John Elias Baldacci
Governor

Maine Department of Health and Human Services

Maine Center for Disease Control and Prevention
286 Water Street, 3rd Floor
11 State House Station
Augusta, ME 04333-0011

Brenda M. Harvey,
Commissioner

Dora Anne Mills, MD, MPH
Public Health Director
Maine CDC Director

July 20, 2006

Orenco Systems, Inc.
Attn.: Sam Carter, GRM
814 Airway Avenue
Sutherlin, OR 97479

Subject: Product Registration, Orenco Systems, Inc. **Biotube Effluent Filters**

Dear Mr. carter:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules, for code registration, for use in Maine.

Product Description

The Orenco Systems, Inc. **Biotube Effluent Filters** consists of three series: Residential, Commercial, and External Basin.

The Residential series is comprised of 4 inch Biotube effluent filter, 4 inch Biotube Jr., and 8 inch and 12 inch Base Inlet inserts (for use with existing plastic tee outlets). The Commercial series is comprised of 8, 12, and 15 inch Biotube effluent filters, and 12 and 15 inch Bitoube effluent filters with an integral slide rail to accommodate adjustments in elevation. The External Basin consists of a an 18 diameter plastic cylinder with an 8 inch Biotube effluent filter, and is installed between the septic tank outlet and the point of disposal. The Biotube filters are comprised of a series of proprietary perforated plastic tubes, arranged in parallel around a vertical axis.

Claim

According to the information you provided, the Orenco Systems, Inc. **Biotube Effluent Filters** reduce suspended solids in septic tank effluent by approximately 66 percent.

Determination

On the basis of the information submitted, the Division has determined that the Orenco Systems, Inc. **Biotube Effluent Filters** are acceptable for use in the State of Maine, provided that they are installed, operated, and maintained in conformance with the manufacturer's directions.

In the event that the product fails to perform as claimed by the applicant, use of the product in Maine, including all installations approved pursuant to Chapter 18 of the Rules, shall cease. Use of the product shall not resume until the applicant and the Division have reached a mutually acceptable agreement for resolving the failure to perform as claimed.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Orenco Systems, Inc. **Biotube Effluent Filters**. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Wastewater and Plumbing Control Program
Division of Health Engineering
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

June 28, 2006

Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479

TOLL FREE:
(800) 348-9843

TELEPHONE:
(541) 459-4449

FACSIMILE:
(541) 459-2884

WEB SITE:
www.orenco.com

Russell G. Martin, P.E.
Maine Division of Environmental Health
Department of Health & Human Resources
Maine Center for Disease Control and Prevention
Division of Environmental Health
11 State House Station
Augusta, ME 04333

RE: Orenco Systems, Inc. Products Approval Request

Dear Mr. Martin:

Please accept this letter as a formal request to approve the following products as manufactured by Orenco Systems, Inc. for General use in the State of Maine. I have enclosed information on each product line to support this request for approval.

AdvanTex® Treatment System

Orenco Systems Inc. has been conducting research and development on packed bed filters for over 25 years. Our efforts have produced the AdvanTex® Treatment System. AdvanTex incorporates a non-woven textile as the substrate for an attached growth (fixed film) treatment process. The textile media incorporates the best process treatment features of the Intermittent and Recirculating Sand Filters into one compact unit. The AdvanTex - AX filter system will significantly reduce BOD_5, TSS and Total Nitrogen in residential strength wastewater to levels that meet advanced wastewater treatment standards.

Enclosed you will find an Approvals Binder that includes an Approvals Summary, Frequently Asked Questions, Treatment System Overviews, Drawings, Design Criteria, AdvanTex Treatment System Performance Summary, Warranties, Installation Instructions, and Operation and Maintenance Procedures. Included in the appendix is information on the history of packed bed filters, as well as technical papers on textile packed bed filters.

Fiberglass Tank

Orenco's injection-molded, watertight tanks have been optimized for use in onsite wastewater collection and treatment systems (residential and commercial) and in communitywide effluent sewer systems. Tanks are made of fiberglass-reinforced polyester for durability, and injection-molded for unmatched part quality and consistency. Two sizes are available 1000-gallon and 1500-gallon.

Enclosed you will find an Orenco Fiberglass Tank Approvals Binder that includes drawings and detail sheets, installation instructions, and structural analysis.

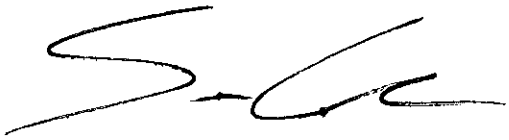
Biotube® Effluent Filters
Orenco's FT-Series Biotube effluent filters are used in new or existing tanks, for both residential and commercial applications. Each filter comes with a Biotube filter cartridge (in 4-, 8-, and 15-in. diameters), PVC housing, and extendible PVC handle. A shortened version of our standard 8- and 12-in. diameter filters, called a "base inlet filter", is available for low-profile tanks.

Enclosed you will find an Orenco Effluent Filter Folder that includes product sheets, drawings, and sizing information.

I have also enclosed a general Product Catalog that covers all the products Orenco Systems, Inc. manufactures which may require approval of some sort. Understandably you may need additional or more specific information on any of these products, that I would be happy to send you.

Please feel free to contact me to discuss what additional information you may need or if you have any questions.

Best Regards,



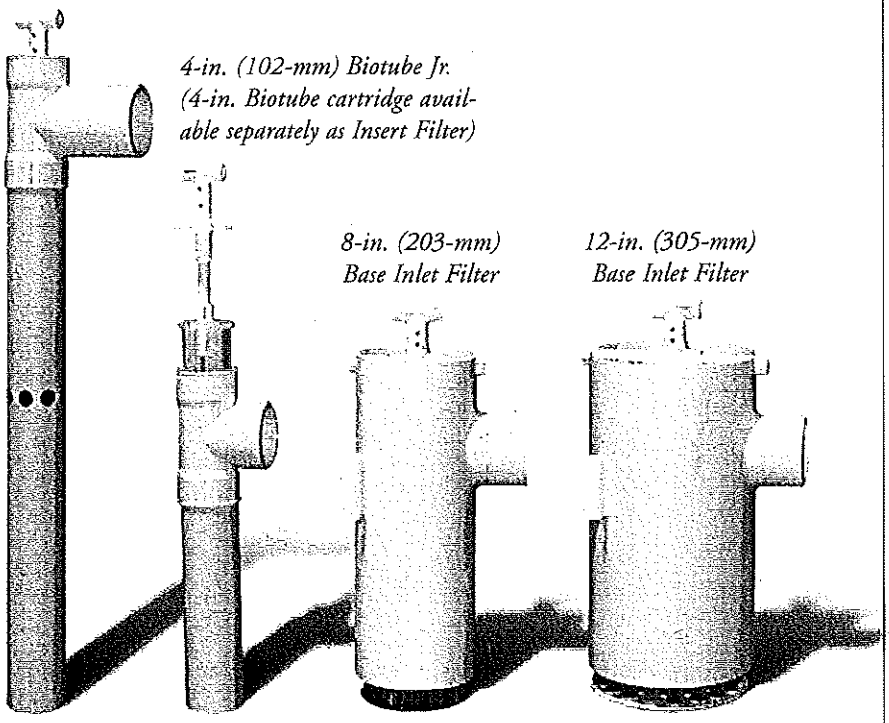
Sam Carter
Government Relations Manager
Orenco Systems, Inc.
1-800-536-4192
scarter@orenco.com

Residential Biotube® Effluent Filters

Applications

Our patented* 4-in. (102-mm) Biotube Effluent Filters, Biotube Jr., Biotube Insert Filters, and Biotube Base Inlet Filters are ideal for residential septic tanks and have a lifetime warranty. They prevent large solids from leaving the tank, dramatically improving wastewater quality and extending the life of residential drainfields.

