeter overflow system, and deck at the same elevation. The perimeter overflow system shall:
 - (A) Be capable of handling 100 percent of the flow rate determined by the Registered Design Professional in the pool design without flooding the overflow troughs;
 - (B) Be capable of handling a water surge equal to one gallon per square foot, or 41 liters per square meter, of swimming pool water surface area. A surge tank may be used to meet this requirement;
 - (C) Be capable of maintaining the water level of the swimming pool above the level of the overflow rim of the perimeter overflow system, except for time intervals of no more than 20 minutes when water is transferred between a surge tank and the public swimming pool;
 - (D) Be constructed so the dimensional tolerance of the overflow rim shall not exceed ¼ inch (6.4 mm) as measured between the highest point and the lowest point of the overflow rim;

- (E) Be capable of providing continuous and automatic skimming of the water during quiescence;
 - (F) Be constructed so that the overflow troughs are installed continuously around the perimeter of the public swimming pool, except at steps, recessed ladders, and stairs, or except when used in combination with recessed automatic surface skimmers; and
 - (G) Provide a hand-hold on the exposed surfaces of the overflow trough.
- (2) When a public swimming pool uses recessed automatic surface skimmers, the recessed automatic surface skimmers shall be designed and constructed in accordance with NSF Standard 50 requirements for water circulation system components for swimming pools, spas, or hot tubs and be installed as follows:
- (A) The rate of water flowing through any one recessed automatic surface skimmer shall be no less than 20 gallons per minute and no more than the maximum flow the skimmer is certified to handle under NSF Standard 50;
 - (B) There shall be at least one recessed automatic surface skimmer for each 400 square feet of water surface area of the swimming pool or fraction thereof;
 - (C) When two or more recessed automatic surface skimmers are required, they shall be located to enable skimming of the entire swimming pool water surface;
 - (D) Skimmers shall not protrude into the water of the public swimming pool. Pools using recessed automatic surface skimmers without a perimeter overflow system shall be installed so that the operating water level of the pool is no more than nine inches below the level of the finished deck.
- (l) Where flooded suction on the pump is not possible to prevent cavitation and loss of prime, skimmers shall have a device or other protection to prevent air entrainment in the suction line. Skimmer equalizer lines shall be in compliance with ANSI/PHTA/ICC-7 or disabled. Skimmer equalizer lines shall be disabled by plugging the line under the skimmer basket and where the equalizer pipe exits the pool shell.
- (m) Nothing in this Section shall preclude the use of a surface overflow system that combines both a perimeter overflow system and a recessed automatic surface skimmer or skimmers that meet the requirements of this Rule.

History Note: Authority G.S. 130A-282;
Eff. May 1, 1991;
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