Ecoflo biofilter – Design guide | Ontario

This guide contains specific information required to plan the installation of an Ecoflo biofilter in the province of Ontario. The installation must be performed by an authorized installer. For more information, contact your local distributor or our Customer Service team at +1 800 632-6356.

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1. General description of the system

The Ecoflo biofilter is a biofiltration system designed to treat domestic septic tank effluent to an extremely high level before final dispersal. A typical Ecoflo biofilter system consists of:

- A septic/primary tank with a commercially rated effluent filter connected to the tank outlet pipe.
- An Ecoflo biofilter, where advanced treatment occurs due to physical, chemical, and biological processes that are optimized in the 100% organic filtering medium made of a layer of coconut husk fragments underlying a layer of peat moss. The Ecoflo biofilter can be housed in different types of tanks (fibreglass, concrete, or polyethylene).
- A site-specific final effluent dispersal system.

The Ecoflo biofilter system is based on simple, passive biofiltration principles. Once the wastewater has passed through the primary/septic tank, it flows toward the Ecoflo biofilter, where a unique combination of physical, chemical, and biological interactions between the effluent and the organic filtering medium takes place to treat the effluent.

Inside the biofilter, a tipping bucket evenly scatters the wastewater onto specially designed plates, which, in turn, evenly distribute the wastewater onto the filtering medium. The wastewater then trickles through the filtering medium, where it is treated aerobically by bacteria fixed in the filtering medium via an optimized water/air (oxygen) mass transfer process. Treated effluent is then disposed of either by gravity or pumped to final dispersal/infiltration into the ground.

The Ecoflo biofilter has been tested, certified, and listed by the CAN/BNQ standard 3680-600 as meeting the requirements of treatment level B-IV. The Ecoflo biofilter is certified for two hydraulic loading rates (HLR) applicable to the surface of the filtering medium:

- Demand dose: 308 L/m²-d
- Time dose: 385 L/m²-d.

2. Treated effluent quality

When treating domestic wastewater up to the design flows and loads, a properly maintained Ecoflo biofilter system will exceed the performance requirements of CAN/BNQ standard 3680-600. Actual test results established through analytical methods described in CAN/BNQ standard 3680-600 averaged 3 and 4 mg/L in $CBOD_5$ and 4 and 4 mg/L in TSS for demand and time-dose configurations, respectively.

Table 1: Ecoflo biofilter treated effluent quality

	Influent	Ecoflo Effluent Demand Dose (HLR: 308 L/m²-d)	Ecoflo Effluent Time Dose (HLR: 385 L/m²-d)
TSS	262 mg/L	3 mg/L	4 mg/L
$CBOD_5$	207 mg/L	4 mg/L	4 mg/L
pH	7.8	7.0	6-9

The Ecoflo biofilter system has demonstrated its robustness over the years. The system does not require any acclimation or start-up period to consistently provide effluent quality demonstrated in the table above, which makes it the perfect system for secondary or seasonal homes or any other intermittent use applications. Also, the Ecoflo biofilter system has been specifically developed and tested for cold-climate applications. Treatment efficiency is not subject to significant variation with ambient air temperature fluctuations.

3. Wastewater system component design and specification

3.1. System configuration

The designer of an Ecoflo biofilter system is responsible for proper configuration and sizing of the components of the system, pump, and other peripheral component specifications, as well as treated effluent dispersal or final disposal, and construction details per the Ecoflo biofilter design guide. Design shall comply with all requirements of Division B Part 8 of the Ontario Building Code (OBC).

3.2. Design flow

Applicable regulations usually define the daily flow based on the number of bedrooms or the number of occupants, number of water fixtures, and/or square footage.

3.3. Primary/septic tank

As per CAN/BNQ 3680-600 certification, the primary/septic tank shall have a minimum effective capacity of twice the daily design flow. It shall comply with local regulations. Premier Tech provides a complete line of high-performance polyethylene septic tanks ranging from 2,260 to 5,800 L (500 to 1,280 US gal). Consult Premier Tech's septic tank promotional guide at *premiertechaqua.com/en-ca/pro-space* for more information on these products.