4-in. (102-mm) Biotube Effluent Filter



4-in. (102-mm) Biotube Jr. (4-in. Biotube cartridge available separately as Insert Filter)

8-in. (203-mm) Base Inlet Filter

12-in. (305-mm) Base Inlet Filter

Orenco's superior effluent filters resist clogging better than all other brands. Our standard, full-sized 4-in. (102-mm) Biotube Effluent Filter provides maximum long-term protection in a complete package, with housing. Our 4-in. (102-mm) Biotube Jr., at half the size of our standard model, has more filtering capacity than the full-sized filters sold by other manufacturers. For tanks with existing outlet tees, the Biotube Insert Filter is ideal. And for low-profile tanks, there's the Base Inlet Filter.

* Covered by patent numbers 5,492,635 and 4,439,323

To Order

Call your nearest Orenco Systems®, Inc. distributor. For nearest distributor, call Orenco at 800-348-9843 or go to www.orenco.com and click on "Distributor Locator."

APS-FT-1
Rev. 3.2 © 2/05
Orenco Systems®, Inc.

Standard Features & Benefits

- Has 5-10 times more flow area than other brands, so lasts many times longer between cleanings, increasing homeowner satisfaction
- Installs in minutes inside new or existing tanks; extendible tee handle for easy removal
- Easy to clean by simply hosing off whenever the tank needs pumping
- Removes about two-thirds of suspended solids, on average, extending drainfield life
- Corrosion-proof construction, to ensure long life
- Lifetime warranty

Optional Features & Benefits

- Alarm available, to signal the need for cleaning
- Flow modulating discharge orifices available to limit flow rate leaving tank, mitigating surges and increasing retention time
- Custom and commercial sizes available

Biotube Filtering Process

Effluent from the relatively clear zone of the septic tank, between the scum and sludge layers, horizontally enters the Biotube Effluent Filter. Effluent then enters the annular space between the housing and the Biotubes, utilizing the Biotubes' entire surface for filtering. Particles larger than the Biotube's mesh are prevented from leaving the tank.

Orenco Systems®
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www.orenco.com

Nomenclatures

4-in. Biotube Filter (standard)

FT □ □ 04 □□-□□ □

- Options: Blank = no options; M = flow modulation plate installed; A = float bracket attached
- Cartridge height: 28" and 36" are standard
- Housing height: 36" and 44" are standard
- Filter diameter (inches)
- W = fits Type 3034 outlet pipe; S = fits Schedule 40 outlet pipe
- Blank = 1/8" filtration; P = 1/16" filtration
- Biotube effluent filter series

8-, 12-in. Biotube Filter (base inlet model)

FT □ □□ 22-14 B □

- Options: A = float bracket
- Base inlet model
- Cartridge height: 14" standard
- Housing height: 22" standard
- Filter diameter (inches): 08 = 8"
- Blank = 1/8" filtration; P = 1/16" filtration
- Biotube effluent filter series

4-in. Biotube Jr. (includes cartridge and housing)

FT J □ □ 04 18 □

- Options: Blank = no options; M = flow modulation plate installed; A = float bracket attached
- Cartridge height (inches)
- Filter diameter (inches)
- W = fits Type 3034 outlet pipe; S = fits Schedule 40 outlet pipe
- Blank = 1/8" filtration; P = 1/16" filtration
- Junior series
- Biotube effluent filter series

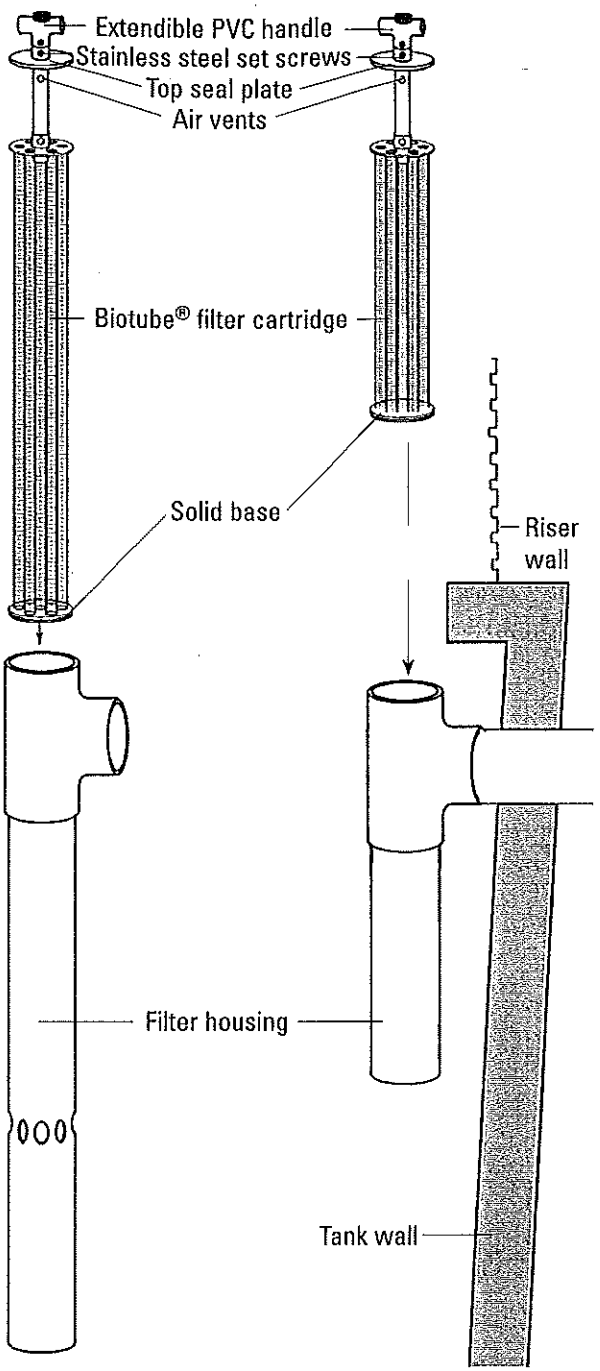
4-in. Biotube Filter Insert (cartridge only)

FT i □ 04 18 - □ - □

- For customized options (e.g., NC indicates North Carolina regions)
- W = fits Type 3034 outlet tee; S = fits Schedule 40 outlet tee
- Cartridge height (inches)
- Filter diameter (inches)
- Blank = 1/8" filtration; P = 1/16" filtration
- Insert
- Biotube effluent filter series

4-in. Biotube Effluent Filter

4-in. Biotube Jr.



