

# Biotube<sup>®</sup> EasyPak<sup>™</sup> Design Criteria

## **System Description**

Orenco's EasyPak<sup>™</sup> pumping systems are designed for pumping effluent from a dosing tank that is separate from the septic tank. The EasyPak pump vault includes three Biotube<sup>®</sup> effluent filter cartridges that filter out solids, so that only clear effluent is pumped out of the dosing tank. This reduces biological loading and clogging of downstream components, saving money on O&M and extending the life of drainfields, secondary treatment systems, and other parts of the septic system.

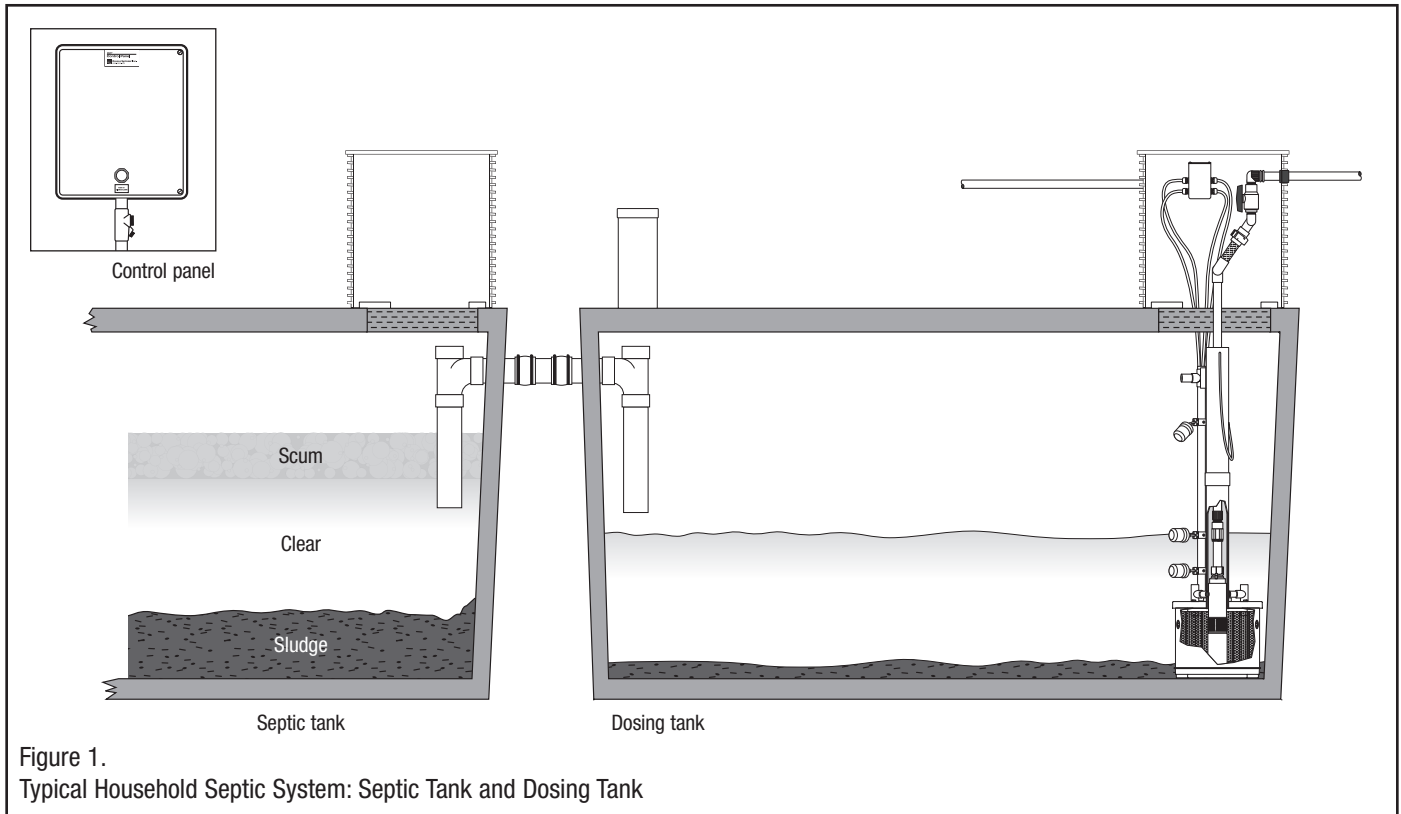


Figure 1 shows a typical household system with a septic tank and dosing tank. Raw sewage enters the septic tank and separates into three distinct zones: a scum layer, a clear layer, and a sludge layer. An outlet tee from the septic tank allows effluent from the clear layer to flow into the dosing tank. The EasyPak pump package in the dosing tank pumps filtered effluent to the drainfield or other downstream component.

## Pumping System

Figure 2 shows the components of an EasyPak pumping system for a dosing tank.

