

15A NCAC 18A .2518 CIRCULATION SYSTEM

- (a) Pools shall be equipped with a circulation system.
- (b) The capacity of the circulation system shall be sufficient to clarify and disinfect the entire volume of swimming pool water four times in 24 hours. The system shall be operated 24 hours per day during the operating season.
- (c) The circulation piping shall be designed and installed with the necessary valves and pipes so that the flow from the swimming pool can be from main drains or the surface overflow system. The circulation piping shall be designed such the flow of water from the swimming pool can be simultaneous from the surface overflow system and the main drains. Skimmer piping constructed after May 1, 2010 shall be sized to handle the maximum flow rate for the required number of skimmers, but in no case less than 100 percent of the design flow rate. Perimeter overflow system piping constructed after May 1, 2010 shall be sized to handle 100 percent of the design flow rate. The main drain piping constructed after May 1, 2010 shall be sized to handle 100 percent of the design flow rate.
- (d) Piping shall be designed to reduce friction losses to a minimum and to carry the required quantity of 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. Piping shall be of non-toxic material, resistant to corrosion, and able to withstand operating pressures. If plastic pipe is used, a minimum of Schedule 40 PVC is required. Flexible pipe shall not be used except that flexible PVC hoses that meet NSF Standard 50 may be affixed to spa shells where rigid pipes do not provide the necessary angles to connect circulation components. Exposed pipes and valves shall be identified by a color code or labels.
- (e) The circulation system shall include a strainer to prevent hair, lint, and other debris from reaching the pump. A spare basket shall be provided. Strainers shall be corrosion-resistant 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 pump suction line and are accessible for daily cleaning.
- (f) A vacuum cleaning system shall be provided to remove debris and foreign material that settles to the bottom of the swimming pool. Where provided, 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 in pools with two or fewer skimmers provided the skimmer basket remains in place while the vacuum is in operation. Integral vacuum cleaning systems shall be provided with valves and protective caps. Integral vacuum ports constructed after May 1, 2010 shall have self-closing caps designed to be opened with a tool.
- (g) A rate-of-flow indicator, reading in liters or gallons per minute, shall be installed on the filtered water line and located so that the rate of circulation is indicated. The indicator shall be capable of measuring flows that are at least 1½ times the design flow rate, shall be accurate within 10 per cent of true flow, and shall be easy to read. The indicator shall be installed in accordance with manufacturers' specifications.
- (h) A pump or pumps shall be provided with capacity to recirculate the swimming pool water four times in 24 hours, and shall be so located as to eliminate the need for priming. If the pump or pumps, or suction piping is located above the overflow level of the pool, the pump or pumps shall be self-priming. The pump or pumps shall be capable of providing a flow adequate for the backwashing of filters. Unless headloss calculations are provided by the designing engineer, pump design shall be based on an assumed total dynamic head of 65 feet of water. Pumps three horsepower or smaller shall be NSF International (NSF) listed or verified by an independent third-party testing laboratory to meet all applicable provisions of NSF/ANSI Standard 50 which is incorporated by reference including any subsequent amendments or editions. Copies may be obtained from NSF International, P.O. Box 130140, Ann Arbor, MI 48113-0140 at a cost of one hundred fifty-five dollars (\$155.00). Verification shall include testing and in-plant quality control inspections. Larger pumps for which NSF listing is not available shall be approved by the Department on a case-by-case basis.
- (i) Inlets.
- (1) Inlets shall be provided and arranged to produce a uniform circulation of water and maintain a uniform disinfectant residual throughout the pool.
 - (2) The number of inlets for any swimming pool shall be determined based on return water flow. There shall be at least one inlet per 20 gallons per minute of return water flow. There shall be a minimum of four inlets for any swimming pool.
 - (3) Inlets shall be located so that no part of the swimming pool is more than 25 feet of horizontal distance from the nearest return inlet.
 - (4) Provision shall be made to permit adjustment of the flow through each inlet, either with an adjustable orifice or provided with replaceable orifices to permit adjustments of the flows.
- (j) Drains.
- (1) Public Swimming pools with suction drains shall be provided with at least two main drain outlets which are located at the deepest section of the pool and connected by "T" piping. Connecting

