

# HOMEOWNER'S MANUAL

Onsite Wastewater Collection & Treatment Systems

## How to Take Care of Your Wastewater System



**Orenco Systems®**  
Incorporated

*Changing the Way the  
World Does Wastewater®*

**800-348-9843**  
**[www.orenco.com](http://www.orenco.com)**  
**[www.vericomm.net](http://www.vericomm.net)**

# How to Take Care of Your Wastewater System

## *Congratulations!*

Your home includes reliable, carefully engineered equipment — manufactured by Orenco Systems®, Inc. — for the collection and/or treatment of household wastewater.



And your service provider should have a copy of this manual. It's available on our Document Library, at [www.orenco.com](http://www.orenco.com). Or call 800-348-9843 and we'll send you another.

When properly designed and installed, onsite wastewater treatment does a terrific job of decomposing household waste and recycling precious water resources. Our systems use little energy and frequently outperform municipal sewage treatment plants. The treated effluent is often returned harmlessly to the soil, where it receives final polishing and filtration for groundwater recharge. There's no degrading of our nation's rivers and oceans . . . which is so often the case with municipal sewage.

As with any engineered system, such as your car or your heat pump, your onsite wastewater system will work better and last longer if it is regularly maintained by a qualified service provider. Your service provider should be present during installation, so he or she is familiar with your system, especially those service lines, conduits, and connections that get buried.

Your system will also work better and last longer if you learn what can go into it — and what can not. Little effort is required. Just read and practice the “do's and don'ts” that follow. Every member of your household should be familiar with these. And if you have guests who want to “help out in the kitchen,” be sure to tell them, too. With this preventive maintenance, along with periodic inspections, your onsite wastewater system should function for decades. And you'll save water and energy, too!

There's a place on the back of this Homeowner's Manual to record “Important System Facts.” If those have not been filled in for you, please record those now, before you file or shelve this manual. And give a copy of these facts to your service provider, especially if your service provider changes. You'll be glad you did.

## Do's and Don'ts for INSIDE the House

There are a number of do's and don'ts that will help ensure a long life and minimal maintenance for your system. As a general rule, nothing should be disposed into any wastewater system that hasn't first been ingested, other than toilet tissue, mild detergents, and wash water. Here are some additional guidelines.



**Don't** flush dangerous and damaging substances into your wastewater treatment system. (Please refer to the "Substitutes for Household Hazardous Waste," on the next panel.) Specifically, do not flush . . .

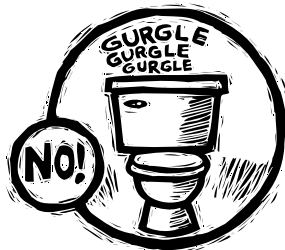
- Pharmaceuticals
- Excessive amounts of bath or body oils
- Water softener backwash
- Flammable or toxic products
- Household cleaners, especially floor wax and rug cleaners
- Chlorine bleach, chlorides, and pool or spa products
- Pesticides, herbicides, agricultural chemicals, or fertilizers



**Do** keep lint out of your wastewater treatment system by cleaning the lint filters on your washing machine and dryer before every load. Installing a supplemental lint filter on your washing machine would be a good precautionary measure. (This normally takes just a few minutes. Lint and other such materials can make a big difference in the frequency and cost of pumping out your primary treatment tank.)



**Don't** use special additives that are touted to enhance the performance of your tank or system. Additives can cause major damage to other areas in the collection system. The natural microorganisms that grow in your system generate their own enzymes that are sufficient for breaking down and digesting nutrients in the wastewater.



**Don't** ignore leaky plumbing fixtures; repair them. A leaky toilet can waste up to 2,000 gallons of water in a single day. That's 10-20 times more water than a household's typical daily usage. Leaky plumbing fixtures increase your water bill, waste natural resources, and overload your system.



**Don't** leave interior faucets on to protect water lines during cold spells. A running faucet can easily increase your wastewater flow by 1,000 to 3,000 gallons per day and hydraulically overload your system. Instead, properly insulate or heat your faucets and plumbing.



**Do** collect grease in a container and dispose with your trash. And avoid using garbage disposals excessively. Compost scraps or dispose with your trash, also. Food by-products accelerate the need for septage pumping and increase maintenance.



**Do** use your trash can to dispose of substances that cause maintenance problems and/or increase the need for septage pumping. Dispose of the following with your trash:

- Egg shells, cantaloupe seeds, gum, coffee grounds
- Tea bags, chewing tobacco, cigarette butts
- Paper towels, newspapers, sanitary napkins, diapers, kitty litter, candy wrappers
- Rags, large amounts of hair

## Do's and Don'ts for INSIDE the House



**Don't** use excessive amounts of water. Using 50 gallons per person per day is typical. If your household does not practice any of the “water conserving tips” below, you may be using too much water.

**Do** conserve water:

- Take shorter showers or take baths with a partially filled tub. Be cautious about excessive use of large soaking tubs.
- Don't let water run unnecessarily while brushing teeth or washing hands, food, dishes, etc.
- Wash dishes and clothes when you have a full load.
- When possible, avoid doing several loads in one day.
- Use water-saving devices on faucets and showerheads.
- When replacing old toilets, buy low-flush models.



**Do** use substitutes for household hazardous waste. Replace the following hazardous products with products that are less environmentally harmful. The hazardous cleaners are listed below, followed by the suggested substitute.

### Ammonia-based cleaners:

Sprinkle baking soda on a damp sponge. For windows, use a solution of 2 tbs white vinegar to 1 qt water. Pour the mixture into a spray bottle.

### Disinfectants:

Use borax: 1/2 cup in a gallon of water; deodorizes also.

### Drain decloggers:

Use a plunger or metal snake, or remove and clean trap.

### Scouring cleaners & powders:

Sprinkle baking soda on a damp sponge or add 4 tbs baking soda to 1 qt warm water. Or use Bon Ami; it's cheaper and won't scratch.

### Carpet/upholstery cleaners:

Sprinkle dry cornstarch or baking soda on, then vacuum. For tougher stains, blot with white vinegar in soapy water.

### Toilet cleaners:

Sprinkle on baking soda or Bon Ami; then scrub with a toilet brush.

### Furniture/floor polishes:

To clean, use oil soap and warm water. Dry with soft cloth. Polish with 1 part lemon juice and 2 parts oil (any kind), or use natural products with lemon oil or beeswax in mineral oil.

### Metal cleaners:

- Brass and copper: scrub with a used half of lemon dipped in salt.
- Stainless steel: use scouring pad and soapy water.
- Silver: rub gently with toothpaste and soft wet cloth.

### Oven cleaners:

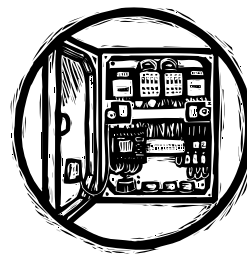
Quickly sprinkle salt on drips; then scrub. Use baking soda and scouring pads on older spills.



### Laundry detergents:

Choose a liquid detergent (not a powder) that doesn't have chlorine or phosphates.

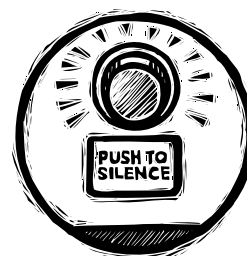
## At the Control Panel



**Do** locate your electrical control panel where it will be protected from potential vandalism and have unobstructed access.

**Do** familiarize yourself with the location of your wastewater system and electrical control panel. Refer to the panel's model and UL number (inside the door panel) when reporting a malfunction in the system.

**Do** take immediate action to correct the problem in the event of an alarm condition. Call your system operator or maintenance company immediately whenever an alarm comes on. (It sounds like a smoke alarm.)



**Do** remember that the audible alarm can be silenced by pushing the lighted button located directly above the “Push to Silence” label on the front of the electrical control panel. With normal use, the tank has a reserve storage capacity good for 24-48 hours.

**Don't** turn off the main circuit breaker to the wastewater pumps when going on vacation. If there is any infiltration or inflow into the system, the pumps will need to handle it.

## Do's and Don'ts for OUTSIDE the House



**Don't** enter your tank. Entering an underground tank without the necessary confined space entry training and procedures can result in death from asphyxiation or drowning. Keep children away from tank openings if lids are off or lid bolts are removed.

**Do** keep the tank access lid fastened to the riser at all times with stainless steel lid bolts. If the lid or riser becomes damaged, **BLOCK ACCESS TO THE TANK OPENING, IMMEDIATELY.**

Then call your service provider to repair it. If you or your service provider needs replacement bolts, call Orenco at 800-348-9843.



**Don't** dump RV waste into your wastewater system. It will increase the frequency of required septage pumping. When dumped directly into the pumping vault, RV waste clogs or fouls equipment, causing undue maintenance and repair costs. (Also, some RV waste may contain chemicals that are toxic or that may retard the biological digestion occurring within the tank.)

**Don't** ever connect rain gutters or storm drains to the sewer or allow surface water to drain into it. And don't discharge hot-tub water into your system. The additional water will increase costs, reduce the capacity of the collection and treatment systems, and flood the drainfield. It can also wash excess solids through the tank.



**Don't** dig without knowing the location of your wastewater system. As much as possible, plan landscaping and permanent outdoor structures before installation. But easily removable items, such as bird baths and picnic tables, are OK to place on top of your system.



**Do** make arrangements with a reliable service person to provide regular monitoring and maintenance. Place the service person's phone number on or in your control panel!

**Do** keep a file copy of your service provider's sludge and scum monitoring report and pumpout schedule. This information will be beneficial for real estate transactions or regulatory visits.

**Do** keep an "as built" system diagram in a safe place for reference.



**Don't** drive over your tank or any buried components in your system, unless it's been equipped with a special traffic lid. If the system is subject to possible traffic, put up a barricade or a row of shrubs.

### IMPORTANT! CAUTION!

Only a qualified electrician or authorized installer/operator should work on your control panel. Before anyone does any work on either the wiring to the level control floats and pumps in the vault or on the control panel itself, it is imperative to first switch the isolation fuse/breaker and the circuit breakers in the panel to the "Off" positions, then switch "Off" the power to the system at the main breaker!

# HOMEOWNER'S MANUAL

## Onsite Wastewater Collection & Treatment Systems



**Do** keep accurate records of maintenance and service calls. Make sure whoever services your tank keeps a complete record, and ask for a copy for your records.