Distributed By:

Commercial Biotube® Effluent Filters

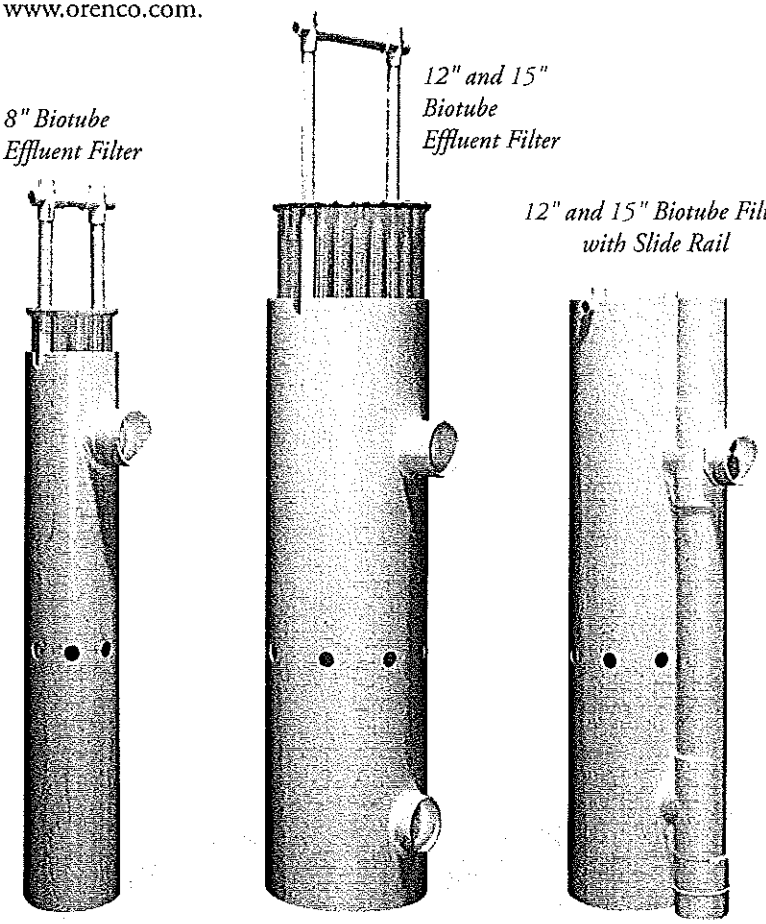
Applications

Our patented* Biotube® Effluent Filters in 8", 12", and 15" diameter sizes are ideal for large residential, commercial, and community applications. They prevent large solids from leaving the tank, dramatically improving wastewater quality and extending the life of downstream treatment systems. For more information, see our "Filter Facts" document, AFL-FT-2-PRN, which is available on our online document library at www.orenco.com.

8" Biotube Effluent Filter

12" and 15" Biotube Effluent Filter

12" and 15" Biotube Filter with Slide Rail



Orenco's commercially-sized effluent filters are the only effluent filters on the market capable of handling large wastewater flows. Standard models have up to 52 ft² of filter area, to resist clogging while providing maximum long-term protection. Large filter area increases the time between cleanings.

**Covered by patent numbers 5,492,635 and 4,439,323*

To Order

Call your nearest Orenco Systems®, Inc. distributor. For nearest distributor, call Orenco at 1-800-348-9843 or go to www.orenco.com and click on "Distributor Locator."

APS-FTL-1
Rev. 4.0 © 7/04
Orenco Systems®, Inc.

Standard Features & Benefits

- The only large, commercial-size effluent filter available
- Removes about two-thirds of suspended solids, on average, extending drainfield life
- Flow modulating discharge orifices to limit flow rate leaving tank, mitigating surges and increasing retention time
- Extendible cartridge handle, simplifies filter removal
- Easy to clean by simply hosing off filter cartridge
- Corrosion-proof construction, to ensure long life

Optional Features & Benefits

- Alarm available, to signal the need for cleaning
- Slide Rail System available, required when there is only one tank access to the effluent filter compartment
- Multiple filters may be used to accommodate larger flows

Biotube Filtering Process

Effluent from the relatively clear zone of the septic tank, between the scum and sludge layers, horizontally enters the Biotube Effluent Filter through inlet holes in the housing. Effluent then enters the annular space between the housing and the Biotubes, utilizing the Biotubes' entire surface for filtering. Particles larger than the Biotube's mesh are prevented from leaving the tank.

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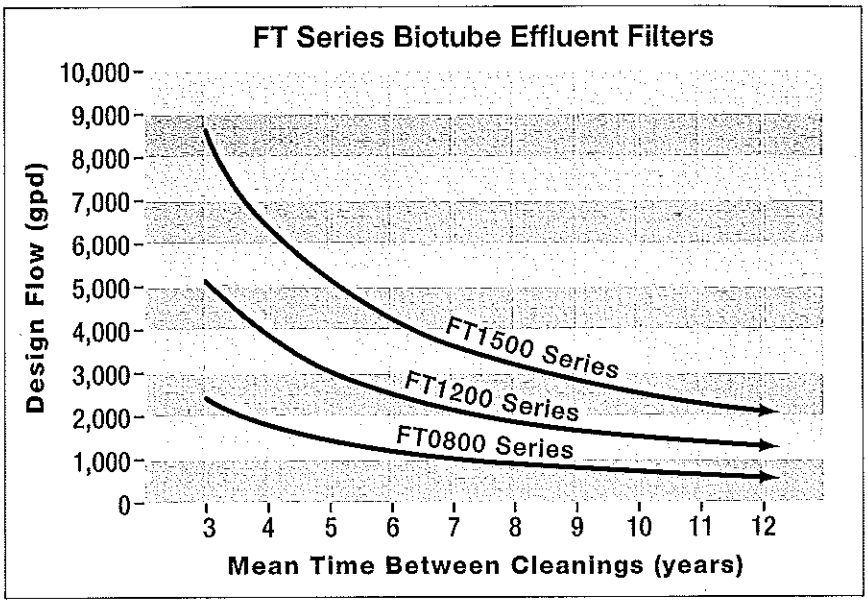
www.orenco.com
www.vericomm.net

Select Biotube Filter to Match Design Flow and Desired Cleaning Interval

This chart shows the relationship between Biotube Filter size (diameter), design flow, and mean time between cleanings. The larger the filter and the smaller the flow, the longer you can go between cleanings. For example, a typical 3-year cleaning frequency would require an 8" filter for up to 2500 gpd, a 12" filter for up to 5000 gpd, and a 15" filter for up to 8500 gpd. See NDA-FT-FT-1, "Biotube Effluent Filter Sizing," for more sizing information.

Modulating orifice calculations are also required for applications with large surge flows. Contact Orenco for assistance.