1. **Riser and lid** (ordered separately from EasyPak package) — The riser and lid on the dosing tank provide access to the pumping equipment.
2. **Splice box** — In the electrical splice box, wires from the control panel are spliced with the cords from the pump and float switches.
3. **Biotube PVEP Pump Vault** (with three filter cartridges) — A specially configured pump vault with filter allows pumping from the bottom half of the dosing tank.
4. **Orenco 4-in. turbine effluent pump** — A 4-in. turbine effluent pump moves the effluent to the distribution point. (See Appendix 1.)
5. **Float switch assembly** — Float switches affixed via float collars to a quick-disconnect float stem are mounted onto the pump vault to monitor and control the liquid level inside the dosing tank.
6. **Discharge plumbing assembly (DPA)** — A discharge plumbing assembly connects the pump to the point of discharge from the dosing tank. (See Appendix 3.)
7. **Control panel** — A control panel to govern the operation of the pump is mounted within sight of the pump system. (See Appendix 2.)

## Package Selection

All EasyPak pump packages are available in both demand-dose and timed-dose applications. There are two basic packages, based on dose method and flow rate:

1. **Demand-dose** — The typical package for demand-dose systems is the BEP10DD.

The BEP10DD accommodates flows up to 10 gpm (15 gpm without ¼-in. flow control) and can be used to pump from a dosing tank to a gravity drainfield (distribution box, hydrosplitter, etc.). BEP30DD and BEP50DD systems are available for demand-dose applications that require flows greater than 15 gpm.

2. **Timed-dose** — The typical package for timed-dose systems is the BEP30TDD.

The BEP30TDD accommodates flows up to 40 gpm and can be used for pumping from a dosing tank to a final dispersal area (pressurized drainfield, sand filter, etc.). BEP10TDD systems are available for timed-dose applications with flows of 10 gpm or less, such as drip irrigation. BEP50TDD systems are available for timed-dose applications that require flows of 40 gpm or more, such as large, pressurized drainfields.

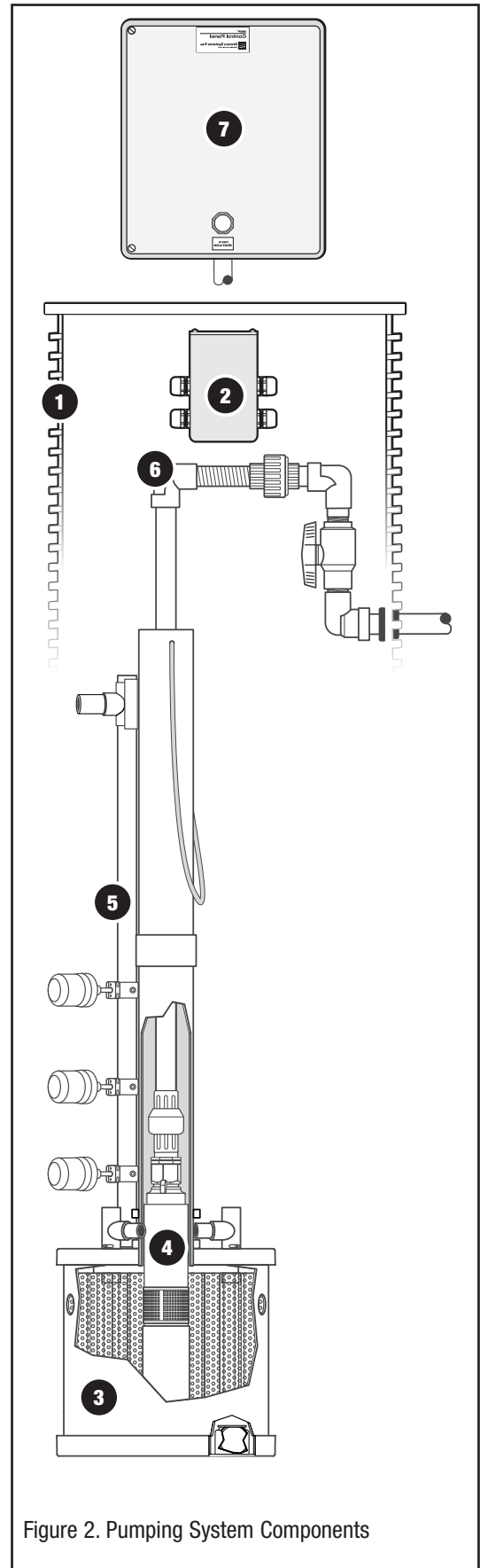


Figure 2. Pumping System Components

## Design Tools

The EasyPak Design Aid CD-ROM allows system designers and specifiers to select the correct system for the application. When information about the drainfield or sand filter is entered, a PumpSelect™ program, which has been specially designed for EasyPak, calculates the pump flow rate and TDH required for the system. For help in calculations, see Appendix 3 in this document, “Headloss in Discharge Assemblies.”

