NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

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November 13, 2025

POSITION STATEMENT

TO: Registered Environmental Health Specialists, Program Supervisors, and Managers

SOURCE: Chad Gambill, Pools, Tattoos, and State Institution Program

SUBJECT: Clarification of Flow Reductions - Rule .2539(d)(1)

BACKGROUND INFORMATION:

NC Rules Governing Public Swimming Pools 15A NCAC 18A .2500 incorporate ANSI/APSP/ICC-16 2017 ("APSP 16") and ANSI/PHTA/ICC-7 ("PHTA 7") by reference. APSP 16 is incorporated by reference into the Virginia Graeme Baker Pool and Spa Safety Act ("VGBA") by Section 1404 of the federal law. APSP 16 Section 3.6.3.2 requires that the maximum flow rating of all bather accessible submerged suction outlets ("SOFAs") be greater than the maximum system flow rate of the suction system (pumping system).

Compliance = SOFA flow rating [A] ≥ maximum achievable flow rate of the suction system [B]

A. APSP 16 requires that the maximum flow rating of a SOFA be determined and certified by the manufacturer of the cover/grate through specific testing methods.
B. APSP 16 specifies that the maximum system flow rate of the pools suction system is to be determined using one of the following three methods set forth in PHTA 7 Section 4.4.5:
    1. Using the maximum flow capacity of a new or replacement pump according to the pump manufacturer's certified pump curve at the highest speed the pump can operate.
    2. Measuring the maximum achievable system flow at the pump's operational speed with a flow meter accurate to 5%, installed according to the manufacturer's specifications, and certified in accordance with NSF 50. Note, the required accuracy of flow meters in this standard was reduced from 10% to 5% in November 2020. This is a factor in the DPH guidance in the document below.
    3. Measuring the maximum achievable flow at the pump's operational speed by using vacuum and pressure gauges to determine the Total Dynamic Head ("TDH") of the system at the pumps operational speed and then looking up the flow rate on the manufacturer's certified pump curve based on the measured TDH.

In November 2020, PHTA 7 Section 4.4.5 was amended to require that any calculated maximum system flow rate, including calculations submitted by a Registered Design Professional ("RDP"), must be verified using methods 2 or 3 above. This change was a major factor in the creation of this DPH guidance document.

In North Carolina, we have assigned the term "Flow Reduction" in Rule .2539(d)(1) to indicate instances where it is necessary to use the measured flow of the suction system to determine SOFA compliance. Methods 2 and 3 listed above are what we call flow reductions. REHSs in NC may also hear the term "True Flow" used to indicate that measured system flow was used to determine SOFA compliance.

DISCUSSION AND RATIONALE:

Revised Rule .2539(d)(1) that became effective November 1, 2024, added a requirement that pumping systems with a flow reduction have a method to verify the system flow at any time after the documented (and photographed) flow reduction measurements.

> *.2539 (d)(1) "All systems using a flow reduction to comply with this rule shall have a flow meter installed in accordance with manufacturer's instructions confirming that the water flow does not exceed the gallon per minute flow rating of the drain covers or a sealed statement from a Registered Design Professional showing calculations used to justify the reduction."*

DPH interprets the option in .2539(d)(1) for a "flow meter installed in accordance with manufacturer's instructions confirming that the water flow does not exceed the gallon per minute flow rating of the drain covers" as requiring an approved method to measure the system flow, which includes either a meter or gauges in accordance with the APSP 16 (methods 2 or 3 above). DPH maintains that an easy flow rate verification method is an essential requirement in our rules that provides a mechanism for the pool operator to verify system flow rate and for the REHS to verify compliance with APSP 16 during each inspection as required by Rule .2539(b). Note that, because PHTA 7 now requires TDH calculations from an RDP to be verified with a flow measurement, the option for a sealed statement from an RDP with TDH calculations is now incomplete unless accompanied by a flow measurement.

