

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 onsite 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.”

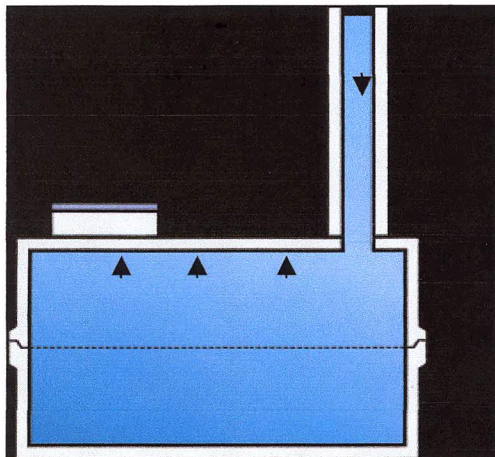
Actual anticipated loads from liquids inside the tank will never result from liquid levels higher than the outlet opening invert - - unless the system is in some failure mode! Then why specify water testing to higher levels? **This is not a test – it is a trick!** Concrete tanks depend on the weight 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 9,360lbs. This is considerably more than the 6800lb weight of the tank’s upper half. Top seam tanks are even more vulnerable to this trick.

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