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### IMPORTANT SYSTEM FACTS

#### Distributor or Dealer:

Please fill out the following important information before giving out this Homeowner's Manual:

\_\_\_\_\_  
*Distributor/Dealer Name*

\_\_\_\_\_  
*Permit # (if applicable)*

\_\_\_\_\_  
*Distributor/Dealer Address*

\_\_\_\_\_  
*Property Address*

\_\_\_\_\_  
*Distributor/Dealer Phone Number(s)*

\_\_\_\_\_  
*Property Owner Name(s)*

\_\_\_\_\_  
*Authorized Service Provider Name*

\_\_\_\_\_  
*Start-Up Date*

\_\_\_\_\_  
*Authorized Service Provider Phone Number(s)*

\_\_\_\_\_  
*Control Panel Model # and UL #*

\_\_\_\_\_  
*Authorized Installer Name*

\_\_\_\_\_  
*AdvanTex® Model # (if applicable)*

\_\_\_\_\_  
*Authorized Installer Phone Number(s)*

\_\_\_\_\_  
*AdvanTex® Serial # (if applicable)*

\_\_\_\_\_  
*Engineer Name (if applicable)*



AdvanTex®  
Treatment System  
AXN Models meet  
the requirements of  
NSF-ANSI Standard 40  
for Class I Systems.

\_\_\_\_\_  
*Engineer Phone Number(s)*

\_\_\_\_\_  
*Regulatory Agency*

\_\_\_\_\_  
*Regulatory Contact Name*

\_\_\_\_\_  
*Regulatory Contact Phone Number(s)*



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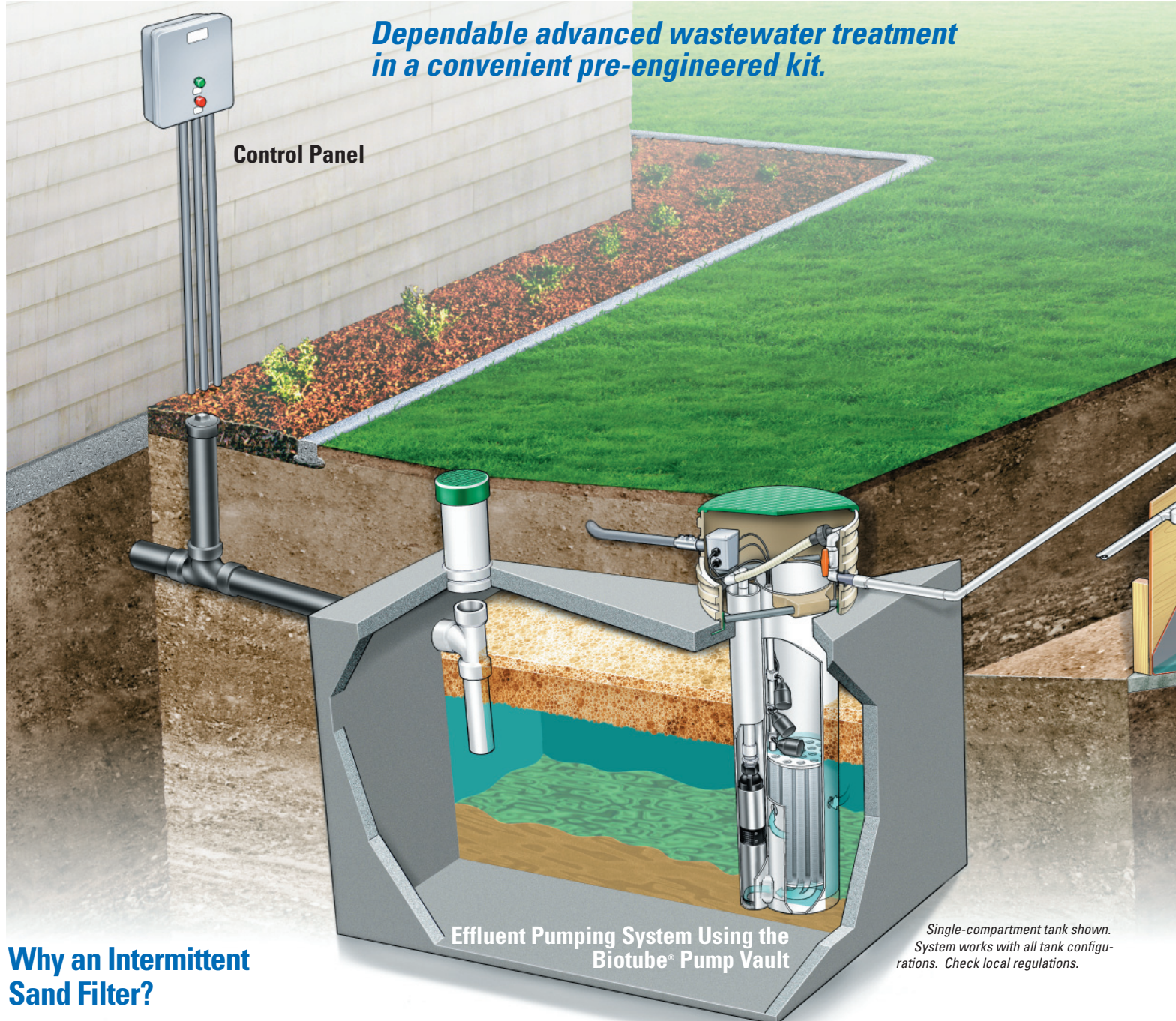
## **Intermittent Sand Filters**



**Setting the Standard  
for Onsite Wastewater  
Treatment**

# The Orenco Intermittent Sand Filter System

*Dependable advanced wastewater treatment in a convenient pre-engineered kit.*



Control Panel

Effluent Pumping System Using the Biotube® Pump Vault

*Single-compartment tank shown. System works with all tank configurations. Check local regulations.*

## Why an Intermittent Sand Filter?

**W**here high groundwater, poor soils, or other site constraints rule out a conventional septic system, Intermittent Sand Filters (ISFs) are the ideal solution. With a long history of superior treatment, ISFs from Orenco outperform aerobic treatment plants. Tucked neatly underground, modern ISFs can be planted over with lawn or flowers to blend into the landscaping. Now you can safeguard your family and enjoy your yard too!

## Orenco Makes Sand Filters Easy

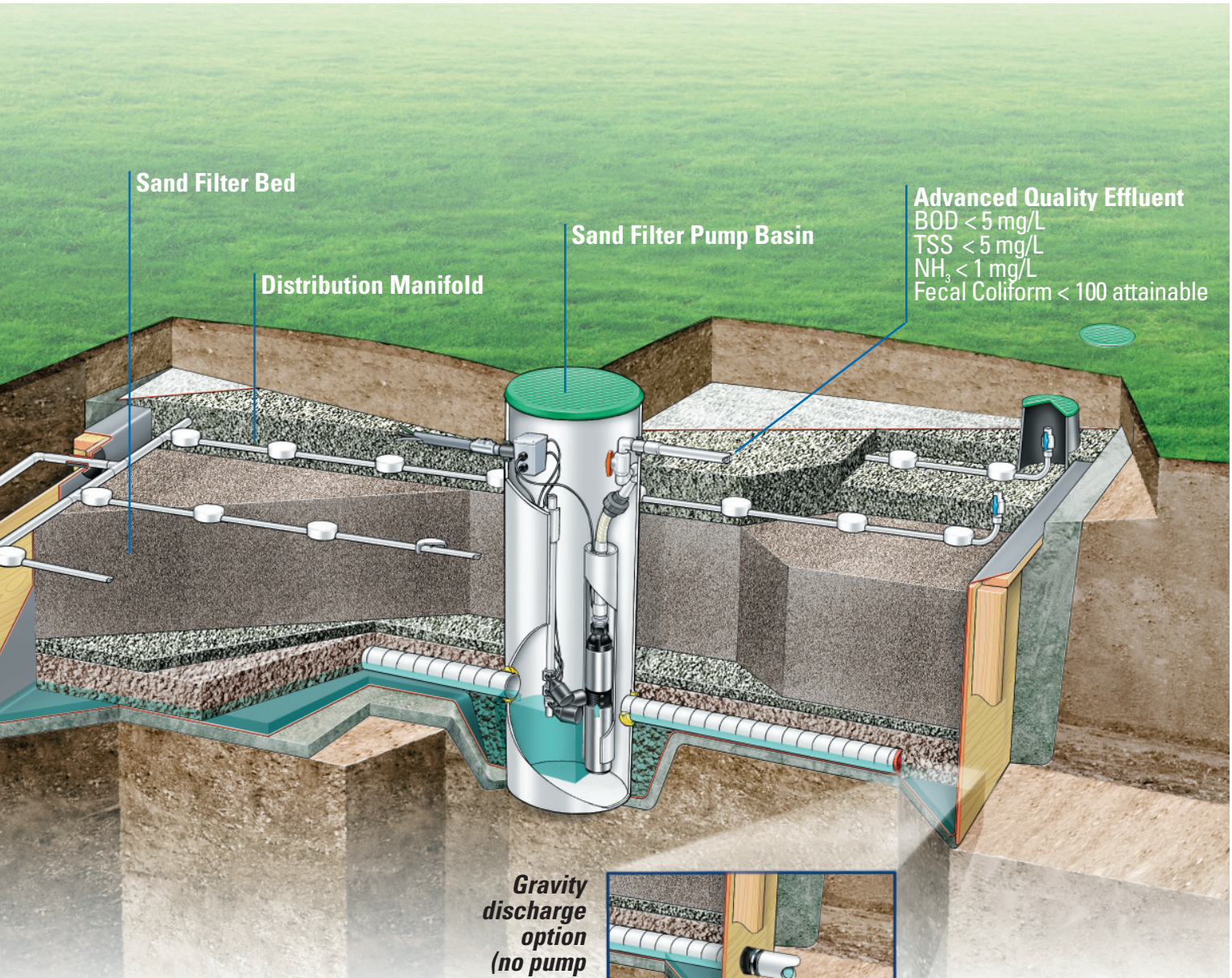
- Standard ISF designs fit nearly any site.
- Complete ISF kits\*: Orenco expertise delivered to your door.
- Easy-to-follow installation instructions.
- Comprehensive owner's manuals.
- Cold weather options available.

\*Covered by one or more of the following patents: 4,439,323, 5,360,556, 5,492,635.

