

THE BIOFIL TOILET SYSTEM

The Toilet Facility that Makes Good Sanitation Sense

The Biofil Digester is a simple compact on-site organic waste treatment system that uniquely combines the benefits of the flush toilet system and those of the composting toilets and eliminates the disadvantages and drawbacks of both systems.



The Biofil Digester

How it works

The Biofil Digester technology mimics the decomposition found under forests' floors and other natural environments. Living organisms (both microorganisms and macro-organisms such as earthworms) in an enclosed environment treats all organic degradable matter through the natural process of aerobic decomposition.

Wastewater and fecal matter enter at the top of the Biofil Digester where rapid separation of solids and liquid contents of the waste occurs. The digester is essentially a biological filter consisting of a medium of soil and pervious concrete. Bacteria, other organisms degrade solid fecal matter. All liquids are organically filtered out of the bottom of the digester and drained into the soil where further and final decomposition occurs. Other solids (toilet paper & all degradable anal cleaning material) are decomposed and converted into rich & safe soil.

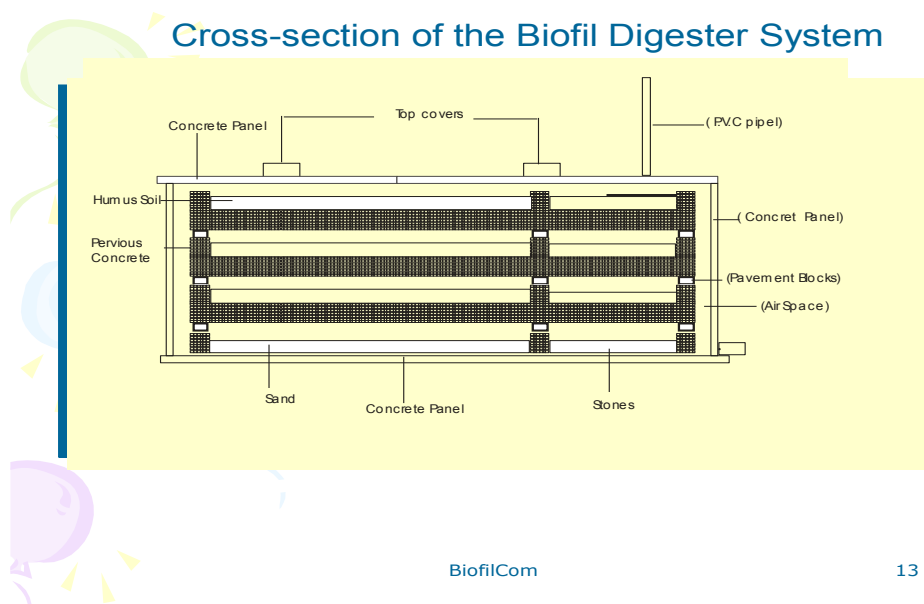
When the Biofil Digester is used in the flush toilet situation, high nutrient biologically treated water is made available for effective landscaping and beautification of the environment.

The design is simple, replicable, and affordable. It operates on very low maintenance requirements. It suitable for all soil conditions including heavy clay soils, shallow or exposed rock beds and soils with high water tables. The digester can be laid above ground or below ground depending on the groundwater level of the location.

The digester operates as a filter via:

- ⊙ Rapid separation of solids and liquids
- ⊙ Aerobic composting of solids and
- ⊙ Bio-filtration of waste water

For maximum sanitation effect, the Biofil Microflush Toilet System is designed to integrate hand washing.



The main drivers of the Biofil system

Good sanitation practice

Biofil Digester is completely aerobic. It requires minimum maintenance and needs no mechanical or electrical aeration of solid mass to achieve decomposition. There is no need for human contact with excreta. No odours or sludge are generated in the system to attract insects that spread germs. Design considerations of the system (digester made of concrete) make it impossible for rodents to burrow into Digester unlike conventional pit latrines.

Minimum land uptake

The basic digester is 2ft X 2ft X 6ft (600mm X 600mm X 1800mm) and so land-take is minimized.

Number of Users

The typical digester (2ftX2ftX6ft or 600mm X 600mm X 1800mm) can accommodate 25 users in the micro-flush setting and 10 users when operated as a flush unit. These are average typical usages the digester can tolerate occasion heavier use.