## Standard EasyPak™ Packages

Demand Dose			Timed Dose		
Model Code	Discharge	Maximum Flow Rate	Model Code	Discharge	Maximum Flow Rate
BEP10DD	Standard	15 GPM	BEP10TDD	Standard	15 GPM
BEP10DD-DB	Drainback	15 GPM	BEP10TDD-DB	Drainback	15 GPM
BEP10DD-CW	Cold Weather	15 GPM	BEP10TDD-CW	Cold Weather	15 GPM
BEP30DD	Standard	40 GPM	BEP30TDD	Standard	40 GPM
BEP30DD-DB	Drainback	40 GPM	BEP30TDD-DB	Drainback	40 GPM
BEP30DD-CW	Cold Weather	40 GPM	BEP30TDD-CW	Cold Weather	40 GPM
BEP50DD	Standard	65 GPM	BEP50TDD	Standard	65 GPM
BEP50DD-DB	Drainback	65 GPM	BEP50TDD-DB	Drainback	65 GPM
BEP50DD-CW	Cold Weather	65 GPM	BEP50TDD-CW	Cold Weather	65 GPM

## Accessory Equipment

The following products may be required to complete the package:

- Access Risers with Fiberglass Lids
- Riser Tank Adapters with Bolt-Down Kit
- Adhesives
- Anti-Siphon Valve
- Grommets

See Orenco's *General Onsite Products Catalog* to order these products.

## Appendix 1: 4-in. Turbine Pumps

In onsite wastewater and pressure distribution systems, Orenco's 4-in. turbine effluent pumps are commonly used because of several advantages they offer compared with other types of pumps in those applications:

1. **High cycle life.** Orenco 4-in. turbine pumps regularly reach lifetime cycle counts of more than one million.
2. **Scouring velocity.** Orenco 4-in. turbine pumps provide more than sufficient energy to flush laterals and help keep orifices clear.
3. **Pump run-dry.** The pump has 24 hr run-dry capability with no deterioration in pump life or performance.
4. **Durable operation.** Orenco 4-in. turbine pumps can operate for extended periods in the "no discharge" condition or at heads greater than the maximum "shut-off" head.
5. **Ease of maintenance.** A ½-hp turbine pump weighs about 25 lb and can be removed by one person for maintenance or repairs without the need for a lifting mechanism.
6. **Excellent abrasion and corrosion resistance.** Orenco's pumps are constructed entirely of 300-series stainless steel and thermoplastics.

## Appendix 2: Control Panels

Orenco's EasyPak simplex control panels provide pump control based on dose method. Demand-dose panels are specifically engineered for pumping from dosing tanks into such applications as conventional gravity systems. Timed-dose panels are specifically engineered for applications that require programmable timers, such as pressurized drainfields and secondary treatment systems. Shared features of both control panels include the following:

- Motor-start contactor for increased system life
- 20A Auto/Off/Manual toggle switch for easy troubleshooting and maintenance.
- Resettable control circuit breaker that negates the need for easily lost or forgotten fuses
- Discrete, touch-safe terminal locations for simple, intuitive pump and float wiring
- Fiberglass enclosure, for increased durability over plastic
- Easily accessed external "Push to Silence Alarm" button, for homeowner control over audible alarms

Demand-dose panels include the following features:

- Audible and visual alarms to signal high level conditions.
- Audible alarm silence relay keeps the audible alarm off until power is removed then restored.
- Auto reset feature resets the alarm when the tank liquid level returns to normal

Timed-dose panels include the following features:

- Choice of digital or analog timers
- Digital timing is accurate to within 1%
- Multiple timer settings allow for optimum dosing during both normal and peak flow conditions
- Built-in programming keys for adjusting timer settings in the field without a portable computer
- Built-in elapsed time meter and counters
- Audible and visual alarms to signal high level and low level conditions
- High and low-level alarm conditions differentiated by steady or blinking light
- Silenced alarms automatically reactivated after 12 hours if condition is not corrected
- Timed delays on float inputs to prevent chattering
- Visual indicators of float position

### Appendix 3: Headloss in Discharge Assemblies

Headlosses through discharge assemblies are very difficult to calculate theoretically because of the interdependence of the various types and positions of fittings and valves. Simple addition of K values for fittings and valves gives very inaccurate results. Empirically derived equations and curves for specific types of discharge assemblies are much more accurate. Equations for headlosses through discharge assemblies of the type illustrated in Figure 2 are shown in Table 2. These equations are developed by measuring actual headlosses that occur under operating conditions.

**Table 2. Headloss Equations for Selected Discharge Assemblies**

Nominal Pipe Diameter	Model Number	Equation*
1-inch	HV100BC	$H_L = 0.044 Q^2$
1 1/4-inch	HV125BC	$H_L = 0.007 Q^2$
2-inch	HV200BC	$H_L = 0.002 Q^2$

\*  $Q$  = flow