## With Reliability You Can Trust

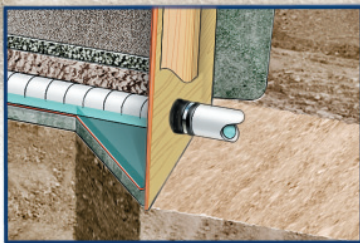
- Nothing beats ISFs for consistent effluent quality, even when faced with system fluctuations and stresses.
- Every Orenco ISF kit is engineered for long life. Orenco quality pumps are designed for long life duty.
- Simple maintenance requires an average of only 30 minutes a year. No routine raking, tilling, or replacement of the sand.





**Advanced Quality Effluent**  
 BOD < 5 mg/L  
 TSS < 5 mg/L  
 NH<sub>3</sub> < 1 mg/L  
 Fecal Coliform < 100 attainable

*Gravity discharge option (no pump basin required)*



### How an ISF Works

Following primary treatment in a septic tank, wastewater from a home is filtered by Orenco's patented\* Biotube® Pump Vault Technology to keep solids in the tank and out of the sand filter.

The clarified wastewater is then pumped to pressurize the distribution manifold on top of the sand filter bed.

Evenly spread over the surface of the bed, the wastewater percolates through the sand, where naturally occurring microorganisms clinging to the particles organically break down contaminants. In the bottom of the sand filter, treated

effluent – now clear and odorless – is collected and conveyed by pump or gravity to landscaping for subsurface irrigation or to a reduced-size drainfield.\*\*

\*Covered by the following patents: 4,439,323 and 5,492,635.  
 \*\*Observe local regulations.

### Let Orenco Help

More than 25 years of experience and continuing innovation have made Orenco the world leader in sand filter technology. You can depend on Orenco for:

- Design assistance
- Standard drawings
- Plans review

with every state-of-the-art ISF equipment kit.

Orenco engineers are eager to share their expertise. Attend in-house training at our facilities, or ask about workshops and conferences in your area.

# Orenco Kits Make Intermittent Sand Filters Easy

## Pre-Engineered Kit

A world leader in alternative wastewater treatment systems, Orenco offers the only complete, pre-engineered kits for sand filters on the market today. Designed for easy installation, Orenco's patented\* sand filter kits are made of high-quality, reliable components, selected for efficiency and long-term performance.

## One-Stop Shopping

An Orenco sand filter kit simplifies an installer's life – no shopping around for parts. It's also the best way to guarantee that installations are of consistent quality. Inspectors like Orenco's sand filter kits because they know what to expect and feel comfortable with their proven record. The homeowner wins too with a sand filter system that's engineered to be not only dependable but easy to monitor and maintain.

## Orenco Kit Components

### Effluent Pumping System

- Access Riser & Lid
- Splice Box
- Biotube® Pump Vault
- Float Switch Assembly
- Discharge Assembly
- High Head Effluent Pump
- MVP Control Panel

### Sand Filter

- 30 mil (0.8 mm) Liner
- Pre-assembled Manifold
- Slotted Underdrain
- Filter Fabric

### Pump Basin Assembly (optional)

- Sand Filter Pump Basin
- Splice Box
- Float Switch Assembly
- Discharge Assembly
- Effluent Pump

Orenco can also provide you with ISF designs on diskette.

\*Covered by one or more of the following patents:  
4,439,323, 5,360,556, 5,492,635.

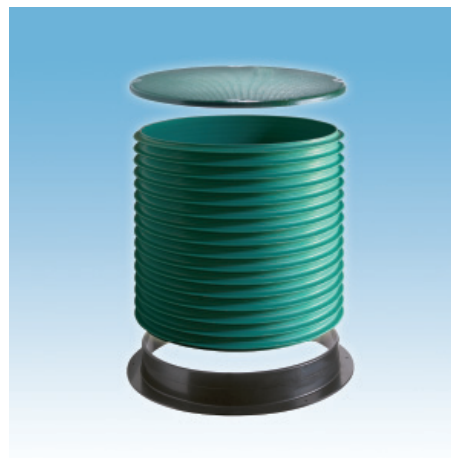


- Orenco's patented Biotube® Pump Vault helps ensure an ISF system's long life and minimizes maintenance by filtering out gross solids to maximize the treatment capacity of the sand.
- Every component is corrosion-resistant and easy to install and maintain.
- Light-weight, high-head, corrosion-resistant pumps provide high pressure for continuous orifice clearing. Orenco's high-head pumps possess a high cycling capability, allowing multiple small doses for optimal treatment and years of trouble-free operation.

Cutaway Vault shows interior components: Biotube® filter, float assembly, and pump.

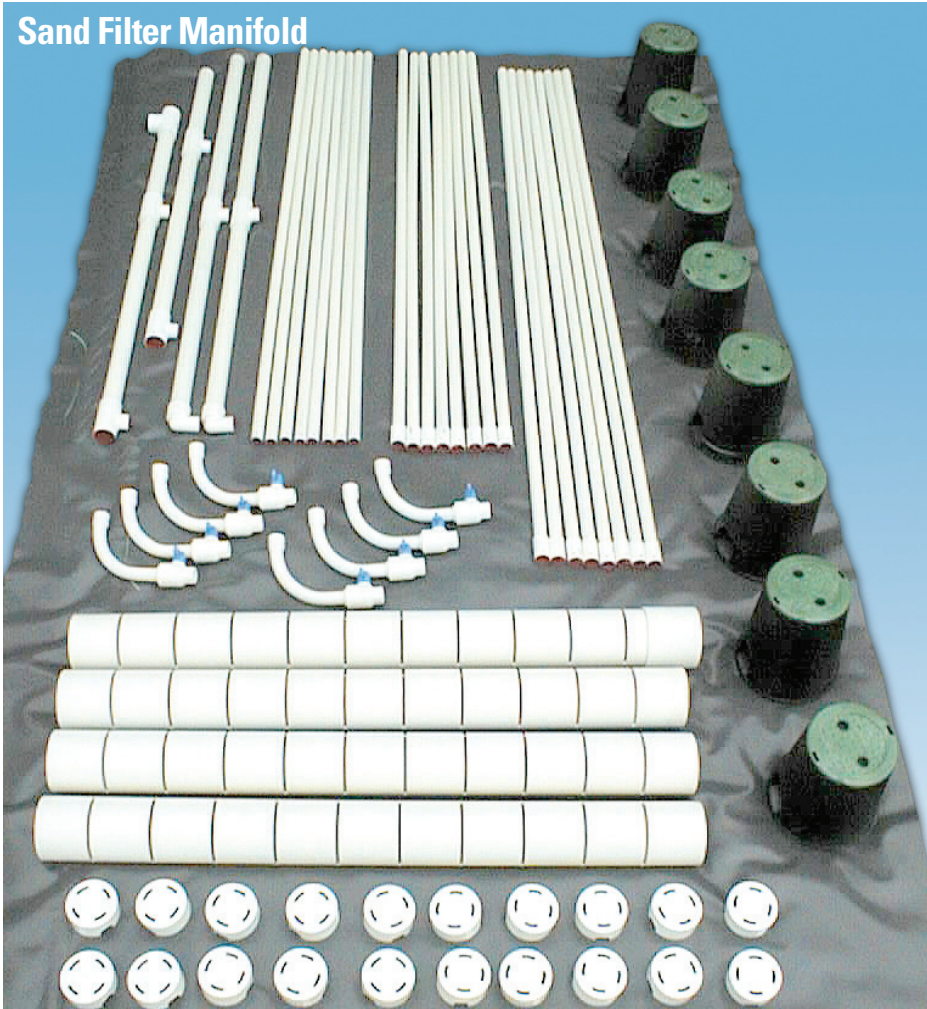


- High quality, heavy duty, UL-listed components provide long lasting reliability and ease of operation, monitoring, and maintenance.
- All MVPs include an easy-to-use, programmable logic unit that incorporates many timing and logic functions, such as multiple timing intervals to adjust for changing flow conditions.
- Built-in programming keys allow reprogramming in the field without a portable computer.



- Allows easy access into tank.
- Attractive, non-skid lids.
- Strong and lightweight.
- Tamper-resistant.

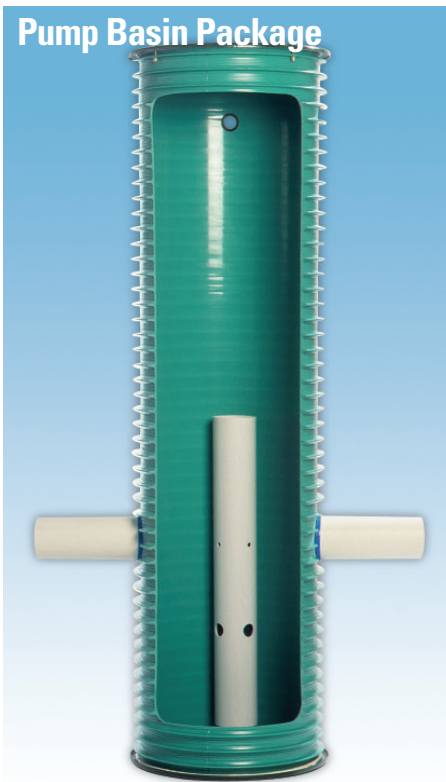
## Sand Filter Manifold



Factory assembly of Orenco manifolds eliminates difficult field fabrication.

- Manifold sections are labeled for ease of installation.
- Orifices are sized accurately using Orenco's custom-built drilling system.
- Small diameter laterals ensure high scouring velocity for reduced maintenance.
- Flushing valve cleanout and enclosure allows easy access for maintenance and monitoring.
- Slotted underdrain collects treated effluent for transport to the pump basin or dispersal area.

## Pump Basin Package

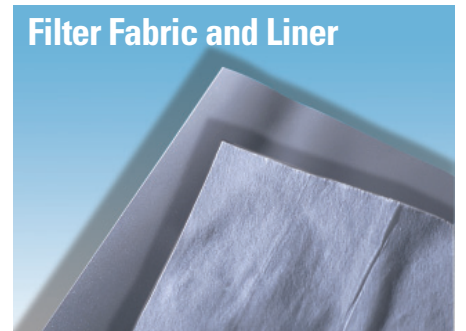


Small diameter pump basin houses pump and associated equipment within the sand filter bed.

- Lightweight. Easily carried by hand.
- Corrosion-proof construction.
- Access secured by stainless steel bolts for safety and convenience.

*Cutaway Pump Basin shows interior housing for pump.*

## Filter Fabric and Liner



- Breathable fabric protects top of sand filter from fine soil yet allows air and water to pass through.
- Watertight PVC liner provides a barrier between the sand filter and the ground water.
- Liner is 30 mil (0.8 mm) for enhanced durability.
- Boots glue to liner to provide a watertight seal for transport pipes.