Model Codes for Ordering

FT ☐ ☐☐ ☐☐ - 36 ☐

Options:
R = slide rail (12" and 15" only)*

Cartridge height, 36" standard

Housing height (inches)
48 = when minimum liquid level is 37" - 46" (8" diameter only)**
54 = when minimum liquid level is 46" - 63"**
60 = when minimum liquid level is 64" - 84"**
66 = when minimum liquid level is 85" - 112"**

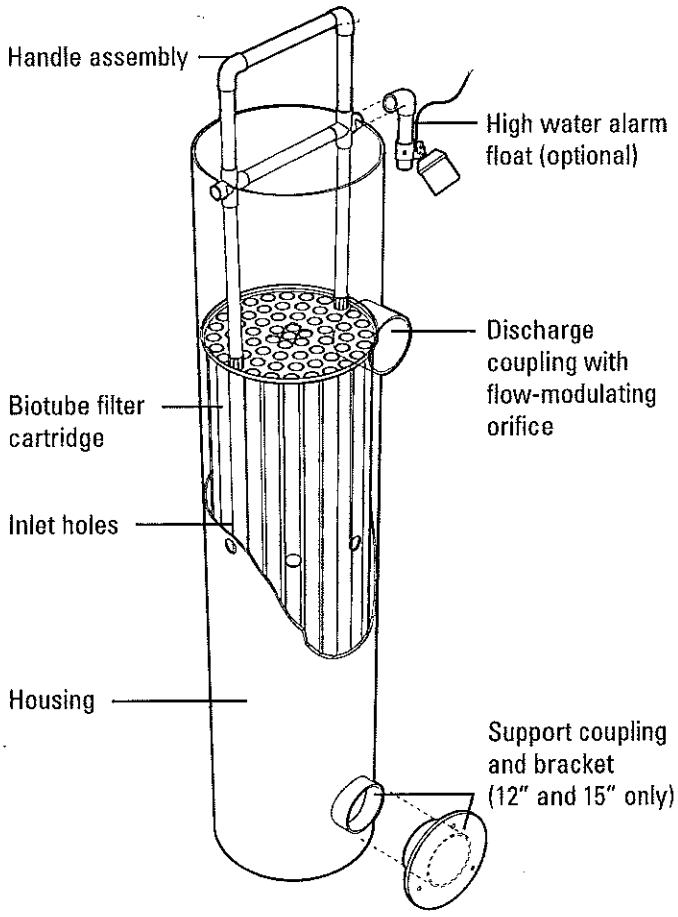
Filter diameter (inches):
08 = 8"
12 = 12"
15 = 15"

Blank = 1/8" filtration
P = 1/16" filtration

Biotube effluent filter series

* Use the slide rail when only one access is available for the filter chamber
** Minimum liquid level is measured from the invert of the outlet to the tank floor

8", 12", and 15" Biotube Effluent Filter

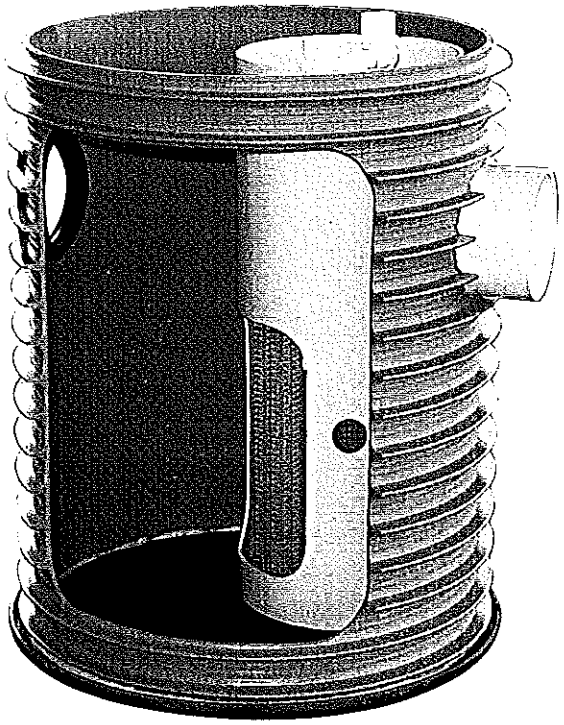


Distributed by:

18-in. External Effluent Filter Basin

Applications

Orenco's 18-in. (457-mm) External Effluent Filter Basin, featuring patented* Biotube® filter technology, is an ideal way to improve performance of existing residential septic systems by reducing solids discharge to the drainfield. External Filter Basins eliminate the need to make costly, and sometimes hazardous, modifications to existing septic tanks with restrictive access openings or to unusable outlet baffles or tees.



Orenco's External Effluent Filter Basins are the best solution for retrofitting existing residential septic systems. The 8-in. (203-mm) diameter Biotube® Filter has more than 800 in.^{2} of filter area, to resist clogging while providing maximum long-term protection.

*Covered by U.S. patent numbers 5,492,635 and 4,439,323

Standard Features & Benefits

- Complete packaged kit ready to install; reduces cost and simplifies installation
- Removes approximately two-thirds of suspended solids, on average
- Flow control discharge orifices limit the flow rate leaving the basin
- Extendible cartridge handle simplifies filter inspection
- Basin can be extended to match depth of existing tank outlet
- Large filter area resists clogging and increases cleaning intervals
- Easy to clean by simply hosing off filter cartridges
- Corrosion-proof construction ensures long life

Biotube Filtering Process

Effluent from the relatively clear zone of the septic tank, between the scum and sludge layers, enters the Biotube Effluent Filter through inlet holes in the filter housing. Effluent then enters the annular space between the housing and the Biotubes, utilizing the entire surface for filtering. Particles larger than the mesh of the Biotube are prevented from leaving the tank.

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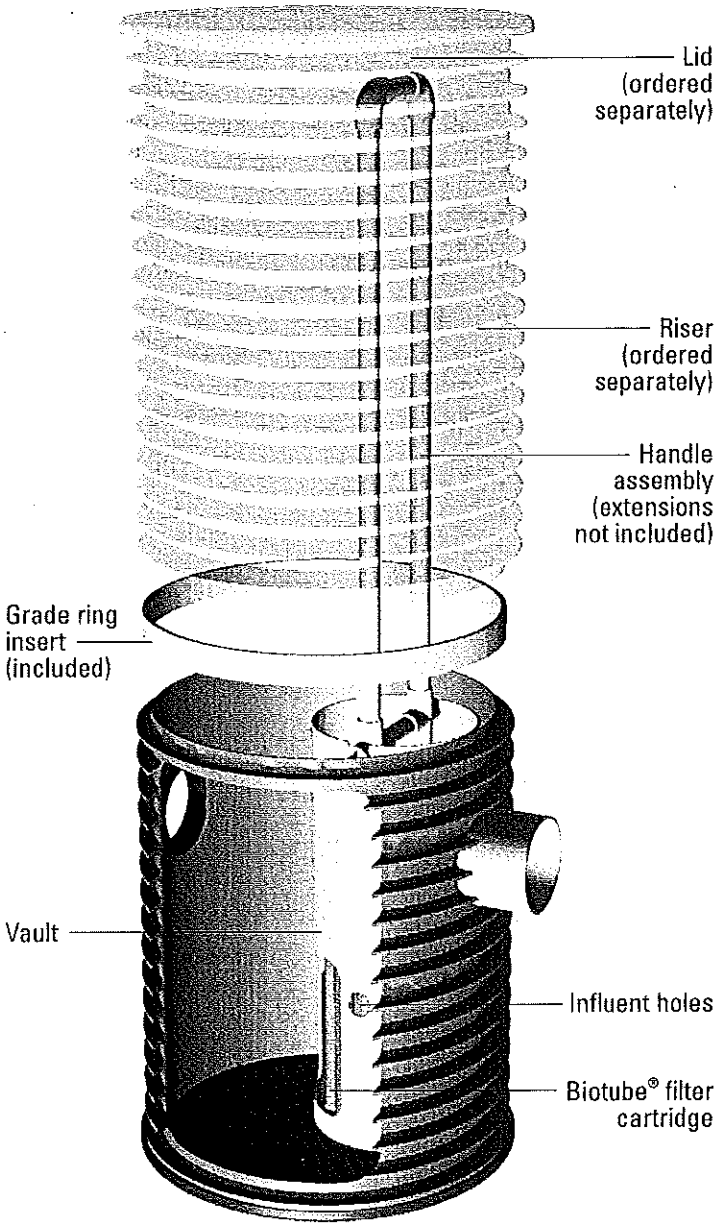
800-348-9843
www.orenco.com