pipng shall be sized and configured such that blocking any one drain will not result in flow through the remaining drain cover/grates exceeding the cover/grate manufacturer's safe flow rating while handling 100 percent of the pump system flow. The drains shall be capable of permitting the pool to be emptied completely. Drains shall be spaced not more than 30 feet apart, and not more than 15 feet away from the side walls. Drains shall be separated by at least three feet measured from centers of the cover/grates. This shall not preclude construction of a public swimming pool without main drains where water is introduced at the bottom of the pool and removed through a surface overflow system designed to handle 100 percent of the design flow rate. Provision shall be made to completely drain pools constructed without drains. 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 or a secondary method of preventing bather entrapment in accordance with Rule .2539 of this Section.

- (2) Drain outlets shall comply with the American National Standard ASME/ANSI A112.19.8-2007 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs which is hereby incorporated by reference including any subsequent amendments, editions, and successor standards under the Virginia Graeme Baker Pool and Spa Safety Act (15 U.S.C. 8001 et seq.). Copies may be obtained from ASME, P.O. Box 2300, Fairfield, NJ 07007-2300 at a cost of fifty-three dollars (\$53.00).
- (3) Public swimming pools constructed after May 1, 2010 shall comply with ANSI/APSP -7 2006 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 and editions. Copies may be obtained from APSP, 2111 Eisenhower Avenue, Alexandria, VA 22314 at a cost of three hundred fifty dollars (\$350.00).

(k) Surface Overflow Systems.

- (1) Swimming pools shall be provided with a surface overflow system that is an integral part of the circulation system and that consists of a built-in-place perimeter overflow system, a pre-fabricated perimeter overflow system, or recessed automatic surface skimmers.
- (2) Whenever a built-in-place perimeter overflow system or a pre-fabricated perimeter overflow system is provided, it shall be designed and installed as follows:
 - (A) The system shall be capable of handling 100 percent of the circulation flow without the overflow troughs being flooded;
 - (B) A surge capacity shall be provided either in the system or by use of a surge tank; and the total surge capacity shall be at least equal to one gallon per square foot (41L per square meter) of swimming pool water surface area;
 - (C) The water level of the swimming pool shall be maintained above the level of the overflow rim of the perimeter overflows, except for the time needed to transfer all of the water that may be in the surge capacity back into the swimming pool after a period of use; provided that this transfer time shall not be greater than 20 minutes;
 - (D) When installed the 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) During quiescence, the overflow system shall be capable of providing continuously and automatically a skimming action to the water at the surface of the swimming pool;
 - (F) The overflow troughs shall be installed completely around the perimeter of the swimming pool, except at steps, recessed ladders and stairs;
 - (G) The exposed surfaces of the overflow trough shall be capable of providing a firm and safe hand-hold; and
 - (H) The overflow trough shall be cleanable and shall be of such configuration as to minimize accidental injury.
- (3) Whenever a recessed automatic surface skimmer or skimmers are installed, they shall be designed and constructed in accordance with Section 8 of NSF Standard #50 for circulation system components for swimming pools, spas, or hot tubs. Recessed automatic surface skimmers shall be installed as follows:
 - (A) The flow-through rate through any one recessed automatic surface skimmer shall be between 20 gallons per minute and the maximum flow the skimmer is certified for under NSF Standard Number 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 so located as to minimize interference with each other and as to insure proper and complete skimming of the entire swimming pools water surface; and
- (D) Skimmers shall not protrude into the swimming pool. Automatic surface skimmer or skimmers without a perimeter overflow system shall be installed so that the operating level of the pool is no more than nine inches below the finished deck level so that the deck can be used as a handhold.

(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. The inlet to the equalizer line shall be provided with a grate.

(m) Nothing in this Section shall preclude the use of a roll-out or deck-level type of swimming pool. Such designs shall conform to the general provisions relating to surface overflow systems.

(n) 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.

*History Note: Authority G.S. 130A-282;
Eff. May 1, 1991;
Amended Eff. May 1, 2010; February 1, 2004; April 1, 1999; January 1, 1996; July 1, 1992.*