# Proven Technology

## ***Orenco's Intermittent Sand Filters Perform!***

- ***Clear, odorless effluent averages BOD<5, TSS<5, NH<sub>3</sub><1, FC<100 attainable***
- ***Long track record, documented worldwide***
- ***Complete pre-engineered kits, compatibility ensured***
- ***Drainfields as small as 40 square feet (4 m<sup>2</sup>)***
- ***Blends with the surrounding landscape***
- ***Maintenance averages only 30 minutes a year***
- ***Power costs 3¢-6¢ a day, vs. \$.30-\$1.50 a day for aerobic plants***
- ***More resistant to biological upset than other technologies***
- ***The reassurance of Orenco's years of sand filter experience.***

***Solving wastewater challenges is Orenco's only business. Call one of our experienced engineers for information or free technical assistance at 800-348-9843.***



## **Stinson Beach—One Community's Story**

**O**n the Northern California coast overlooking scenic Bolinas Bay and Lagoon lies Stinson Beach, a small community where wastewater has traditionally been treated in onsite septic systems. But in the early 1970s high coliform counts in surface waters prompted the state to issue an ultimatum – clean up the pollution – and folks in Stinson Beach started looking for alternatives.

Engineering studies ensued – nine in all. A central treatment system and every other alternative proposed were out of the question – just too costly for the small population. Finally, working with renowned wastewater expert Dr. George Tchobanoglous, residents established a wastewater management district to bring the community's onsite systems into compliance.

The solution to their trickiest problems? Intermittent Sand Filters from Orenco. Tiny lots, coarse soils, proximity to recreational waters – ISFs could handle it all. Longtime residents who had been threatened with eviction were able to keep their homes, and previously unbuildable waterfront lots could be developed.

Today more than 100 of Orenco's Intermittent Sand Filters safeguard the community's health and the sensitive ecosystem of Stinson Beach and its sheltering bay.

# Adapting to the Site

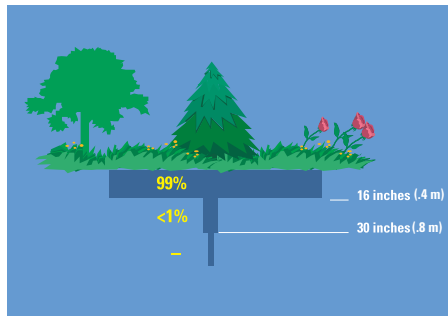
**T**his 2,000 square foot (186 m<sup>2</sup>) waterfront cottage in Stinson Beach, California, occupies a lot that's only 60 by 125 feet (18 by 38 m) with 6-foot (2 m) side setbacks and 25-foot (8 m) setbacks front and back.

Even with these challenging constraints, the site easily accommodates the Orenco sand filter system. The filter bed sits under the sandy terrace (upper right), and raised flower beds (foreground) sit atop the drainfield.

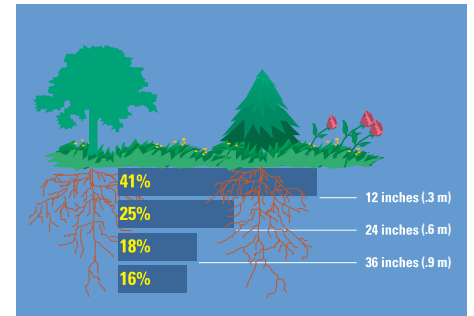


## Shallow Is Better

Subsurface dispersal of sand filter effluent works best in the top soil stratum where roots and soil biota are concentrated. Nitrates and other contaminants are removed by microbial activity and plant uptake.



*Biota*



*Water use*

## Drainfields Can Be Smaller

The Oregon-approved shallow gravelless drainfield trench can be loaded with ISF effluent at a rate of more than 4 gpd/ft<sup>2</sup> (163 lpd/m<sup>2</sup>). Soil structure improves and permeability actually increases over time. Raised beds can be useful to enhance separation to groundwater in most soils.



*Shallow gravelless drainfield*



*Raised beds*

## Water Reuse Is an Option

Subsurface drip and spot irrigation are among the water reuse techniques compatible with ISF systems.



*Drip irrigation*



*Spot irrigation*

# The Orenco Story

In response to widespread onsite wastewater system failures during the 1970s, Oregon's Department of Environmental Quality denied many new septic tank installations (up to 50% in some areas) until hazards could be corrected and further failures prevented. Douglas County, Oregon, invested in an ambitious program to clean up local problems and to ensure the success of new systems. A dedicated group of engineers, soil scientists, and sanitarians sought out appropriate wastewater technologies, designed and monitored demonstration projects, and then helped write new onsite wastewater rules for the state.

During this process they discovered that much of the equipment required to implement their innovative designs was not commercially available. In 1981, several of these engineers founded Orenco to manufacture the specialized hardware they needed.

Today Orenco is a rapidly growing firm dedicated to the creation of cost-effective, technically elegant solutions to a wide variety of residential and commercial waste-

water handling problems. To complement its design and manufacturing functions, Orenco invests time and money in a continuing research program, often cooperating in projects with colleges and universities.

Because Orenco's team of civil, environmental, mechanical, and electrical engineers works exclusively in the onsite and effluent sewer industries, it is able to offer unmatched technical and design assistance. In today's world, the rules are constantly changing. At Orenco the goal is to help clients make efficient use of technology to achieve a sensible, environmentally responsible solution for every individual project.



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*Distributed by:*

# Operation & Maintenance

For Standard Intermittent Sand Filter Kits (w/o distributing valves)

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Oreco Systems<sup>®</sup>  
Incorporated

1-800-348-9843

## *Important names and phone numbers*

Service Person: \_\_\_\_\_

Phone: \_\_\_\_\_

\_\_\_\_\_

Installer: \_\_\_\_\_

Phone: \_\_\_\_\_

\_\_\_\_\_

Electrician: \_\_\_\_\_

Phone: \_\_\_\_\_

\_\_\_\_\_

Regulating agency: \_\_\_\_\_

Phone: \_\_\_\_\_

\_\_\_\_\_

Designer: \_\_\_\_\_

Phone: \_\_\_\_\_

\_\_\_\_\_

Oreco sand filter kit model #: \_\_\_\_\_

\_\_\_\_\_

Residual head (squirt height) at startup: \_\_\_\_\_

\_\_\_\_\_

Programmable timer settings:

"ON" \_\_\_\_\_ "OFF" \_\_\_\_\_

Float settings from top of dosing tank: alarm/timer override \_\_\_\_\_ inches

timer off \_\_\_\_\_ inches

red. off/low level alarm \_\_\_\_\_ inches

Distance from top of sand filter pump basin (SFPB) to "ON" level: \_\_\_\_\_ inches

Distance from top of SFPB to bottom of treatment sand: \_\_\_\_\_ inches

# O&M Manual: *Standard Intermittent Sand Filter Kits*

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**Important:** *Attach as-built drawings and pumping equipment component information to back of this manual.*



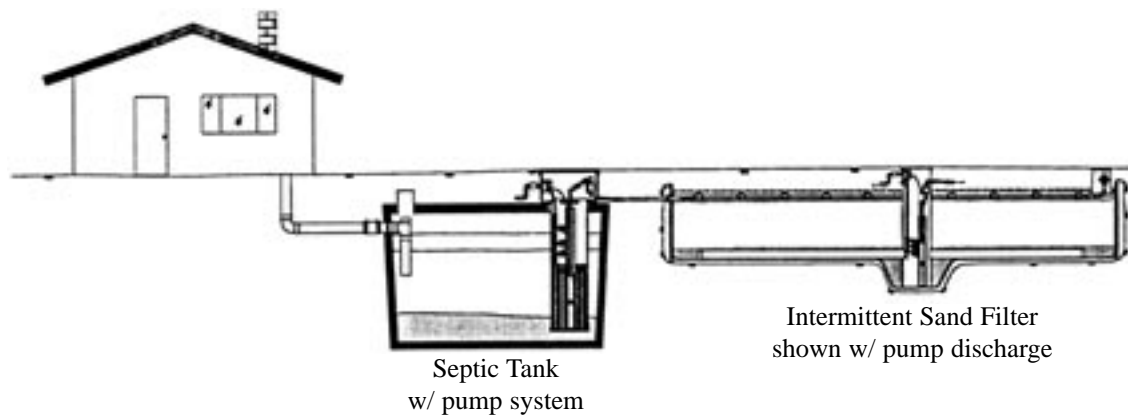
## Introduction

### *Intermittent Sand Filter Systems for Treatment of Residential Sewage*

#### The intermittent sand filter (ISF) system concept

Figure 1 below illustrates the general layout of an intermittent sand filter (ISF) system serving a home. Normally, the entire system is buried except for the fiberglass lids at ground level for maintenance access.

Figure 1: Typical Residential ISF System



The following describes the path the sewage takes through the system.

- Raw sewage from the home flows by gravity into the septic tank where the heavy solids settle to the bottom of the tank and the light solids float to the top of the tank. A relatively clear zone forms between the floating solids (scum) and the settled solids (sludge).
- A pump system suspended in the outlet end of the septic tank pumps liquid effluent from the clear zone of the tank to the sand filter. PVC plastic piping evenly distributes the effluent over the surface of the specially-graded sand. Small particles and other contaminants in the effluent are mechanically, biologically, and chemically reduced as the effluent passes down through the sand.
- The treated effluent is collected at the bottom of the sand filter in an underdrain from which it passes by gravity or is pumped for final treatment and disposal, usually in some type of soil absorption system.

The installer of the system should provide to the user exact drawings of the layout and construction of system. These drawings should be attached at the end of this manual.

#### Benefits of using an ISF system

An ISF system produces very high quality effluent, much superior to that which is discharged by a septic tank alone. In many localities, this higher degree of treatment is required to protect ground water, surface waters, and public health. Sites that have poor soil conditions, poor drainage, high ground water, or sensitive surface waters are potential candidates for sand filter installations. Because ISF effluent is highly treated, many cities and counties allow substantial reduction in the area they require for disposal. Additionally, some localities allow ISF treated water to be reused for subsurface landscape irrigation.

