

Separation Technology

Separation technology separates the toilet waste (blackwater) from the rest of the sewage (graywater). There are two part of a system that uses separation technology. The first part is the toilet, which instead of a flush toilet is a composting, incinerating or chemical toilet. By removing the toilet waste from the system the soil treatment system can be downsized by 40%. The separation removes a lot of the organic material and nitrogen. The second part is the soil treatment system for the graywater.

Incinerator toilets can completely eliminate liquid and solid toilet wastes from the sewage treatment system. The initial cost may vary from \$800 to \$1,500, including electric wiring and a fireproof vent for the waste gases. In addition to the initial expense, there may be some replacement costs of component parts for an incinerator toilet. Average energy use is 1.5 pounds of gas or 1.0 kwh for each toilet cycle (flush). Current energy costs can be used to determine the actual use cost. Because an incinerator toilet requires a cool-down period after each incineration cycle, it may not be a particularly desirable device for a large family where demands on the toilet may come in short spans of time. An incinerator toilet is not particularly effective for situations where there is a considerable amount of liquid waste. Liquid is difficult to burn. The waste gases from an incinerator toilet have some odor and, under certain atmospheric conditions, may settle to the ground and be objectionable to occupants or neighbors. There have been reports along lakeshore areas, where temperature inversions are common, of incinerator toilets causing serious odor problems. The firepot requires regular cleaning to remove ashes and other residue and will need to be periodically replaced, depending upon the amount of use.

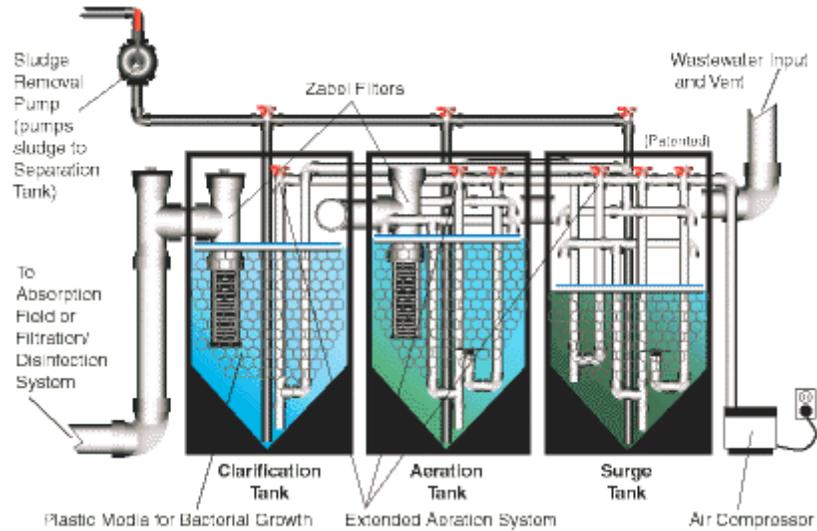


In most chemical toilets, a charge of chemical is added to a small amount of water. After use, the liquid is recirculated by an electric- or hand-operated pump to flush the wastes into the holding chamber. The initial charge of chemical is adequate for 40 to 160 uses, depending upon the model. When the holding chamber is full, a valve can be opened to discharge wastes into the septic tank. On some chemical toilets, the holding chamber can be removed for disposal of wastes. Wastes are reduced to about two percent of those from a conventional flush toilet. The initial cost of chemical toilets varies greatly depending on model and size, but it will likely range from \$200 to \$700 plus installation. The cost of the chemical may be from two to three cents per toilet use. Because most chemical toilets are plastic, they should not corrode. Maintenance costs should be minor.

Composting toilets are more appropriately called biological toilets and have two basic principles of operation: liquid is evaporated, and solid wastes are biologically decomposed into compost. The biological toilet uses no water and requires no connection to house plumbing. Every biological toilet has a capacity limit, which depends on its ability to evaporate moisture. To increase the capacity, most room-sized biological toilets use heating elements and fans, together with mixers for the organic material. All biological toilets designed for year-round use must have electricity to run the fan and the heating element. Large-volume biological toilets may be used in seasonal residences without having electricity available, but care must be taken that excess liquid is not discharged into them. All biological toilets must have the compost removed periodically. The frequency, which depends upon the type of toilet and the number of people using it, might vary from every three weeks to once per year. A biological toilet requires frequent examination and care so that it will continue to function in a satisfactory manner. Care and maintenance requirements vary with the different brands of toilets. It is advisable to obtain an accurate cost estimate from the supplier of the model you are interested in, as well as information about energy consumption, installation, maintenance and replacement. Energy costs may be appreciable for the year-round use of a composting toilet. The prices of composting toilets may range from \$750 to \$3,000, plus installation.



The second part is the graywater treatment system. Graywater is sewage that does not contain toilet wastes. Graywater systems receive, treat, and dispose of only graywater. Toilet wastes from the residence or other establishment have to be treated in some other system, or the residence has to have a privy. Graywater systems cannot accept garbage disposal waste. Graywater tanks are constructed to the same specifications as other sewage tanks, except that the liquid capacity of the tank is 40% smaller than if the tank was receiving toilet waste too. Aerobic treatment units can be used as part of a graywater system; they have to meet the same requirements as for aerobic units serving any other systems. A picture of a gray water aerobic unit is shown below.



If a dwelling has a graywater, system, it is a Class IV residence, and average daily flow is estimated as 60 percent of a similar house. Effluent from a graywater tank has to enter a soil treatment system for final treatment. This can either be a trench, bed or mound system. It cannot be discharged to the surface. Proper sizing of the soil absorption system is based on Class IV flows and the appropriate soil sizing factor.