Model Codes for Ordering

18-in. External Effluent Filter Basin

FTB 1824 - 0812

- FTB: Biotube effluent filter basin
- 18: Basin diameter: 18" standard
- 24: Basin height: 24" standard
- 08: Filter diameter: 8" standard
- 12: Filter cartridge height: 12" standard



Effluent Filter Basin with Extension to Grade

To Order

Call your nearest Orenco Systems, Inc. distributor.
For nearest distributor, call Orenco at 800-348-9843 or go to www.orenco.com and click on "Distributor Locator."

Distributed By:

Design Aid

Biotube® Effluent Filter Sizing

Orenco Systems® Incorporated
1-800-348-9843

Orenco has developed guidelines for calculating the correct sizing of and cleaning frequencies for effluent filters, based on decades of experience as well as monitoring data from thousands of effluent filter installations.*

While these guidelines may not be accurate for every wastewater system, they will be relevant to most situations. (See "Filter Facts," AFL-FT-2, for more information.)

Guidelines were based on the following criteria:

Watertightness

A completely watertight septic tank must be used. If either infiltration or exfiltration is present, there is no way to accurately determine filter sizing.

Hydraulic Retention Time

Residential flows — A septic tank capacity of at least 1000 gallons is used for systems handling flows from a single-family residence of three bedrooms or less. A septic tank capacity of at least 1500 gallons is used for 3-bedroom homes with garbage disposals and for systems handling flows from a single-family residence with more than three bedrooms, up to flows of 600 gpd.

Larger flows — Adequate septic tankage will anaerobically digest organic material, remove settleable and floatable solids, help modulate flow, and consistently discharge effluent that meets "primary treatment" standards.

A septic tank capacity of at least three times the daily design flow is used for systems handling flows greater than those of a single-family home.

After conducting extensive research on septic tankage, Orenco has found that smaller tankage will result in suboptimal effluent quality and more frequent septage pumping. For Orenco's tank sizing recommendations for various applications, see "Primary Tank Sizing," NDA-TNK-1 and "Septic Tank Sizes for Large Flows," NTP-TNK-TRB-2.

Waste Strength

Residential strength wastewater that has been through primary treatment is used. This is equivalent to what Crites and Tchobanoglous describe as "expected effluent wastewater characteristics from a residential septic tank without ... effluent filter" (*Small and Decentralized Wastewater Management Systems*, Table 4-16, p. 183). Here are the parameters:

BOD = 180 mg/L

TSS = 80 mg/L

Oil & Grease = 25 mg/L

Sizing Equations

$A_F = C_f\,(Q)\,(MTBC)$

where:

A_F = Filter area required (ft^2)

C_f = Filter coefficient $\left(\frac{ft^2}{gpd \cdot yr}\right)$

Q = Daily flow in gallons (gpd)

MTBC = Mean time between filter cleaning (years)

The filter coefficient, C_f, is equal to 0.0044 when actual or true daily flow rates are used. A value of 0.002 is applicable if design flow is used. The design flow is defined as a peak flow that allows for a safety margin and is typically about twice the actual flow. All values are based on a filter surface area with approximately 30% or more open or "flow" area.

Actual Flow Equation:

$A_F = 0.0044\,(Q)\,(MTBC)$
(for calculations based on "actual flows")

Design Flow Equation:

$A_F = 0.002\,(Q)\,(MTBC)$
(for calculations based on "design flow" as defined above)

If a kitchen garbage disposal is used, more frequent filter maintenance may be required, due to the additional solids loading. Kitchen garbage disposals contribute an additional 36% (approximately) to the level of solids loading. Increasing the filter area by 36% gives better approximations for sizing and cleaning frequencies when garbage disposals are used.

Sizing filters for systems larger than single family dwellings is more complicated. For systems larger than single family dwellings, utilizing proper tankage and not exceeding residential strength wastewater, filter sizing using the given equations is valid. Systems having less than three times the daily design flow in storage require more conservative filter sizing to prevent the need for frequent cleaning.

**Orenco's effluent filter performance data is so extensive that Dr. George Tchobanoglous, co-author of Small and Decentralized Wastewater Management Systems, used that data to help develop his findings on effluent filters.*

Design Aid

Biotube® Effluent Filter Sizing

Orenco Systems® Incorporated
1-800-348-9843

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While these guidelines may not be accurate for every wastewater system, they will be relevant to most situations. (See "Filter Facts," AFL-FT-2, for more information.)

Guidelines were based on the following criteria:

Watertightness

A completely watertight septic tank must be used. If either infiltration or exfiltration is present, there is no way to accurately determine filter sizing.

Hydraulic Retention Time

Residential flows — A septic tank capacity of at least 1000 gallons is used for systems handling flows from a single-family residence of three bedrooms or less. A septic tank capacity of at least 1500 gallons is used for 3-bedroom homes with garbage disposals and for systems handling flows from a single-family residence with more than three bedrooms, up to flows of 600 gpd.

Larger flows — Adequate septic tankage will anaerobically digest organic material, remove settleable and floatable solids, help modulate flow, and consistently discharge effluent that meets "primary treatment" standards.

A septic tank capacity of at least three times the daily design flow is used for systems handling flows greater than those of a single-family home.

After conducting extensive research on septic tankage, Orenco has found that smaller tankage will result in suboptimal effluent quality and more frequent septage pumping. For Orenco's tank sizing recommendations for various applications, see "Primary Tank Sizing," NDA-TNK-1 and "Septic Tank Sizes for Large Flows," NTP-TNK-TRB-2.