## Operation

### *Components and automatic operation of the ISF system*

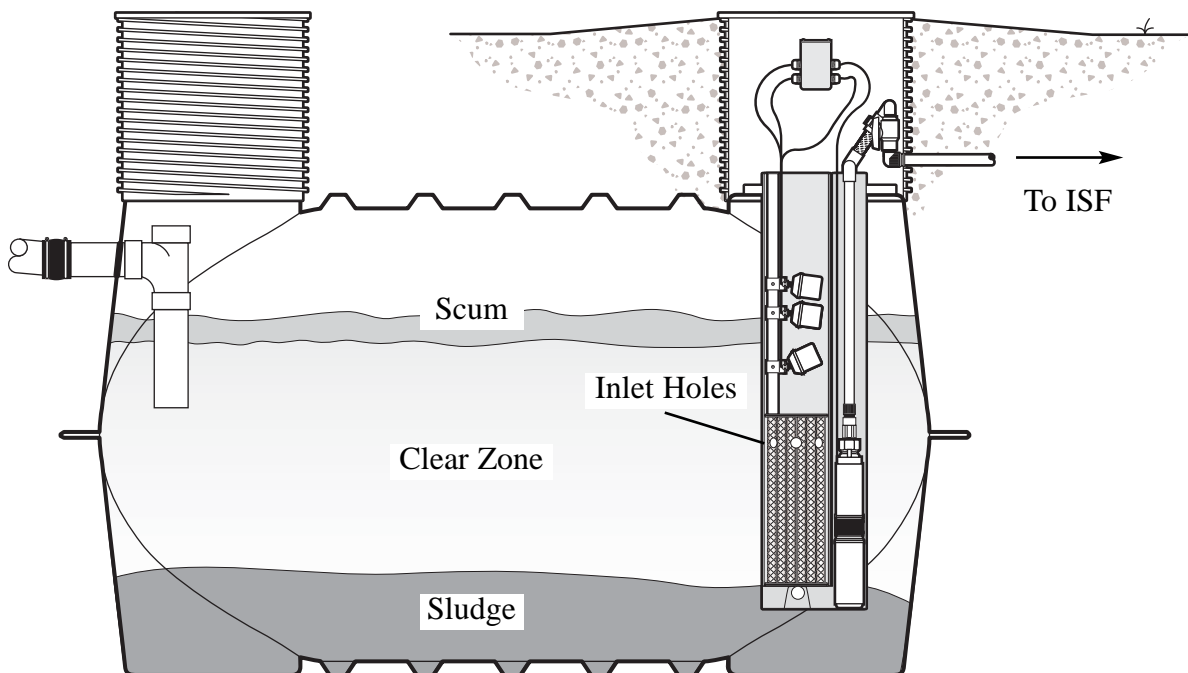
#### The septic tank

Figure 2 below illustrates a septic tank with a pump system installed. The septic tank is a structurally sound, watertight vessel that accepts raw sewage from a home. In the tank, the heavy solids in the sewage fall to the bottom of the tank to form the sludge layer and the light solids in the sewage float to the top of the tank to form the scum layer. The septic tank is very efficient in digesting the sewage. In fact, more than 40% of the overall sewage treatment takes place in the tank. Solids accumulate slowly in the tank over many years and have to be pumped out periodically. Please refer to the monitoring and maintenance section for further discussion.

#### The septic tank pump system

Figure 3 on the following page illustrates the pump system. It is installed at the outlet end of the septic tank so that the pump system's inlet holes can draw from the clearest zone in the tank. As effluent enters the PVC vault through the inlet holes, the Biotube® filter cartridge prevents solids larger than 1/8th inch from getting to the pump, thus allowing the discharged effluent to be substantially free of solids.

Figure 2: Single Compartment Dosing Septic Tank



## Operation

The pump system consists of 7 main components:

1. **PVC riser with fiberglass lid** — provides ground-level access for servicing equipment and septage pumping.
2. **Electrical splice box** — provides an approved, safe method for wiring the pump and float assembly.
3. **Float assembly** — controls the minimum and maximum liquid levels in the tank and sends alarm signals to the control panel under certain conditions.
4. **Biotube® screened pump vault** — provides the method for filtering the effluent and contains the pump and float assembly.
5. **Discharge assembly** — connects the pump to the piping outside the tank and usually includes a ball valve and union for removal and maintenance.
6. **High-head effluent pump** — pumps the filtered effluent to the sand filter.
7. **Control panel** — provides electrical control of the pump system. Figures 4 and 5 show examples of “single-pump” and “double-pump” sand filter control panels.

The septic tank pump system’s operation is automatic, being controlled by the float assembly and by the programmable timer (PT) in the control panel. Under normal operating conditions, the liquid level in the tank is maintained between the top two floats (Figure 3). The PT turns the pump on for short periods of time throughout the day as long as the liquid level is between the top two floats. This allows small volumes of effluent to be dosed to the sand filter, evenly spread out over a 24-hour period.

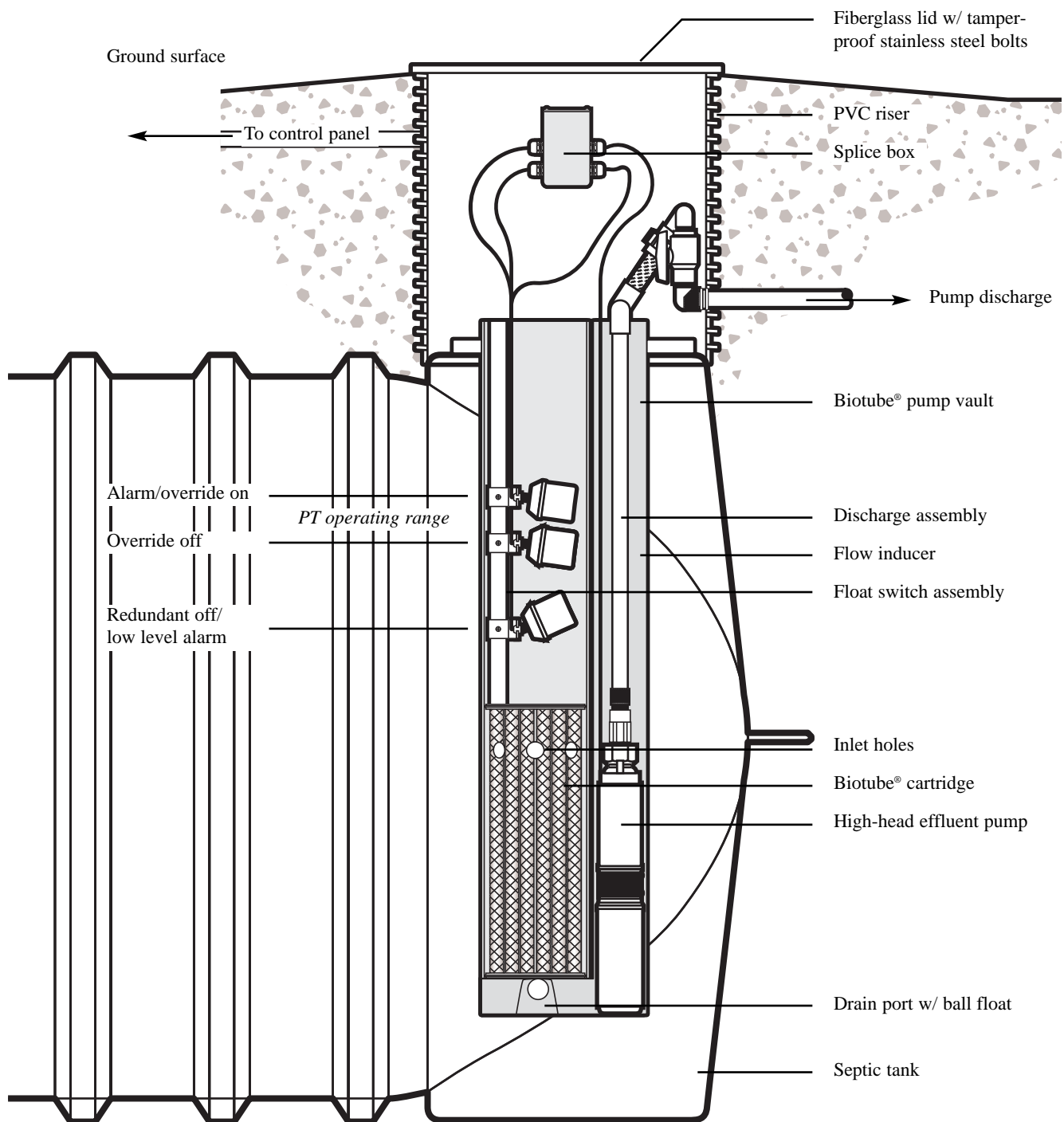
When the liquid level in the tank drops to the second or “timer off” float, the programmable timer is temporarily deactivated, preventing any effluent from being pumped out of the tank until flow into the tank raises the liquid level again. This usually happens once or more each 24-hour period, normally during the middle of the day and at night when little water is being used.

In the event that the liquid level rises to the top or “high level alarm/timer override” float, the pump will come on (overriding the PT) and an alarm on the control panel will sound. The pump runs only for a few minutes, just long enough to drop the liquid level 2.5 to 3 inches. The system then returns to PT operation and the alarm resets itself once the override condition is over. Please refer to page 17 of this manual for troubleshooting alarms.

The bottom float is called the “redundant off/low level alarm” float and is only activated during a problem situation. If the liquid level drops to this bottom float, an alarm will sound on the control panel and the pump will shut off (if it’s running). Please refer to page 17 of this manual for troubleshooting alarms.

