



NC DEPARTMENT OF  
**HEALTH AND  
HUMAN SERVICES**

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November 13, 2024

**MEMORANDUM**

**TO:** Registered Environmental Health Specialist, Program Supervisors, and Managers

**FROM:** Chad Gambill, REHS, Field Supervisor  
Pools, Tattoos, and State Institutions Program

**SUBJECT:** Changes in Rule .2518 “Circulation System” and Rule .2539 “Suction Hazard Reduction”  
Effective November 1, 2024

The changes to .2518 and .2539 enhance safety, clarify existing language, and align the rules with current practices and ANSI standards that are adopted by reference in these rules. Some notable changes in these rules are listed below followed by some questions and answers. This document will be available at our webpage (<https://ehs.dph.ncdhhs.gov/faf/pti/pools.htm>). The Q and A will be updated as needed when additional questions come in. The information in this document replaces the guidance in the 7/19/2021, “Guidance for Variable Speed Pumps” document which is hereby rescinded. This guidance document replaces all previous guidance regarding rules .2518 and .2539. The information in this guidance document is not enforceable on its own but is intended to promote uniform interpretation and enforcement of the underlying rules.

**Rule changes establishing new requirements in .2518 and .2539:**

- In .2518 (d) a new requirement was added for pools constructed after the readoption effective date (11/1/2024) to use only plastic piping made of a minimum of Schedule 40 PVC.
- In .2518 (d) new language states that piping shall be free of visible water leaks.
- In .2518 (d) there is a new requirement that if pipes and valves are identified only by a color code, there must now also be a legend to indicate what the color codes mean.
- .2518 (g) now requires flow meters to be capable of measuring the flow between the turnover rate and the maximum flow rate as determined by the pipe size instead of being required to measure 1.5 times the design flow rate.
- In .2518 (h) a new, more lenient standard was added to accommodate variable speed pumps that do not meet the total dynamic head of 65 feet of water.
- .2518 (h) now requires that all pumps, not just pumps three horsepower or smaller, be NSF certified or verified by an independent third-party testing laboratory to meet the provisions of NSF Standard 50.

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AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

- .2539 (c)(1) will now require the operator to test an installed SVRS system using the methodology and at the frequency recommended by the manufacturer. The operator will be required to keep a written record of these test results in the written records required by Rule .2535(11). A SVRS installed or replaced after the effective date of the amended rule will also be required to have a shut-off valve, if recommended by the manufacturer.

Reminder, per ANSI/PHTA/ICC-7 4.3.2, “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.” In short, it is imperative that SVRS systems be installed and tested in accordance with the manufacturer’s instructions.

- .2539 (d)(1) now specifies that photographs must be taken of flow reduction measurements [vacuum and pressure gauges for TDH measurements or readings from a properly installed flow meter accurate to 5% (ICC-7 4.4.5.2) within two (2) hours of backwashing or replacing the (cartridge) filter]. The Rule requires these photographs to be part of the documentation submitted with the pool application when there is a flow reduction needed for VGBA compliance. For clarification, a flow reduction measurement is a one-time event that does not need to be repeated yearly; it would need to be repeated if there was a change in the pools suction system equipment or piping. This rule also requires that any pumping system with a flow reduction have a properly installed flow meter on the return water line for ongoing verification that the water flow does not exceed the drain cover ratings. The flow meter required by this rule for ongoing verification of water flow after a flow reduction is not something required by the ICC-7. Therefore, for ongoing verification after the flow reduction, a flow meter only has to be accurate to at least 10% per rule .2518(g). For example, a flow reduction based off TDH measurements using vacuum and pressure gauges, would only require a flow meter accurate to at least 10% for ongoing verification of that flow reduction. .2539 (d)(1) also provides an exception to the requirement of a flowmeter for ongoing verification of any flow reduction when an RDP provides a sealed statement showing head loss calculations to justify the flow reduction. Vacuum and pressure gauges are used for flow reduction measurements mostly in cases where a flow meter reading is not possible. Therefore, in most instances, flow reductions based on TDH measurements with vacuum and pressure gauges will need to be accompanied by head loss calculations from an RDP. Note also that head loss calculations from an RDP cannot stand alone as evidence of a flow reduction. Per ICC-7 4.4.5.2, any flow reduction based on head loss calculations must be verified with TDH measurements using vacuum and pressure gauges or be verified using a properly installed flow meter accurate to 5%. In short, most instances of flow reduction using vacuum and pressure gauges for TDH measurements will require an RDP.