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Actual Flow Equation:

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(for calculations based on "actual flows")

Design Flow Equation:

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(for calculations based on "design flow" as defined above)

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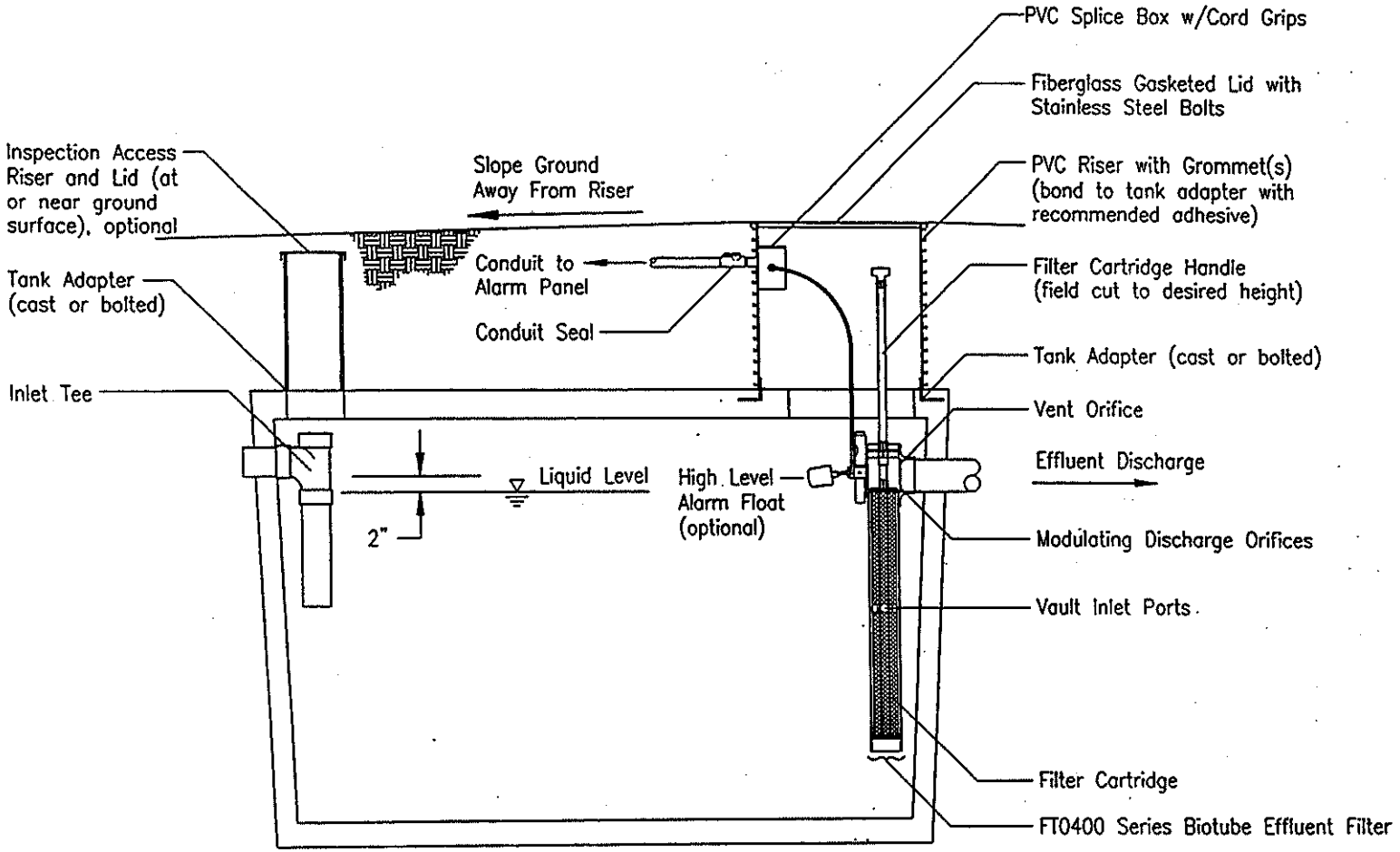
**Orenco's effluent filter performance data is so extensive that Dr. George Tchobanoglous, co-author of Small and Decentralized Wastewater Management Systems, used that data to help develop his findings on effluent filters.*

Septic Tank with 4" Dia. Biotube® Effluent Filter



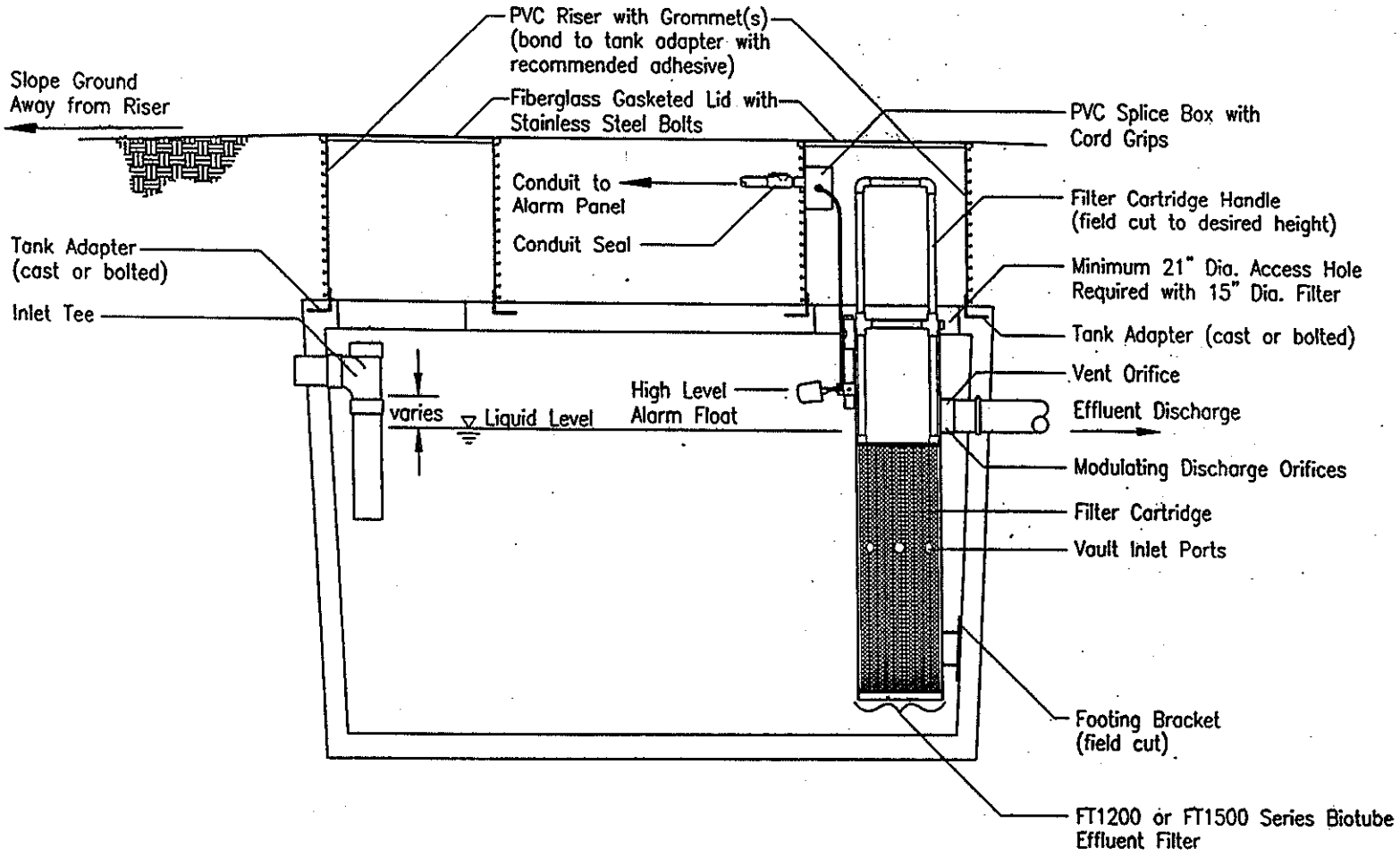
Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479-9012