## Operation

Figure 3. Biotube® Septic Tank Pump System



## Operation

Figure 4: Single-pump Control Panel (gravity discharge sand filter)

1. Programmable Logic Unit
2. Motor-Start Contactor
3. Toggle Switch
4. Controls Circuit Breaker
5. Pump Circuit Breaker
6. Audio Alarm
7. Visual Alarm
8. Panel Enclosure

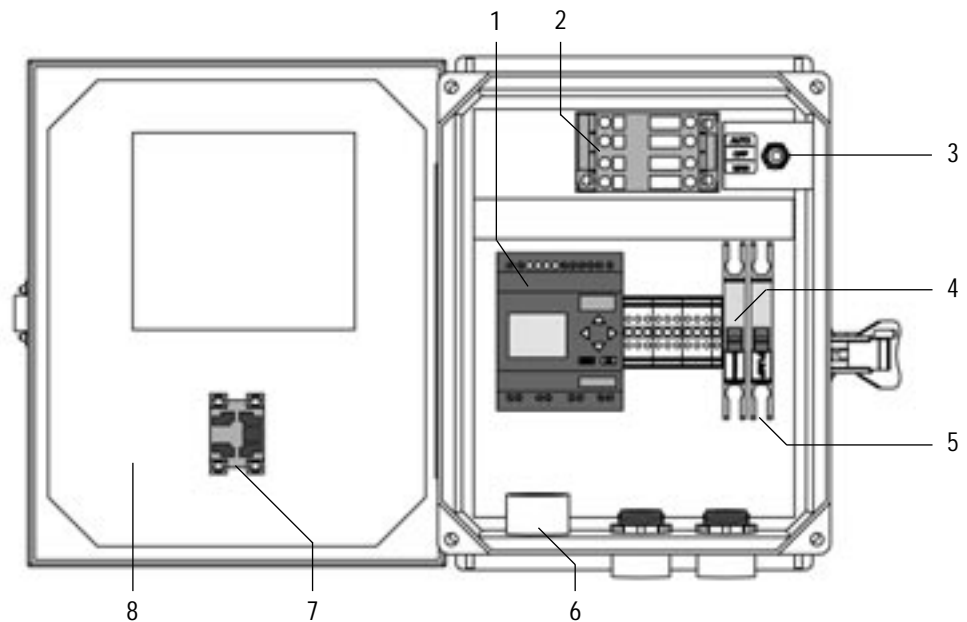
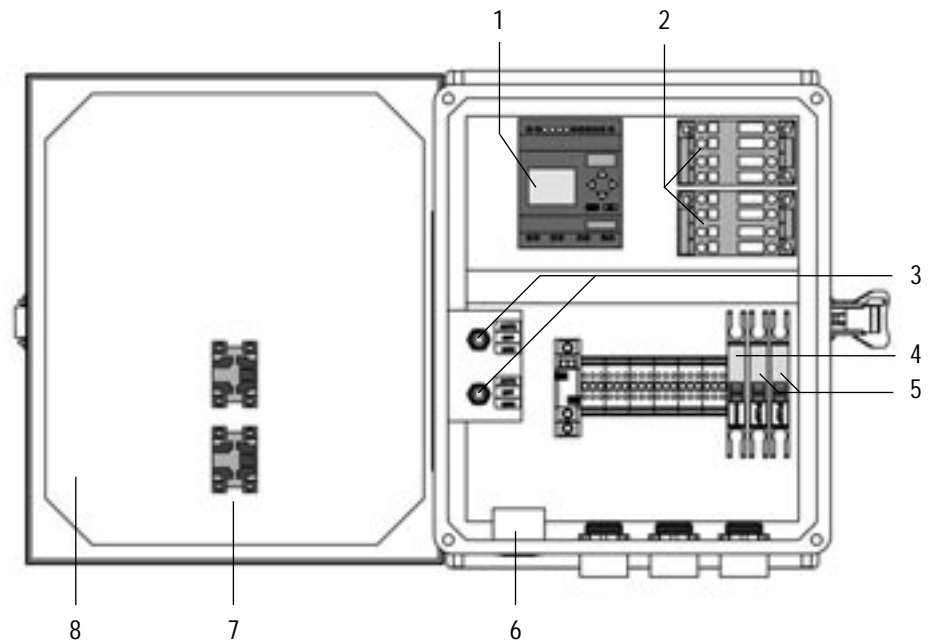


Figure 5: Double-pump Control Panel (pump discharge from sand filter)

1. Programmable Logic Unit
2. Motor-Start Contactor
3. Toggle Switches
4. Controls Circuit Breaker
5. Pump Circuit Breaker
6. Audio Alarm
7. Visual Alarm
8. Panel Enclosure

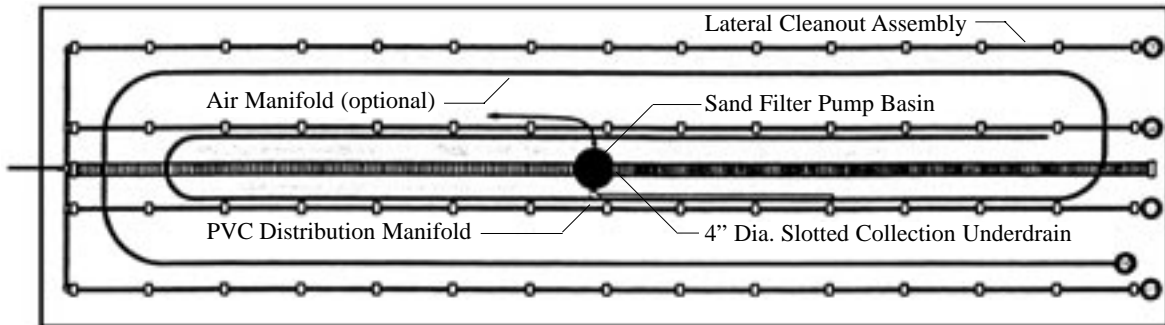


## Operation

### The ISF

Figures 6 and 7 are top and side views of the intermittent sand filter.

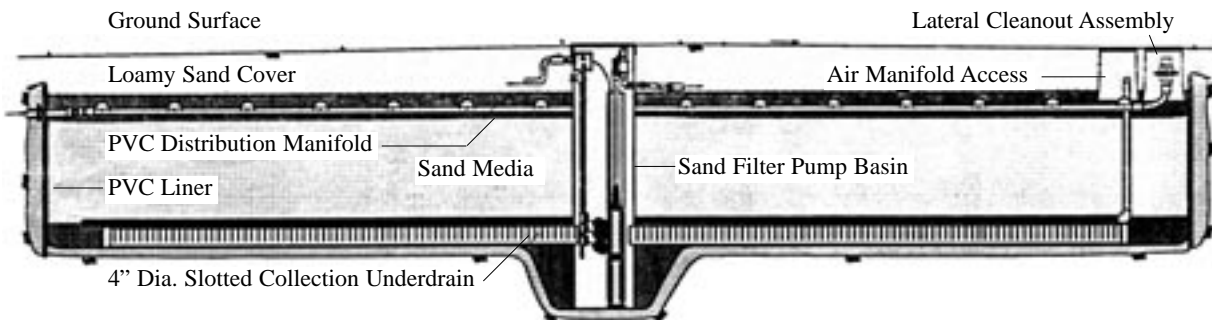
Figure 6: Top View of Standard ISF



The ISF is contained in a 30 mil PVC liner that prevents groundwater from damaging the ISF and permits collection of the treated effluent in the bottom of the ISF. When the pump in the septic tank is running, effluent pressurizes the PVC distribution manifold located on top of the treatment sand and flows out of each lateral through evenly spaced 1/8th inch holes. This spreads the effluent evenly over the sand. Small particles and other contaminants in the effluent are mechanically, biologically, and chemically reduced as the effluent passes down through the approximately 24 inch depth of specially-graded sand.

The sand filter functions optimally when it receives small volumes of effluent, evenly distributed throughout the day. A slotted 4 inch diameter pipe collects the effluent in the bottom of the ISF and conveys the treated effluent to a gravity disposal system or to a sand filter pump basin if final disposal requires the use of a pump. The as-built drawings of the actual installation should be attached at the end of this manual.

Figure 7: Side View of Standard ISF

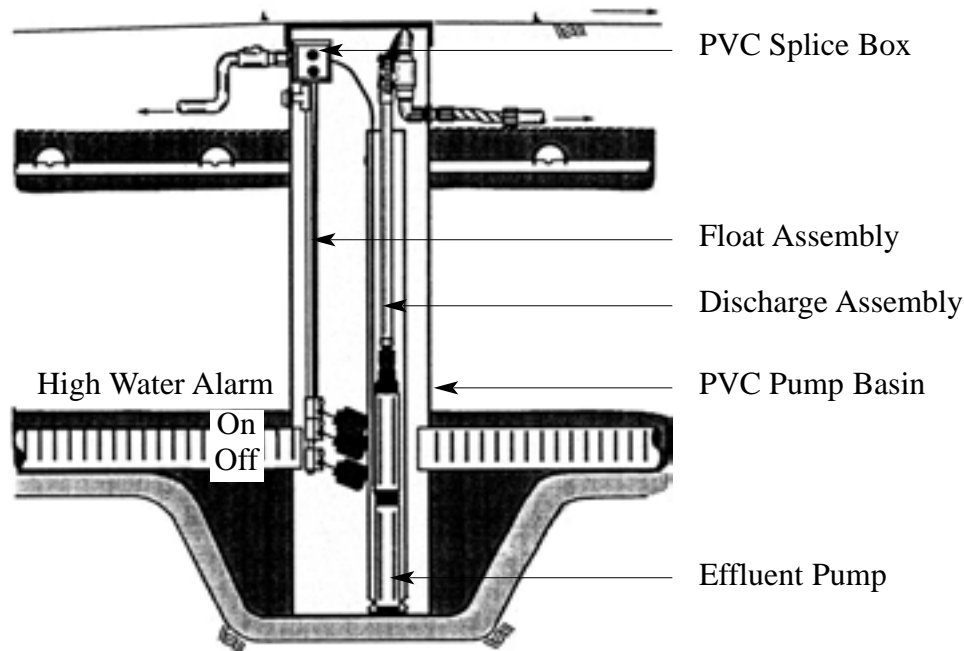


## Operation

### The sand filter pump basin (when required)

When final disposal cannot be achieved by gravity, e.g. the drainfield is on higher ground than the sand filter, a sand filter pump basin is installed in the ISF as shown in Figure 8.

Figure 8: Side View of Standard ISF Pump Basin



The pump basin package consists of components similar to the septic tank pump system:

1. **PVC pump basin** — contains the pump and related equipment in the ISF.
2. **Electrical splice box** — provides an approved, safe method for wiring the pump and float assembly.
3. **Float assembly** — controls the liquid level in the bottom of the ISF and sends an alarm signal to the control panel when a high water condition exists.
4. **Discharge assembly** — connects the pump to the piping outside the basin and usually includes a ball valve and union for maintenance and removal.
5. **Effluent pump** — pumps the treated effluent to the disposal points.
6. **Control panel** — provides electrical control of the pump system. Figure 5 illustrates the “double pump” control panel required when a sand filter pump basin is used.

## Operation

One control panel operates both pumps (one in the septic tank; one in the sand filter pump basin). The pump in the sand filter pump basin is controlled by floats only and does not involve use of a programmable timer. This method of control is often described as “demand” operation since the pump starts “on demand” as soon as the liquid reaches the “on” float. The pump shuts off when the liquid level drops down to the “off” float. A protective interlock in the control panel prevents the septic tank pump from operating if there is a high water condition in the sand filter pump basin. This prevents flooding of the ISF.