Environmental friendliness

Because the digester and effluent pipes are always installed above the ground water table, water contamination is completely eliminated. Waste is treated under complete aerobic conditions eliminating odour and air pollution. The system eliminate the possibility of costly site remediation and clean-up (as in the case of failed septic / KVIPs)

Portable water savings

Bio-filtered water from digester is idea for landscaping in the case of flush toilets

Health impact mitigation,

The hazards of unsafe sanitation include diseases like cholera, dysentery, scabies and intestinal worms, and environmental pollution. Biofil toilets are well ventilated, well illuminated and meet the specific needs of user groups. Misuse of toilets and open defecation is often avoided. Tiled interiors makes cleaning toilet easy. The digester provides a complete barrier to insect vectors that spread diseases.

Ecological impact mitigation

The system eliminates ground/surface water and air contamination. It has a potential of reducing greenhouse gas emissions through the avoidance methane emissions directly into the atmosphere.

Environmental, Social and Technological Benefits

The system is technical, economic, social and environmental suitable for use in all situations, especially where:

- © Water supply is an issue:

- Onsite well, or watercourse on the property where the danger of pollution of these sources by runoff from waste and effluent is real
 - Property is located in chronically drought-affected area
 - Property has limited supply of fresh water
- ⊙ Service is an issue:
- No sewer, no water
 - No septic hauling service
- ⊙ Property is an issue:
- Adverse soil conditions (clayey / solid rock sites)
 - Poor drainage, high water table
 - Low or seasonal use situations of sanitary facilities
 - Crowded area/small land space

Designed in Africa for Africa, Biofil relies entirely on local manufacturers and local materials. It is excellent in performance, affordable and replicable.

BIOFIL DIGESTER AS A FLUSH SYSTEM

When the Biofil Digester is use in homes offices and other commercial properties for treating septic waste, it totally replaces the traditional septic tanks. It may be installed above ground or buried depending on groundwater conditions. All the plumbing within the building remain unchanged. For toilets located on the **ground floors** we recommend that P-trap WC toilet bowls be used in areas with high groundwater tables or in areas where installation of the Biofil digester will have to be above ground.

Septic Tank	Biofil Digester
○ Groundwater pollution	○ None
○ Cesspit emptying cost	○ No need for Cesspit emptying
○ Not ideal for water logged areas	○ Suitable for all soil conditions

BIOFIL STAND-ALONE TOILETS

Design Considerations

The Biofil Stand-Alone Toilet System consists of the digester and a super structure with a robust microflush seat, a wash hand basin and tiled interiors. Design ensures well lit interiors with natural lights. Units are precast and are typically installed within two days.

Stand-Alone units can be used as flush and microflush Units.



KVIP squatting Hole



Tiled interiors of Biofil Microflush Toilet

Relative Advantage

KVIPs Vs. Biofil Digester

KVIP

- System quickly becomes anaerobic releasing hydrogen Sulphide with its odour associated problems
- Groundwater pollution occurs. Not suitable for the rural areas where water supply is obtained almost exclusively from groundwater sources

BIOFIL

- Decomposition occurs under aerobic conditions. NO odourous gas emissions
- Ground water not affected; Water is directed into top soils where microbial activities are most active. Nutrients are removed by soil bacteria decomposition

○ **Danger of spillage of pit contents during floods.**

○ Digester designed above ground and typically has no more than a week of undecomposed contents in digester

○ **Special details required to control of odour and flies in a KVIP latrine**

○ Not necessary – no odours or insects problem

○ **Not suitable for every soil type – esp. rocky soils**

○ Suitable for every soil type

○ **Mosquitoes tend to breed in pits**

○ System largely dry and does not breed mosquitoes

○ **Toilets smell bad when water washes into pit during raining periods or when clean water washes into pit. Always a problem in cultures where water for anal cleaning is the norm.**

○ Designed for cleanliness. Rapid separation of liquid and solids occurs at all times

○ **Pit will eventually fill with fecal sludge and will require shut down for above a year for full decomposition of waste before contents are dug out for reuse of pit. Two pits are always provided for each seat to allow for continuous use.**

○ No sludge buildup. No need for emptying

○ **The sludge requires treatment prior to re-use or disposal**

○ Solid residue can be immediately used as manure

Potential Drawbacks and Maintenance

The Biofil Digester is an aerobic system and must never be subjected to flooding. In many instances the digester must be installed above ground level and always above the highest ground water table level.

When used as a flush unit blockage of effluent line can be a problem. This will usually manifest as flooding or reduced draining rate of the digester. The system is easily restored when the blockage is rectified. When use as a microflush system this problem does not arise.

Examples of Current Biofil System Applications in Ghana



Biofil Digester at Iduaprim Mines Estates



Microflush Biofil Toilet system



Digester installed at new residential



Biofil Digester installed at a School in Pokuase



Biofil Digester installed at a security post



Biofil digester installed at Ghana Home Loans Office block



Stand-alone toilet with Digester



Biofil Toilet attached to a security post