

TECH TALK

USEFUL INFORMATION RELATED TO SEPTIC TANKS

QUESTION: Which is better – water testing or vacuum testing?

ASTM C-1227 allows *either water testing or vacuum testing* to test for leakage in concrete septic tanks. In the case of water testing, the procedure is to “Seal the tank, fill with water, and let stand for 24 hours. Refill the tank. The tank is approved if water level is held for 1 hour.”

What does “fill with water” mean? Is this the level to the bottom of the outlet? Or is it to the inside top of the tank? Or is it to a level above the tank into a riser?

Manufacturers of septic tanks made of other materials, such as plastic, fiberglass or steel, insist on water testing instead of vacuum testing, since they are prone to collapse under vacuum. Further, most tanks other than concrete require filling with some amount of water to counteract earth pressure on all sides while backfilling. Since water is needed anyway, it serves as a practical on-site test for plastic tanks. [Further ASTM C-1227 requirement: “Tanks shall be designed to anticipated earth and hydrostatic pressures when the tanks are **either full or empty.**”]

ASTM C-1227 also says “Proof testing is used to demonstrate the strength of the tank to resist anticipated external and internal loads. Proof testing, when required by the purchaser, shall be performed in such a way as to simulate the actual anticipated loads.”

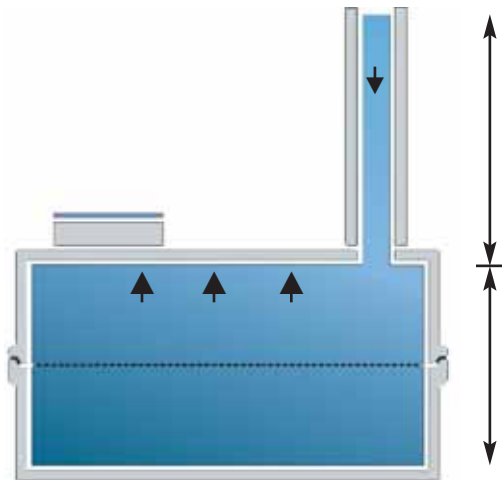
Actual anticipated loads from liquids inside the tank will never result from liquid levels higher than the outlet opening invert — unless the system is in some failure mode! Then why specify water testing to higher levels? **This is not a test – it is a trick!** Concrete tanks depend on the weight of the upper half or top slab, plus the weight of the earth cover, to keep the gasketed joint closed and watertight. But as you can see from the illustration and calculations below, filling a tank above its nominal capacity will result in an upward force on the tank top section which may be large enough to force it apart – a condition for which it was neither intended nor designed. **This is not a test – it is a trick!**

Vacuum testing of concrete tanks is the best choice for many reasons. It can be performed in any weather conditions, and does not require thousands of gallons of water. It only takes minutes, not days. If a leak is detected, it can be immediately and permanently sealed, using readily available materials. The vacuum force applied during testing actually helps compress the joint gasket. It replicates a real life structural condition which occurs when a tank is pumped dry and must withstand the full (possibly saturated) force of earth loading on top, bottom, and sides. Water testing may be appropriate for plastic tanks, but the precast industry has proven that vacuum testing is best for concrete septic tanks.

ANSWER: Water testing and Vacuum testing are recognized methods, but Vacuum Testing is most appropriate for concrete septic tanks!

Many tanks are tested to 9” - 10” Hg for structural proof testing, in order to account for 3’ of earth load plus live load and safety factor. All concrete septic tanks listed under the PCANY Certification Program for Water and Wastewater Products, as shown by the cast in red disk, have demonstrated structural soundness and watertightness. If properly installed and maintained, they will last a lifetime.

Do not install a septic tank without a cast-in red disk proving it is “PCANY Listed”



Why this is a trick.

The adjacent illustration shows a mid-seam tank with a riser assembly. If the riser is 3 feet tall and filled with water, it will exert an upward force on the top portion of the tank of 1.3 psi. If the tank top is 5' x 10', the water's lift force is 9,360 lbs. This is considerably more than the 6800 lb weight of the tank's upper half. Top seam tanks are even more vulnerable to this trick.

If the tank was buried under 3 ft of earth load, this added weight (18,000 lbs) would keep it tight.

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This is part of a series of commentaries related to septic tanks, whose goal is to inform. We welcome your participation, assistance, suggestion or complaint, as long as it is consistent with our stated objectives – to inform, instruct, assist or correct common misconceptions.

The Precast Concrete Association of New York (PCANY) is an organization of over 100 members. It has 31 concrete producers, 17 of which produce concrete septic tanks, and comprise the Septic Tank Group. Our mission is to assure the physical integrity and satisfactory performance of septic tanks for the benefit of all who depend upon on-site wastewater treatment systems and the groundwater resources of the State of New York by demonstrating the unique attributes of concrete to achieve long-term goals of the public and the regulatory community. To successfully achieve this mission, PCANY will:

- 1) Establish a “Manufacturers Certification Program”, including a Quality Control/Quality Assurance component, with a goal to produce and deliver precast concrete septic tanks that are watertight, are designed with a structural capacity appropriate for the installation, and which exhibit a high level of quality within all related manufactured products and their accessories, throughout New York State.
- 2) To interact with the regulatory community and all related public agencies to develop standards for the siting, installation, monitoring, maintenance, management and operation of all components of an on-site wastewater treatment system. This goal shall be further advanced by the publication of “Concrete Septic Tank Installation Guidelines.”
- 3) To act on behalf of all PCANY members through participation on or presentations to committees and boards or at other venues, where the unique attributes and importance of the concrete septic tank in the on-site management of wastewater are subjects of discussion, be they at the state, county or municipal level.

PCANY SEPTIC TANK GROUP PRODUCING MEMBERS

Binghamton Precast & Supply, Binghamton, NY 607-722-0334
Burnett Concrete Products, Inc., Wolcott, NY 315-594-2242
Butts concrete Products, Masonville, NY 607-265-2887
Concrete Building Supply, Plattsburgh, NY 518-563-0700
R. Deso, Inc, Champlain, NY 518-298-8411
Eastern Precast Co., Inc, Brookfield, CT 203-775-0230
The Fort Miller Co., Inc, Schuylerville, NY 518-695-5000
Grimm Building Materials Co., Troy, NY 518-272-1100
Guardian Concrete Products, Schenectady, NY 518-372-0080
Jefferson Concrete Corp., Watertown, NY 315-788-4171
Keeler Vault Co., Inc., Hudson, NY 518-851-6281
Kistner Concrete Products, East Pembroke, NY 585-762-8216 **
Lakelands Concrete Products Inc, Lima, NY 585-624-1990
Oneonta Block, Oneonta, NY 607-432-6641
Sunnycrest Inc., Auburn, NY 315-252-7214
Woodard’s Concrete Products, Inc., Bullville, NY 845-361-3471
Zeiser Wilbert Vault, Elmira, NY 607-733-0568

**additional locations in East Bethany, Lockport, Springville, Clifton Springs, and Jamestown

The PCANY website, www.pcanyc.org identifies the plants that have qualified under our Certification Program, and lists the specific tanks authorized to cast in the “PCANY LISTED” red disk, which means they have been properly designed, manufactured, and vacuum tested for water tightness.