TELEPHONE:
(541) 459-4449

FACSIMILE:
(541) 459-2884

Primary Tank with 12" or 15" Dia. Biotube® Effluent Filter



Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479-9012

TELEPHONE:
(541) 459-4449
FACSIMILE:
(541) 459-2884

Introduction to AdvanTex®

Orenco Systems®
Incorporated
1-800-348-9843

We're very pleased to provide you with information about Orenco's newest contribution to onsite wastewater technology: AdvanTex Treatment Systems.

Our patented AdvanTex Treatment System works just like a recirculating packed bed filter — a proven technology. But the AdvanTex Treatment System uses a highly efficient, non-woven textile material, instead of sand or gravel, for the treatment media. Orenco has been researching and developing the textile treatment process for about seven years. In addition, we've helped to evolve packed bed filter technology for the past 25 years.

AdvanTex textile treatment systems produce effluent that exceeds "secondary" treatment standards, even under peak flow conditions. And because textile can handle much higher loading rates than sand or gravel media, textile filters are very compact units. Consequently, they require significantly less land area and are easier to install than other packed bed filters. They even cost less.

AdvanTex Treatment Systems have undergone third-party evaluation and have successfully passed ANSI testing protocols. Our AX20, rated at 500 gpd, successfully passed the ANSI/NSF Standard 40 testing protocol for Class 1 systems.

About 10,000 systems have been installed in the U.S. and Canada, on all sorts of sites: single-family homes, commercial properties, and community systems.

The enclosed binder includes numerous documents to support a request for regulatory approval in your area. However, your jurisdiction may require additional information relevant to your regulations. We'll be happy to supply whatever additional documentation you need. Please call Sam Carter, Regulatory Relations Coordinator, 1-800-536-4192 or Angela Bounds, Business Development Assistant, 1-800-536-4197.

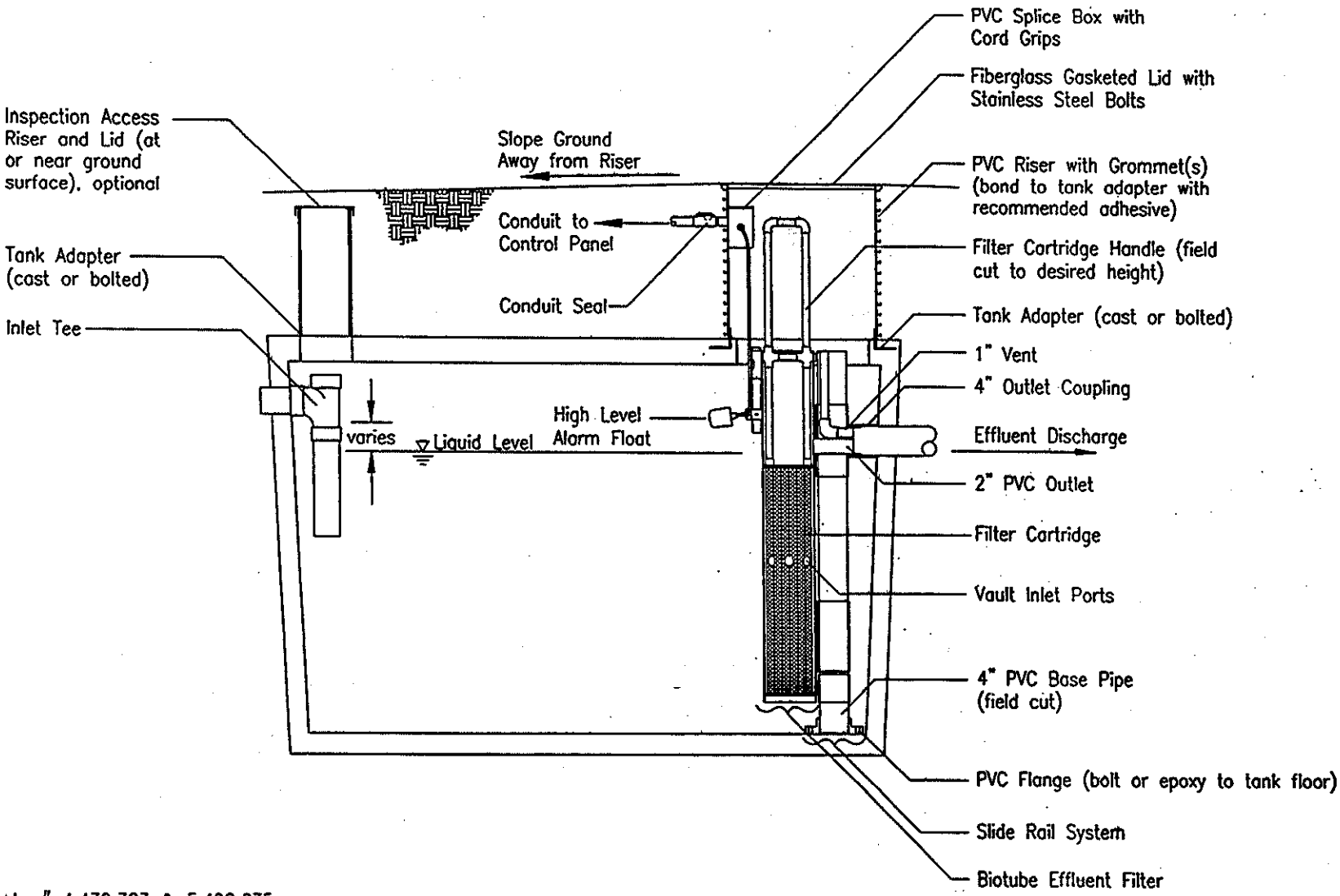
Primary Tank with Biotube® Effluent Filter on Slide Rail

Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479-9012

TELEPHONE:
(541) 459-4449

FACSIMILE:
(541) 459-2884



NDW-TD-12
Rev. 2/98)

