

Home & Environment

Septic Tanks

The Primary Treatment Device of Septic Systems

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Septic tanks play an essential role in effectively treating wastewater in areas without municipal sewage treatment. Homeowners often assume that the septic tank in their backyard is their septic system. Actually, the tank is merely the first of a series of components that make up a well-designed septic system.

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Purpose of Septic Tanks

A septic tank is a large chamber that collects solids from household sewage while allowing the clarified effluent to move through the tank (Figure 1). The time it takes for the clarified effluent to leave the tank once wastewater has been added from the household is typically 24 to 48 hours. During this short time sewage solids settle or float in the tank, depending on their density. Most of these removed solids break down and are converted to methane, carbon dioxide, and other gases that are released through the household plumbing vent system, usually located in the roof. Typically, 15 to 20 percent of household sewage solids are non-degradable, so the collected solids must be removed from the tank every few years.

To reduce in-tank turbulence and encourage solids to settle, baffles are placed in the tank where the sewage pipe from the house enters the tank and where the discharge pipe takes effluent to the soil treatment area. Older tanks were often fitted with concrete or metal baffles that can cor-

rode over time. A missing or damaged baffle can reduce sewage treatment, or even result in expensive damage to the treatment area by allowing solids to overflow the tank. Baffles should be inspected when the tank is cleaned and replaced as needed.

Risers are access ports that extend from the buried tank to the soil surface. Risers aid tank maintenance by providing easy access to the tank for cleaning and inspection of tank components. Risers should be installed on all new tanks and can even be retrofitted for existing tanks. All risers should be childproof and watertight, with the soil surface sloping away from the opening to ensure that surface runoff does not enter the tank or riser.

Types of Septic Tanks

Septic tanks are constructed of concrete, fiberglass, or plastic, but all must be watertight and protected from corrosion. Tanks are normally fabricated off-site. Some are transported to the site in one piece; others are cast in two pieces and reassembled and sealed at the joint on site. One-piece designs are usually

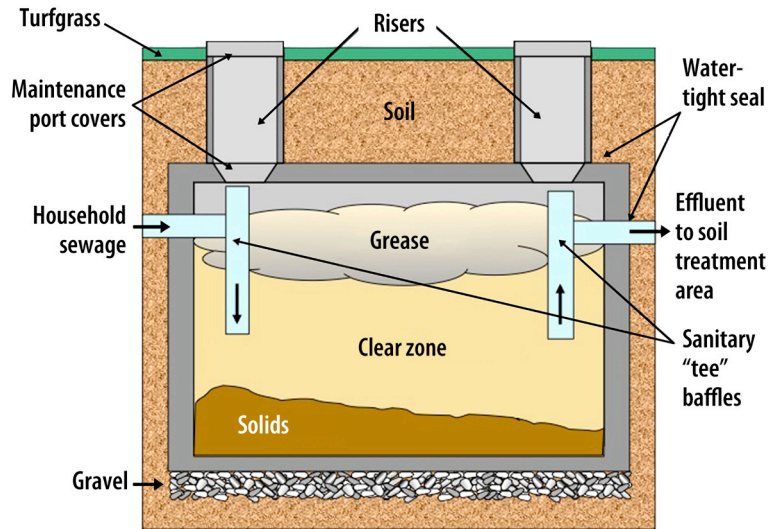


Figure 1. A cross-section view of a septic tank. Dense organic matter sinks while lighter wastewater components (grease and fats) float. The clear zone contains clarified effluent that moves from the septic tank to the soil treatment area.

Tank Tips to Remember

- Always leave septic tank repairs to professionals.
- Install waterproof and childproof risers on septic tanks.
- Add an effluent screen to the outlet end of the septic tank.
- Have your tank cleaned and inspected by a professional every three to five years.
- Obtain the services of a septic system professional for regular maintenance.
- NEVER ENTER OR PUT YOUR HEAD IN A SEPTIC TANK.

preferred because there is a lower chance of leakage. Usually the size of a household septic tank is determined by the number of bedrooms in the home; the more bedrooms, the larger the tank (Table 1).

Septic tanks can be single chambered or multi-chambered (Figure 2). An advantage of multi-chamber tanks

Table 1. Minimum capacity of tanks.

Number of Bedrooms	Gallon Capacity	
	without Garbage Disposal	with Garbage Disposal
3 or less	1000	1250
4	1250	1500
5	1500	1750
Each additional	250	250

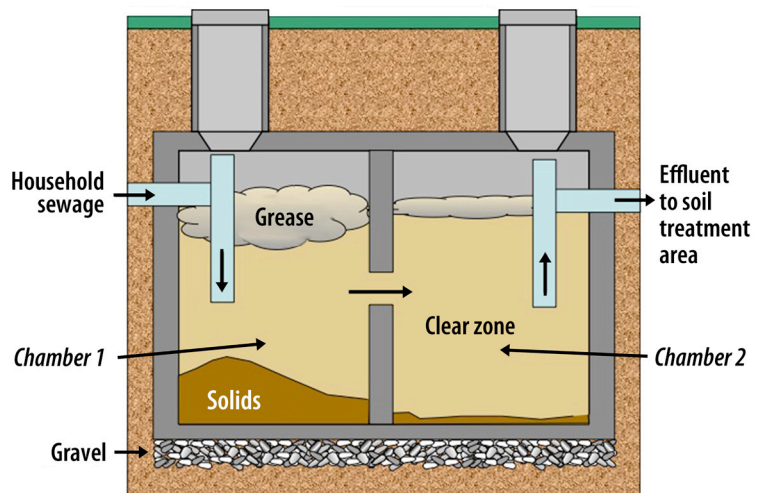


Figure 2. Dual chamber septic tanks help separate solids from the clarified effluent that will move out to the soil treatment area. These tanks require more frequent maintenance than comparably sized single chamber tanks.

includes additional effluent stilling, allowing solids to settle more effectively. A disadvantage is that multi-chamber tanks need to be cleaned more often than comparably sized single-chamber tanks because most solids will collect in the first compartment.