Summary of flow meter accuracy requirements:

1. Flow meter for turnover verification per .2518 (g):
  - Flow meter must be accurate to at least 10%
  - Marked under item #24
2. **Flow meter used for a flow reduction measurement of the maximum achievable pump system flow** at the lowest TDH, or used for verification of the maximum achievable pump system flow at the lowest TDH based on submitted head loss calculations:
  - Flow meter must be accurate to at least 5% per ICC-7
  - If a necessary flow reduction cannot be approved, the pool is marked out under #6 and cannot be permitted or is issued an immediate suspension for non-compliance with VGBA

3. **Flow meter required by .2539 (d)(1) for the ongoing verification of system flow** when there has been a flow reduction without RDP head loss calculations:
- Flow meter must be accurate to at least 10%
  - Marked under item #6 and requires immediate permit suspension if not CDI

If you have any questions about flow reductions or have a pool with a flow meter accurate to 10% that needs/has a flow reduction, reach out to your regional specialist. For more discussion about the required flow meter accuracy and flow reductions please refer to the Q and A at the end of this document.

**Rule updates in .2518 and .2539 that align the rules with previously existing requirements in the referenced ANSI standards for clarification:**

- Throughout .2518 and .2539, the term “cover/grate” was changed to “drain cover” which has a more comprehensive definition in the ANSI standards that are adopted by reference ((ANSI/APSP/ICC-16 and ANSI/PHTA/ICC-7). The ANSI standards define “drain cover” to refer to Suction Outlet Fitting Assemblies (SOFAs) certified in conformance with ANSI/APSP/ICC-16. SOFAs include all components used to attach a cover/grate(s) to the finished surface of a pool and to an individual suction system in accordance with SOFA-specific installation instructions. The cover/grate is only one component of the SOFA.
- Both .2518 and .2539 update the references to national standards for swimming pools, including pool equipment (NSF Standard 50), suction outlets (ANSI/APSP/ICC-16), and suction entrapment avoidance (ANSI/PHTA/ICC-7). These standards were already incorporated by reference, including any subsequent amendments, editions, and successor standards under the previous rule set. Therefore, the change here is only an update of the name to reflect the most current editions of these standards.
- .2518 (f) now clarifies that portable vacuum equipment may be used.
- .2518 (i) clarifies that water return inlets shall be replaced when damaged or missing.
- .2518 (j)(1) clarifies that a single unblockable drain is allowed and clarifies that piping after the “T” must be symmetrical for multiple drains.
- .2518 (l) clarifies that disablement of skimmer equalizer lines is allowed (as per ANSI/PHTA/ICC-7 4.5.1), in addition to the option to remove them, in circumstances where the owner is not able to find covers that accommodate the pump system’s flow rate.

Reminder, per ANSI/PHTA/ICC-7 4.5.1, skimmer equalizer lines shall not be used on new construction.

- .2539 (d)(2) clarifies that the measured flow of the pumping system can be used for VGB compliance. This allowance was already in the ANSI/PHTA/ICC-7. For this flow reduction option, the flow meter used to measure the flow of water through the submerged suction outlets must be certified in accordance with NSF 50, installed in accordance with the manufacturer’s instructions, and must be accurate to 5%. If you have any questions about flow reductions or have a pool with a flow meter accurate to 10% that needs/has a flow reduction, reach out to your regional specialist.

## Questions and Answers

1. Q: New language in .2518 (d) states that piping shall be free of visible water leaks. Does this mean that pool builders must test suction and return piping for leaks before placing concrete? If so, what would those tests look like and what verification would we need?

A: This new language does not require builders to test pool piping prior to placing concrete and therefore would not require LHD verification of any leak test. However, conducting leak testing of pipes before placing concrete is the best practice and builders should not be discouraged from conducting leak tests.

2. Q: .2539 (a) had the following language added, "Submerged suction outlets shall be prohibited in wading pools in accordance with ANSI/PHTA/ICC-7 2020." Does this mean that wading pools with a submerged suction outlet cannot be permitted going forward?

A: No, this does not prevent existing wading pools with submerged suction outlets from being permitted. For new construction, wading pool plans with submerged suction outlets cannot be approved. The predecessor standard to the ICC 7 2020 (ANSI/PHTA/ICC-7 2013) prohibited submerged suction outlets in wading pools, so this is not a new prohibition. For existing wading pools with submerged suction outlets, ANSI/PHTA/ICC-7 2020 requires that submerged suction outlets be permanently disabled or converted to a return fitting ONLY when the pool is modified or retrofitted. The ICC-7 defines retrofitting as the act of adding a component or accessory to the wading pool that was not part of the original installation. Remodeling as defined in .2508 would constitute modifying or retrofitting a wading pool. Replacing certified drain covers that have reached the end of their service life would not constitute modifying or retrofitting a wading pool.

3. Q: .2539 (c)(1) now requires the pool operator to test an SVRS "using the methodology and at the frequency recommended by the manufacturer" and to record the results in the written records required by .2535 (11). Will the written records template be amended with a column to document SVRS test?

A: No. For pools with an SVRS, the test should be documented by the operator on the existing records form in the maintenance or notes section of the form. The REHS should review these records during the inspection and ensure that the SVRS is being tested as required by the manufacturer. Since this is in .2539, it is markable under item #6 and would require an immediate suspension if the operator is not documenting the test unless the operator could demonstrate the SVRS operation and document the test during the inspection. In that case, it would still be marked out and points taken but the pool could remain open. Keep in mind that some SVRS systems do not require testing per manufacturer's instructions.