Primary Tank with 8" Dia. Biotube® Effluent Filter

Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479-9012

TELEPHONE:
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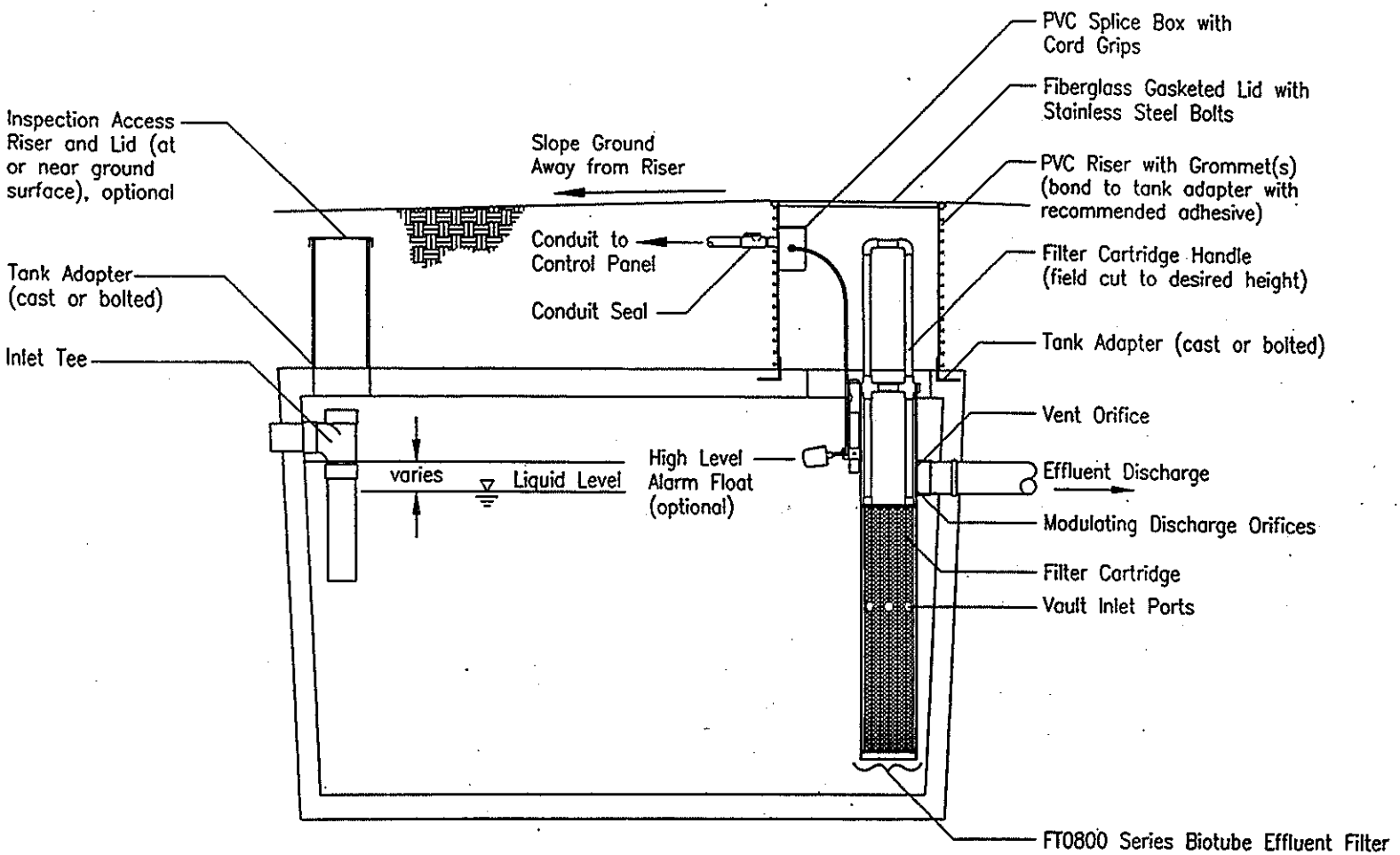
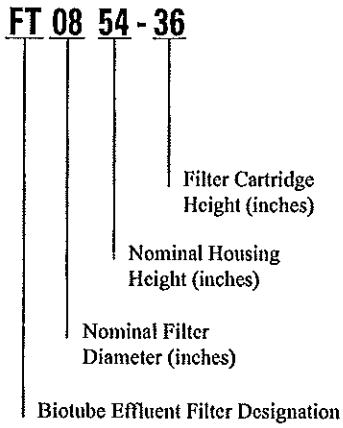


Biotube® Effluent Filter Sizing

Wastewater from restaurants, industrial plants, and other higher waste strength sources needs more detailed analysis of the wastewater characteristics for proper tank and filter sizing and configurations. Multiple filters may be required. Please call to discuss these applications.

Model Nomenclature

Example:



Modulating Orifices and Peak Flows

Effluent filters must also be able to handle situations in which the majority of the daily flow will enter the septic tank over a relatively short period of time. Modulating plates with orifices are often used to limit the flow rate through a tank during peak flow to prevent the flushing out of solids. However, modulating plates and orifices should be used only when the tank has sufficient surge capacity. Simple high liquid level alarms can be added to any Orenco effluent filter.

Filter Surface Area vs. Flow Area

When comparing filters, be sure to note how filter area is being reported. It's important to compare both the Total Filter Surface Area and the Total Flow Area, because *Flow Area is as important as Filter Surface Area.* The surface area of a filter is important, because that's where solids are caught. But the flow area (the area of the "holes" in the filter) is equally important, because that's what prevents the filter from premature clogging.

Selecting A Biotube® Effluent Filter

Filter and Flow Area Chart

Series	Filter Area (ft^2)	Flow Area (ft^2)
FT15-36	50.5	15.2
FT12-36	30.0	9.0
FT08-36	14.6	4.4
FT04-36	5.1	1.5

Design Example:

A 12-unit condominium has a "design flow" of 3600 gallons per day (12 units at 300 gallons per day per unit). If a minimum 3-year cleaning frequency is desired, how much filter area is necessary? Which Biotube Effluent Filter should be selected?

Answer: In this case, the equation for design flow is applicable.

Therefore, $A_F = (0.002)(3600)(3) = 21.6\ ft^2$

Referring to the Filter and Flow Area Chart, an FT1200 Series filter, with a filter area of 30.0 ft^2, is required to satisfy the minimum design criteria.

Using the 30 ft^2 filter area, the design flow equation can be solved for MTBC, giving a cleaning frequency of 4.2 years.

MTBC = 30.0/(3600)(0.002) = 4.2 years.

If the units will include garbage grinders, the filter area is increased by 36% to account for additional solids loading.

Therefore, $A_F = (1.36)(21.6) = 29.4\ ft^2$
And MTBC = 30.0/(3600)(0.002)(1.36) = 3.1 years.

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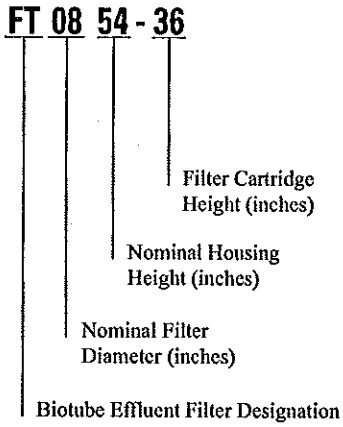

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