### User operation of an ISF system

While the physical and biological processes of handling and treating the wastewater in an ISF system occurs automatically, it is important that users exercise discretion in their disposal of waste to the ISF system. As a rule of thumb, it is recommended that nothing be disposed to the septic tank—with the exception of toilet paper and mild detergents—that hasn’t first been ingested. Avoid dumping toxic chemicals, grease, water softener backwash, and septic tank additives into the system. The use of a garbage grinder is also not recommended.

Daily use of water should be kept within a reasonable range. Most households use an average of 50 gallon per person per day. Excessive water usage can be detrimental to the septic tank, ISF, and final disposal area. Excessive water usage will usually result in periodic short alarm occurrences (approximately 2 to 3 minutes long). These short-term alarms may be the result of doing too many wash loads in one day, leaking septic tank or plumbing fixtures, improper float or programmable timer settings, or large social gatherings. Please see the troubleshooting section starting on page 17 for more complete information on identifying alarm conditions.

The do’s and don’ts lists that follows suggest practices that will help to ensure long life and minimal maintenance for ISF systems.

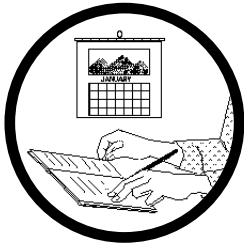


## Operation

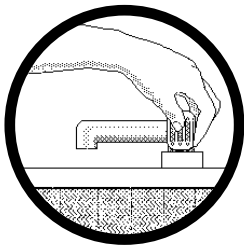


### *Do's*

Do feel free to place a bird bath, potted plant, or other yard decoration on the tank riser lid, as long as it can be readily removed for maintenance. Landscaping or permanent structures should be planned prior to installation in order to ensure that the integrity of the system is not jeopardized.



Do keep accurate records of maintenance & service calls. The results will be valuable if system problems occur. Make sure whoever services the system keeps a complete record with this manual.



Do practice water conservation. By reducing the amount of water use, the life of the system may be increased and power consumption reduced. When possible, avoid doing several loads of laundry in one day. Take short showers and don't let water run unnecessarily while washing hands, food, teeth, dishes, etc.

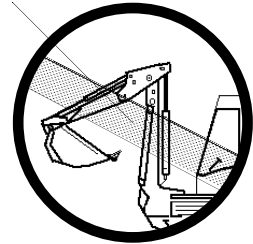


Do be aware that a simple toilet float can hang up and result in over 2000 gallons per day of wasted water. Normal household usage ranges from 100 to 200 gallons per day. Use water-saving devices in the toilet tank and don't flush unnecessarily.

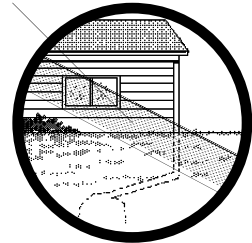
## Operation

### *Don'ts*

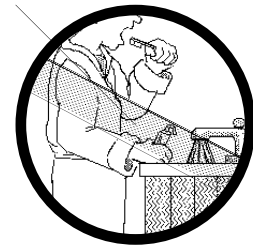
Don't accidentally dig up an underground utility line. Before digging, telephone the local One Call number to have underground utilities marked.



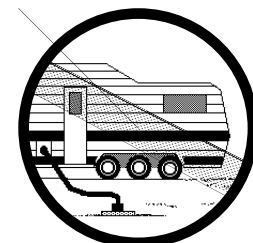
Don't connect rain gutters or storm drains to the septic tank or allow surface water to drain into it.



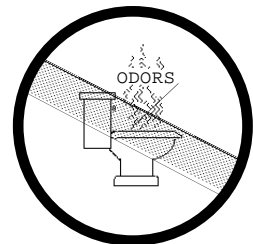
Don't use excessive quantities of water. Repair leaky toilets, faucets or plumbing fixtures. Leaky toilets can waste up to 2000 gallons of water in one day. Take shorter showers and use water saving devices such as low-flow fixtures and low-flush toilets.



Don't dump recreational vehicle (RV) waste into the septic tank because it will increase the the frequency of septage pumping and possibly damage the sand filter. RV waste dumped directly into the screened vault will clog the pump and plug the screen. Some RV waste contains chemicals that are toxic to the biological activity in the septic tank.

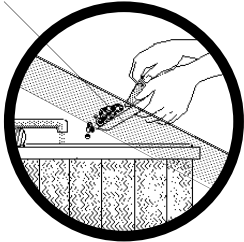


Don't flush undesirable substances into the septic tank. Flushing flammable and toxic products is dangerous. Other materials such as paper towels, rags, newspaper, cigarettes, coffee grounds, egg shells, sanitary napkins, large amounts of hair and cooking grease are a maintenance nuisance. These materials will also increase the frequency of septage pumping and may damage the sand filter.

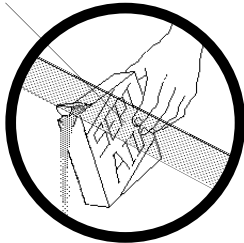


## Operation

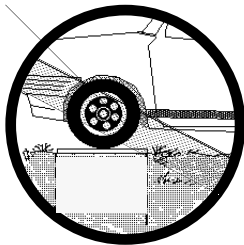
### *Don'ts*



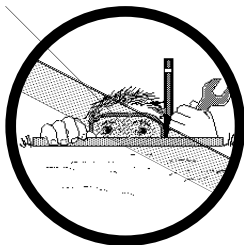
Don't use garbage disposal systems because they also increase the frequency of septage pumping. Compost food scraps or dispose of them in the trash. Collect grease in a container rather than disposing down the drain. Some items (egg shells, coffee grounds, tea bags, etc.) are not biodegradable and should be disposed of in the trash.



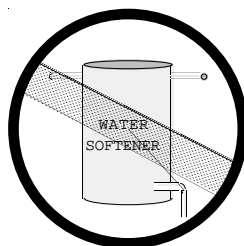
Don't use septic tank additives. Additives do not improve the performance of the septic tank and can cause major damage to the sand filter or drainfield. The natural microorganisms that grow in the system are sufficient. These organisms generate their own enzymes for breaking down and digesting nutrients.



Don't drive over the septic system. If the septic tank is in an area subject to possible traffic, consider putting up an attractive barricade or row of shrubs to discourage traffic unless the tank has been equipped with a special traffic lid.



Don't enter the septic tank. Any work to the tank should be done from the outside. Gases that can be generated in the tank or the lack of oxygen can be fatal.



Don't dispose water softener backwash in the septic tank. The backwash brine contains high levels of chlorides that can destroy the microorganisms and inhibit the biological digestion that occurs in the tank. The brine solution also interferes with the solid's sedimentation that occurs in the tank, and may increase the flow through the tank from 25 to 50 percent.

## Operation

### *Substitutes for household hazardous wastes*

Although their use is not required, the following substitutes for common household chemicals will reduce the stress on a septic system and the environment.

- **Ammonia-based cleaners:** Sprinkle baking soda on a damp sponge. For windows, use a solution of 2 Tbs. white vinegar to 1 qt. water. Place the mixture into the spray bottle.
- **Disinfectants:** Use Borax: 1/2 cup in a gallon of water; deodorizes also.
- **Drain decloggers:** Use a plunger or metal snake, or remove and clean trap.
- **Scouring cleaners and powders:** Sprinkle baking soda on a damp sponge or add 4 Tbs. baking soda to 1 qt. warm water or use Bon Ami. It's cheaper and won't scratch.
- **Carpet/upholstery cleaners:** Sprinkle on dry cornstarch or baking soda, then vacuum. For tougher stains, blot with white vinegar in soapy water.
- **Toilet cleaners:** Sprinkle on baking soda or Bon Ami, then scrub with a toilet brush.
- **Furniture/floor polishes:** To clean, use oil soap and warm water. Dry with soft cloth. Polish with 1 part lemon juice to 2 parts oil (any kind), or use natural products with lemon oil or beeswax in mineral oil.
- **Metal cleaners:** Brass and copper: scrub with a used half of lemon dipped in salt. Stainless steel: scouring pad and soapy water. Silver: rub gently with toothpaste and soft wet cloth.
- **Oven cleaners:** Quickly sprinkle salt on drips, then scrub. Use baking soda and scouring pads on older spills.
- **Laundry cleaners:** Choose one with a zero phosphate content or use soap flakes with 1/3 cup of washing soda. (Before switching, wash clothes in pure washing soda to remove detergent residues.)

## Maintenance

### *ISF system monitoring and maintenance*

Even though it is not difficult or time consuming, maintenance of intermittent sand filter systems is frequently neglected. It is recommended, therefore, that users of these systems contract to have routine inspections and maintenance performed. A business that specializes in installation and maintenance of such sewage disposal systems can perform the following maintenance for a nominal fee and ensure proper operation of the system for many years.

**CAUTION:** Use proper personal protection equipment such as rubber gloves and clothing that cover parts of the body that will be exposed to sewage or effluent.

### Septic tank

Measurement of the septic tank sludge and scum depths should be done after the first year of installation and approximately every three years thereafter to determine when the septic tank needs pumping.

### Septic tank pump system

The pump system should be inspected annually to ensure it's operating properly. Unscrew the two stainless steel bolts that fasten the fiberglass lid over the pumping equipment. Remove the fiberglass lid for an inspection that includes these steps.

1. Verify that there are no obvious holes or leaks in the riser.
2. Verify that the float cords are neatly wrapped in the riser so that they cannot interfere with the operation of the floats.
3. Verify that the high water alarm works by lifting the top float up.
4. Be sure the liquid level is above the middle "timer off" float for the following test. Turn the septic tank pump on by flipping the MOA switch in the control panel (Figure 4 or 5) to manual. Watch the liquid level inside the screened vault as the pump is running for about 30 seconds. Return the MOA switch to auto. If the liquid level inside the screened vault drops very quickly and activates the low level alarm, the Biotube<sup>®</sup> cartridge may need to be cleaned. Refer to the installation instructions for Screened Pump Vaults in Section 5 if cleaning is necessary.
5. If the control panel has an elapsed time meter (ETM) and/or a cycle counter (CT), read and record these values on the inspection form in Section 3. ETM's and CT's are valuable troubleshooting tools if problems occur with the system.
6. Verify the programmable timer setting is correct. The correct timer setting should be written on the front of this manual.