4. Q: For flow reduction, .2539 (d)(1) now requires photographs taken of gauges within two hours of backwashing or replacing the filter. Do these photographs need to be taken every year and provided with the documentation submitted with the application?

A: These required photographs do not need to be taken every year provided there have been no changes to the suction system equipment or piping since the flow reduction photographs were taken. All information on the submitted drain safety sheet should be field verified by the REHS during every inspection. There is a spot beside item #6 on the pool inspection sheet where the REHS attests to having verified the information on the drain safety data sheet. If the pump has changed, the REHS should catch it during the inspection and recognize that the flow reduction before the pump change is no longer valid for the new pump.

5. Q: Why must photographs be taken within two hours of backwashing the filter, why not immediately after backwashing or replacing the filter? (.2539 (d)(1))

A: The two-hour allowance after backwashing is to give the pool operator time to begin the backwashing process before the arrival of the REHS. The REHS should be present when the flow reduction photographs are taken. If this is not possible, a face time call is a good alternative.

6. Q: .2539(d)(1) indicates that for flow reduction measurements, all valves must be in the fully open position. Shouldn't the skimmer valves be turned off to obtain flow reduction readings?

A: Yes, the operator should turn off the skimmer valves to obtain flow reduction readings if doing so will not damage the pool. The valves that the rule refers to, that must remain fully open, are valves on suction lines leading to submerged suction outlets. Skimmers are not considered fully submerged suction outlets. This is discussed in detail in ANSI/PHTA/ICC-7 2020 which defines the Maximum System Flow Rate for purposes of VGB compliance as the maximum potential flow when all available system flow is directed through the submerged suction outlets. Therefore, the skimmers should be turned off to direct all the system flow through the submerged suction outlets. However, keep in mind that pools in NC constructed prior to 2010 were designed with suction piping sized for 50% of the design flow for the drains and the skimmers. In some instances, particularly in very old pools with small pipes, turning off skimmers could result in pump cavitation and damage the pump. If the operator does not feel comfortable turning off skimmers on a pool, flow reduction measurements may be obtained with all valves including skimmer valves in the fully open position. In this instance, the permit should be conditioned that the skimmer valves must remain in the open position when the pool is in operation since that is how the system was tested for the flow reduction. Note in this scenario, testing the system with skimmer valves open should have lower system TDH than if the skimmer valves were closed. Therefore, a higher maximum system flow rate will be recorded for the test. If the drain covers are rated to meet or exceed the higher maximum flow when water is flowing through both the skimmers and the main drains, that is more protective from a VGB compliance standpoint.

7. Q: New language in .2539 (d)(2) requires documentation that the drain covers are rated to meet or exceed the pumps maximum flow or the measured flow of water through the submerged suction outlets. Is the pumps “maximum flow” the maximum flow at the highest speed on the pump curve? What is meant by the measured flow through the submerged suction outlets?

A: For VGB compliance, flow rate of the pump system must never exceed the flow rating of the drain covers. For purposes of VGB compliance, the maximum system flow rate can be determined in any one of the four methods listed below. Methods 2-4 are “flow reductions”. Flow reductions are typically not used on new construction.

Methods to determine the maximum achievable system flow rate for VGB compliance:

- 1) The maximum flow of the pump at the highest speed on the manufacturer’s pump curve.
- 2) The maximum system flow rate based on submitted head loss calculations. Submitted head loss calculations must be verified using method 3 or 4 below.
- 3) The maximum system flow rate determined using TDH measurements from vacuum and pressure gauges that are compared to the manufacturer’s pump curve. Photographs of the gauges must be taken as required in .2539 (d)(1) and become part of the pool record of VGB compliance. This method is detailed in ICC-7 appendix B-4.
- 4) The maximum system flow rate measured with a properly installed flow meter certified in accordance with NSF 50 and accurate to 5% per ANSI/PHTA/ICC-7. The readings of the flow meter must be photographed as required in .2539 (d)(1) and become part of the pool record of VGB compliance.

All flow reduction methods require a properly installed flow meter accurate to at least 10% for ongoing verification of the system flow rate unless there is a sealed statement from an RDP showing head loss calculations to justify the reduction. The requirement for a flow meter must be listed on the permit.

It would be a good practice to ask operators to document the flow rate daily in their pool records when there is a flow reduction, but our rules do not require it and therefore the permit cannot be conditioned to require it.

Any flow reduction that includes limiting the speed of a variable speed pump to ensure VGB compliance also requires the maximum RPM and flow rate of the pump be listed on the permit.

It would be a good practice to ask operators to document the pump rpm and flow rate daily in their pool records when there is a flow reduction on a variable speed pump, but our rules do not require it and therefore the permit cannot be conditioned to require it.

If you have questions about any of the information contained in this document, please reach out to your Regional Specialist.