RESPONSE AND INTERPRETATION:

Based on the requirements in APSP-16 and Rule .2539(d)(1), LHDs must:

1. **Allow pressure and vacuum gauges that remain installed on the system to serve as an alternate method for flow rate verification** on a pumping system with a flow reduction as required by Rule .2539(d)(1)**.** A sealed statement from an RDP is not required when a flow meter or pressure and vacuum gauges are used to determine maximum system flow rate for a flow reduction. More information on determining maximum system flow with vacuum and pressure gauges is provided in this document below.
2. **Require flow reductions based solely on TDH calculations from an RDP to be verified using the methods for measuring maximum system flow rate allowed in PHTA 7** (flow meter accurate to 5% or TDH measurements using vacuum and pressure gauges). If the LHD has a pool with a flow reduction based on a sealed statement from an RDP with TDH calculations that have not been verified as required by PHTA 7, those pools will need to have their flow reduction verified in accordance with PHTA 7 before permitting in 2026.
3. **Verify flow meters used for flow reduction are accurate to 5% beginning in 2026** unless the flow reduction measurement was obtained using a flow meter accurate to 10% prior to November 2020, the pool has VGBA 2008 covers installed, and there have been no changes to

the pumping system since the flow reduction measurement. For a pool meeting these criteria, the 10% flow meter may continue to be used for flow rate verification until such time as the drain covers are replaced with VGBA 2017 covers or there are any changes to the pumping system that require a new flow reduction measurement. Alternatively, a new flow reduction measurement can be obtained using vacuum and pressure gauges. These gauges may remain installed on the system as indicated in item #1 above as an alternative to having a 5% accurate flow meter.

4. **LHDs must notify pool operators immediately of these changes so that they have ample time to plan and make necessary changes before 2026 permitting.**

There may be exceptions to this guidance on a case-by-case basis for unusual situations such as large water parks with Registered Design Professional SOFAs that comply with APSP 16. If you have a rare or unusual situation and have questions about the application of this guidance, please reach out to your regional specialist.

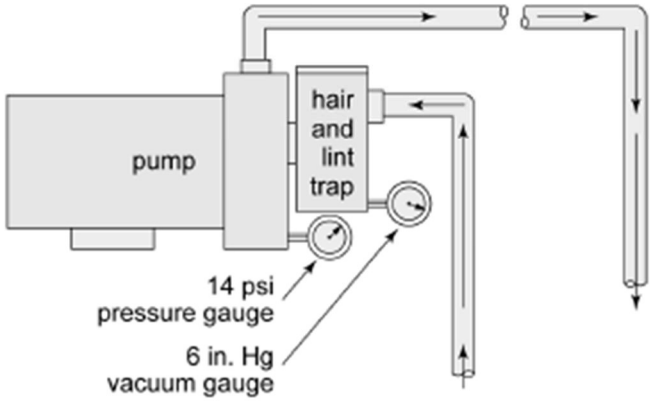
SPECIFIC GUIDANCE ON MEASURING TDH WITH GAUGES:

The basics of using pressure and vacuum gauges on a pumping system to determine the TDH at the pumps operational speed and then comparing that with the manufacturer's pump curve to determine the maximum system flow rate in gallons per minute ("GPM") are provided in PHTA 7 appendix B-4. There are also some important additional caveats listed below that the pool operator and the REHS must be aware of.

PHTA 7 Appendix B-4:

Pressure head: gauge psi × 2.31 = feet of water
Suction head: gauge inches Hg × 1.13 = feet of water

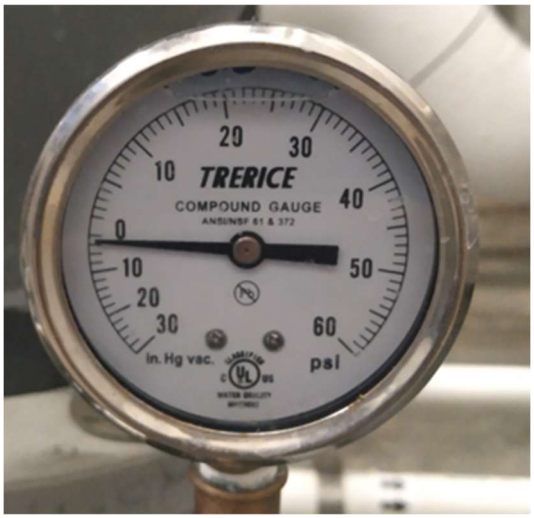
EXAMPLE: If the pressure gauge reads 14 psi and the vacuum gauge reads 6 inches of mercury (Hg), the approximate Total Dynamic Head (TDH) of the system would be 39.12 feet.