## Maintenance

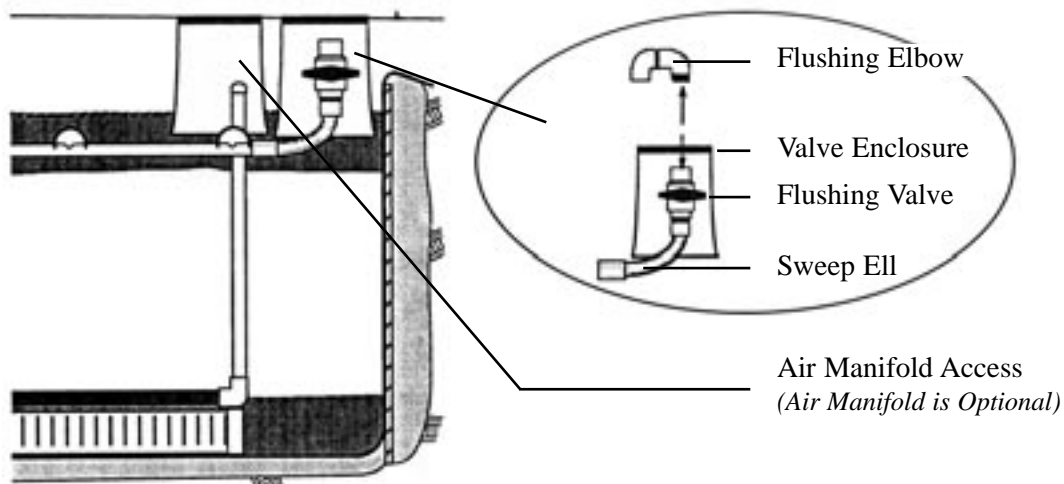
### ISF

The key maintenance objective for the ISF is flushing of the manifold laterals. It is important to flush accumulated solids out of the laterals and keep the distribution orifices (holes) in the manifold clear so that the effluent is spread as evenly as possible over the sand media. Failure to perform lateral flushing will eventually lead to clogging at the top of the sand media.

The end of each lateral (Figure 9) has a cleanout assembly for flushing that should be done annually following these steps.

1. Remove the lid on the flushing valve enclosure at the end of each lateral. Locate the flushing elbow that is in the bottom of one of the enclosures.
2. Thread the flushing elbow onto the outlet of the first flushing valve. Open this valve.
3. In the control panel, flip the MOA (manual/off/auto) switch for the septic tank to manual. The pump should now be running.
4. As soon as the effluent flowing out of the flushing elbow appears clear (this should take only a few seconds), turn off the flushing valve.
5. Quickly move the flushing elbow to the next lateral. Open this valve and flush until the effluent is clear.
6. Repeat step 5 for the remaining laterals. If the redundant off/low level alarm (bottom float) is activated during the flushing, it will be necessary to add water to the tank to finish the flushing.
7. Immediately turn the MOA switch back to auto.

Figure 9: Lateral Cleanout Assembly



## Maintenance

Next, the residual pressure (“squirt”) test that follows should be used to ascertain whether the distribution orifices are clear. A 10 foot long, 3/4 inch diameter, clear PVC pipe with a male adapter glued to one end is necessary to perform these steps accurately.

1. Screw the clear PVC pipe to the end of one of the flushing valves. Maintain the clear pipe in a vertical position. Letting the pipe fall unsupported to the ground may damage the flushing assembly.
2. Open the flushing valve. Have someone turn the pump on. Note: If this test is being done by only one person, turn the pump on before Step 1.
3. Using a tape measure, measure the distance from the bottom of the flushing elbow to the top of the liquid surface in the clear pipe. This measured distance is called the “squirt” height or system residual head.
4. Turn off the pump. Close the flushing valve. Unscrew the clear pipe. Note: If this test is being done by one person, first shut off the flushing valve, then slowly unscrew the clear pipe and allow the effluent in the clear pipe to flow into the flushing valve box before turning off the pump.
5. Compare the measured “squirt” height in Step 3 with the value documented during initial installation of the system. The initial value should be written on the front page of this manual. It might also be found in the control panel or on the underside of the fiberglass lid covering the septic tank pump system.
6. The “squirt” height found in Step 3 should be at least equal to the initial value, but no more than 20% higher.
7. If the “squirt” height is acceptable, be sure all flushing valves are turned off and replace the flushing valve box lids.

If the “squirt” height is found to be excessive, this indicates that too many of the orifices in the distribution manifold are plugged. Clearing of the orifices can be accomplished by one of the following methods:

1. Push a stiff bottle brush (connected to a cleaning snake) down each lateral through its flushing valve assembly.
2. Using a high pressure washer, feed a small diameter “bullet” nozzle through each lateral. The high pressure water coming out of the nozzle will help pull it through the lateral.

The “squirt” test should be performed once more to ensure the cleaning was successful.

## Maintenance

### Sand filter pump basin

The pump system should be inspected annually to ensure it's operating properly. Unscrew the two stainless steel bolts that fasten the fiberglass lid over the pumping equipment. Remove the fiberglass lid for an inspection that includes these steps.

1. Verify that the float cords are neatly wrapped in the top of the basin so that they cannot interfere with the operation of the floats.
2. Verify that the high water alarm works by lifting the top float up.
3. Check that the maximum normal high water level (noted on the front page of this document) is not exceeded in the basin. This can usually be seen as a water mark on the inside of the basin.

### Air manifold kit (optional)

Referring to Figures 7, 8 & 9, an air manifold may have been installed during initial installation for use in renovating a failing ISF or helping the ISF perform during one or more of the following possible problem situations:

1. Clogging due to abuse of the system, resulting in hydraulic or biological overload.
2. Clogging due to poor quality sand. Note: An air manifold should NEVER be used as justification for allowance of poor quality sand.
3. Poor effluent quality due to extremely cold weather.
4. Insufficient oxygen resulting from burying the sand filter too deep, covering the sand filter with dense or otherwise impermeable material, or compaction of the cover material.

A small compressor is attached to the air line under the air manifold access lid. In some cases, it may be necessary to only run the compressor for a few days or few weeks for a successful renovation. If it is necessary to leave a compressor running continuously, a small linear compressor that draws only 2 amps is most cost-effective. Contact Orenco Systems, Inc. or its representative for more information on operating air manifolds. After the sand is renovated, be sure to fix the cause. If poor quality sand was the culprit, removal and replacement of the upper 12" of sand will be required.



## Maintenance

### Troubleshooting chart

The following troubleshooting chart describes most of the common problems found in ISF systems.

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Infrequent short duration alarms	Excessive water usage from too many loads of laundry done at once, large parties, leaving a water fixture running	Spread laundry loads out over the day or several days. Occasional parties will not harm the system—the alarm simply alerts the user that the system is getting more water than it is designed to handle on a regular basis.
Frequent short duration alarms (every day or almost every day)	Water usage beyond what the system is designed to handle  PT not set properly to handle acceptable daily flow.  Top two floats set too close to one another.  Screened Vault filter clogged	Reduce water usage. Check for leaking plumbing such as faucets and toilets. Check for possible infiltration into septic tank.  Reset PT to acceptable range.  Reposition floats to correct settings.  Clean Screened Vault
Short duration alarms only during storms or very wet periods	Infiltration from leaky septic tank, plumbing, or stormwater connections.	Find and fix leaks. Unhook undesirable connections.
Continuous high water alarm		
Continuous low level alarm		

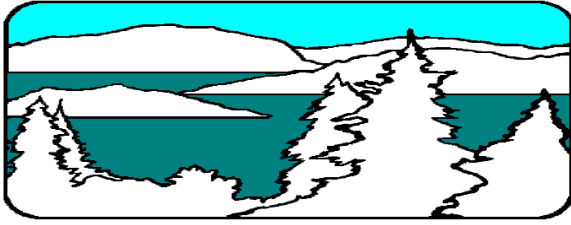


## Appendix A

## **Appendix B**

## Appendix C

## Appendix D



Health & Community Services  
**San Juan County**

P.O. Box 607 ♦ 145 Rhone, Friday Harbor, WA 98250  
Phone: (360) 378-4474 Fax: (360) 378-7036

## YOUR HOME SEWAGE SYSTEM A Homeowners Maintenance Guide

### SYSTEM DO'S

*To extend the life of your on-site sewage system, save on maintenance costs, and protect water quality:*

**1. Inspect your septic tank annually.**

Generally, septic tanks should be pumped every three to five years. Inspection, by you or a professional, may show that you need to pump more or less often. Regular pumping ensures that solids will not flow from the septic tank into the drainfield. Solids can destroy the drainfield, and pumping will not bring a failed drainfield back to life.

**2. To reduce household water usage:**

\*Use water-saving bathroom and kitchen fixtures (faucets, showers, toilets).

\*Run and drain appliances, such as dishwashers and washing machines, one at a time.

\*Spread laundry over the entire week and avoid partial loads.

\*Fix all faucet and toilet leaks promptly.

**3. Direct water from downspouts and roofs away from the drainfield.**

Water from these sources can cause the drainfield to work improperly.

**4. Keep cars and trucks off the septic tank and drainfield areas.**

This prevents pipes from breaking and soil from becoming compacted. Compacted soils do not readily absorb water from the drainfield.

**5. Use phosphate-free detergent.**

Phosphate-free detergents help prevent algae problems in nearby ponds, lakes & streams.

## SYSTEM DON'TS

*To keep your on-site sewage system in proper working order, keep these things in mind:*

**6. Don't use a garbage disposal.**

A garbage disposal adds solids and grease to the system which may lead to drainfield failure.

**7. Don't use septic tank additives or "miracle" system cleaners:**

Some of these chemicals can actually harm the on-site sewage system by allowing solids to flow into and clog the drainfield. Chemical additives can also contaminate ground and surface water.

**8. Don't dispose of water from hot tubs into the on-site sewage system.**

The large amount of water is harmful to the system, and the chlorine can destroy important bacteria in the system. Drain hot tubs onto the ground, away from the drainfield and not into a storm drain.

**9. Don't flush solid wastes into the on-site sewage system.**

These include diapers, cigarette butts, coffee grounds, tampons, condoms, and grease.

**10. Don't put strong chemicals, such as cleaning products, down the drain.**

Household chemicals such as drain cleaners, paint and paint thinners, floor and sink cleaners and excessive amounts of bleach can destroy important bacteria in the septic tank and contaminate ground and surface water.

**11. Don't construct patios, carports, or use landscaping plastic over the drainfield.**

Grass is the best cover for the septic tank and drainfield. Soil compaction and paving prevents oxygen from getting into the soil. This oxygen is needed by bacteria to break down or treat sewage.