Maintenance

Effluent screens

Although not required by law it is highly recommended that effluent screens be installed at the outlets of new or retrofitted septic tanks (Figure 3). Effluent screens can either replace the standard outlet baffles or be inserted into the outlet of a septic tank. These devices screen out solids remaining in the tank effluent and help prevent solids from leaving the tank and plugging the soil treatment area. Effluent screens are easily maintained by homeowners or professionals. Solids that collect on the screen's surface can simply be hosed off back into the tank. Screens should be checked every six to twelve months and cleaned as needed. If the effluent screen clogs significantly, the household plumbing drains cannot function



Figure 4. Photograph of a concrete septic tank lid that has collapsed under a truck's weight. Repair costs were more than \$1,000.

properly. When the effluent screen needs frequent maintenance (like every few weeks or months), this is an indication that the septic tank needs to be inspected. Possible issues associated with screen clogging include excessive solid accumulation in tank and/or hydraulic overloading due to excessive water use in the household.

Effluent screens can be installed easily on new or older tanks. If a septic tank

does not already have one, a riser should be installed at the same time to make cleaning and maintenance easier. The riser lid must be securely fastened for safety (see "Safety" below).

Watertight tanks

Septic tanks must be watertight. Water entering through cracks or leaking risers can cause hydraulic overload of the soil treatment area. Untreated wastewater also could leak out of the tank, contaminating surface water or groundwater. The septic tank should be checked for cracks and leaks when it is installed. When cleaning, practitioners should also inspect for leaks or cracks.

Vehicle traffic

Do not park on or drive over your septic system with anything heavier than a riding lawn mower. Septic tanks and soil treatment areas are installed very close to the ground surface. Traffic from large vehicles can collapse the top of the tank (e.g. see Figure 4), crush a connecting sewer pipe, or compact the soil, thereby irreversibly decreasing the soil permeability in the soil treatment areas.

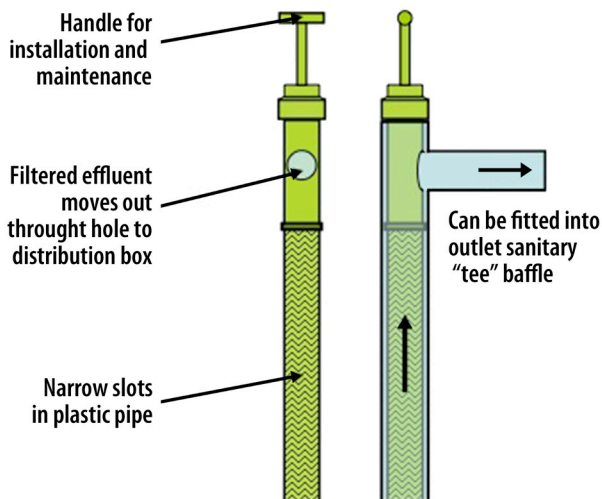


Figure 3. An effluent screen device is essentially a mesh screen that fits into or replaces the outlet baffle of the septic tank. It prevents solids from moving out of the septic tank and being deposited in the soil treatment area trenches. These screens can be fitted into or replace an outlet sanitary "tee."

Safety

Only a trained professional should perform septic tank repairs. Hazards of improperly covered tank openings and careless maintenance include exposure to toxic or explosive fumes, a lack of oxygen, and drowning. Every year, these hazards result in the deaths of children and adults.

Septic tank cleaning

Over time, sludge and scum accumulate in the septic tank, limiting the area between the two layers for the clarified effluent. When that limited space becomes too small, solids may begin to move out to the soil treatment area and begin to clog soil pores and restrict soil infiltration of the effluent. To maintain adequate wastewater detention in the septic tank, hire a professional to periodically remove the scum and sludge. Expect to pay between \$150 and \$300 for this service for a thousand-gallon septic tank. The cost varies with septic tank size, distance travelled by service provider, and method of disposal.

The time between cleanings depends on the amount of solids entering the system and the tank's size. But for most single-family home septic systems, tanks should be cleaned every three to five years.

Table 2. Estimated septic tank inspection and cleaning frequency in years

Tank size (gallons)	Number of people using septic system						
	1	2	3	4	5	6	8
1000	12	6	3	3	2	2	1
1250	16	8	4	3	3	2	1
1500	19	9	6	4	3	3	2

Note: More frequent cleaning needed if garbage disposal is used.

Source: Adapted from Mancl 1984.

References

Mancl, K.1984. Estimated septic tank pumping frequency. *J. Environ. Engineer.* 110:283-285.

For more information

Visit the Home and Environment web page at <http://www.ca.uky.edu/enri/henv/>.

About the author

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