Pressure Head	= 14 psi	× 2.31	= 32.34 feet
Suction Head	= 6 in. Hg	× 1.13	= 6.78 feet
Total Dynamic Head			= 39.12 feet

Important caveats:

1. When the pump is located below the pool's water level, a compound gauge on the suction side or the use of a differential pressure gauge instead of separate vacuum and pressure gauges may be required to get an accurate TDH. A compound gauge like the one pictured below will let the operator know if the pump is far enough below the water level for there to be a net positive pressure on the suction side. If there is a positive pressure reading on the suction side compound gauge of the pumping system, that reading must be subtracted from the psi on the return side.



Example compound gauge on the suction side of a pool's suction system

Alternatively, a differential pressure gauge such as the ones shown below will measure the pressure on the return side relative to the pressure or suction on the suction side. These can be used regardless of the elevation of the pool pump. Using this type of gauge results in a single gauge reading in psi that can then be converted to TDH and used with the manufacturers pump curve to determine the system flow rate in GPM.

Here are some examples of a pressure gauge on the return side of a pumping system and a compound gauge on the suction side of a pumping system that remain installed to meet the requirement in Rule .2539(d)(1) that there is a method to verify the pumping system flow rate.

2. Flow reductions on systems using a variable frequency drive ("VFD") to operate a single speed pump below the maximum speed will likely require a properly installed flow meter for flow reduction measurements and for flow verification. This is because the pump manufacturer only provides a single pump curve for a single speed pump. That pump curve indicates the performance of the pump when operated at full speed and is not applicable to the pump when operated at a lower speed with a VFD. Applying TDH measurements obtained using gauges to the full speed pump curve when the TDH measurements were obtained while the pump was running at a reduced speed will not provide an accurate flow rate. For pumps that were designed from the manufacturer as variable speed pumps and that have multiple pump curves provided by the manufacturer for various speeds of operation, TDH measurements obtained with vacuum and pressure gauges can be compared to these pump curves to determine the system flow rates when the pump is operated at the speeds indicated by the defined curves as well as flow rates when the pump is operated at speeds between the speeds indicated by the defined curves.

3. Flow reduction measurements must be completed with all main drain valves in the fully open position unless those valves are locked partially closed as part of the pool's operational design.

4. If flow reduction measurements are taken with the skimmer or perimeter overflow system valves closed off. This information must be documented by the REHS in the pool file. The operator must turn the skimmer or perimeter overflow system off during each inspection for the REHS to verify and record that the system flow rate is below the SOFA flow rating.

5. If flow reduction measurements are completed with the skimmers or perimeter overflow system valves open, the permit must be conditioned that these valves remain open any time the pool is open to bathers.

6. If flow reduction measurements are completed when a variable speed pump is operating below the maximum user selectable speed, or when a single speed pump with a variable frequency drive is operating below the maximum speed, the permit must be conditioned to

indicate the maximum allowed operational speed of the pump for compliance with APSP 16. Best practice is to also require the owner/operator to post a reminder of this maximum speed on or immediately adjacent to the pump so that all operators will be made aware of the pumps required speed limitations.

Reach out to your regional specialist if you have specific questions regarding how to apply this flow reduction guidance.

REFERENCES: (The referenced PHTA standards are available to read or purchase at PHTA.org)

ANSI/PHTA/ICC-7 2020

ANSI/APSP/ICC-16 2017

15A NCAC 18A .2500

This guidance replaces any guidance given in previous written or verbal communications. NOTE: Position statements are policy documents to clarify how to interpret or enforce a law or rule. They are not enforceable on their own but are intended to promote uniform interpretation and enforcement of the underlying law or rule.