3.4. Effluent filter

As per Code requirements, a septic tank shall be equipped with an effluent filter. The effluent filter extends the life of any treatment system by keeping solids in the primary/septic tank. The effluent filter is especially important if the household is equipped with a sewage pump or any other appliance that is susceptible to increase the suspended solids content in the wastewater and thereby jeopardize the operation of the system and affect its performance. An effluent filter will also prevent solids from reaching the effluent pump. No garbage disposal unit should be installed on the septic system.

Effluent filters to be used with the Ecoflo biofilter shall have a minimal flow area of 600 cm^2 and filter particles 1.6 mm and larger. While many different brands of effluent filters meet those specifications, we highly recommend the use of the effluent filter PL-122 from Polylok, or equivalent.

Effluent filters are normally installed in the second compartment of the septic tank; however, they may also be installed downstream of a septic tank in Premier Tech's TLF-240 effluent filter container, in accordance with local regulations. Please refer to Premier Tech's effluent filter promotional guide as well as the effluent filter container promotional guide at *premiertechaqua.com/en-ca/pro-space* for more information on these products.

3.5. Dosing tank and control unit for time-dose configuration (if applicable)

For time-dose Ecoflo biofilter configurations, a dosing tank of minimum sufficient volume of 0.3 × daily flow (Q) is required to regulate the flow to the unit. This dosing volume can be added to the initial primary reactor volume. In such a case, a pump vault (with integrated effluent filter) would be inserted into the second chamber compartment of the primary reactor or at the outlet of the primary reactor. An independent dosing tank can also be installed between the primary reactor/septic tank and the Ecoflo biofilter.

The dosing tank's pump is connected to the Rewatec DCU-100 simplex control panel, or equivalent, to feed the Ecoflo biofilter 20 hours per 24-hour period. We recommend that the dose to the Ecoflo biofilter does not exceed 30 and 40 L (8 and 10 US gal) per hydraulic event.

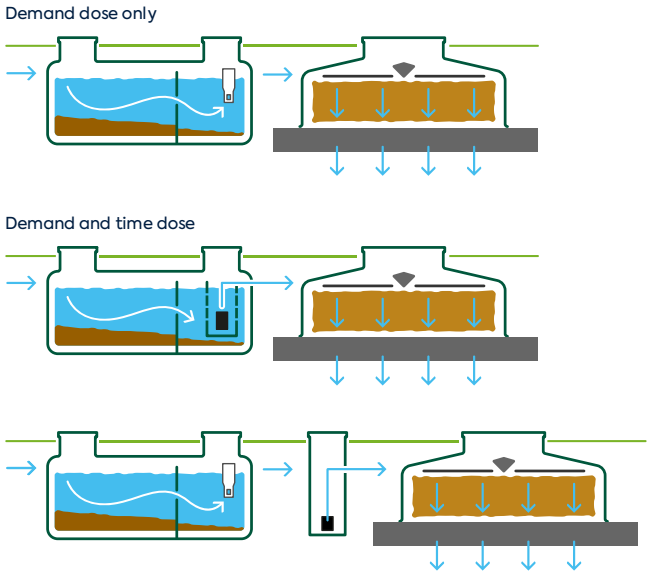
3.6. Ecoflo biofilter

The Ecoflo biofilter is a biofiltration system designed to treat domestic wastewater. In Ontario, the Ecoflo biofilter can be used in two configurations: demand dose and time dose. In the **demand-dose** configuration, septic tank effluent can flow directly by gravity to the Ecoflo biofilter. For the **time-dose** configuration, the septic tank effluent is directly regulated or flows to a dosing tank that will regulate, for 20 hours per day, the wastewater flow dosed to the Ecoflo biofilter. The minimum dosing tank capacity is 0.3 times the daily design flow.

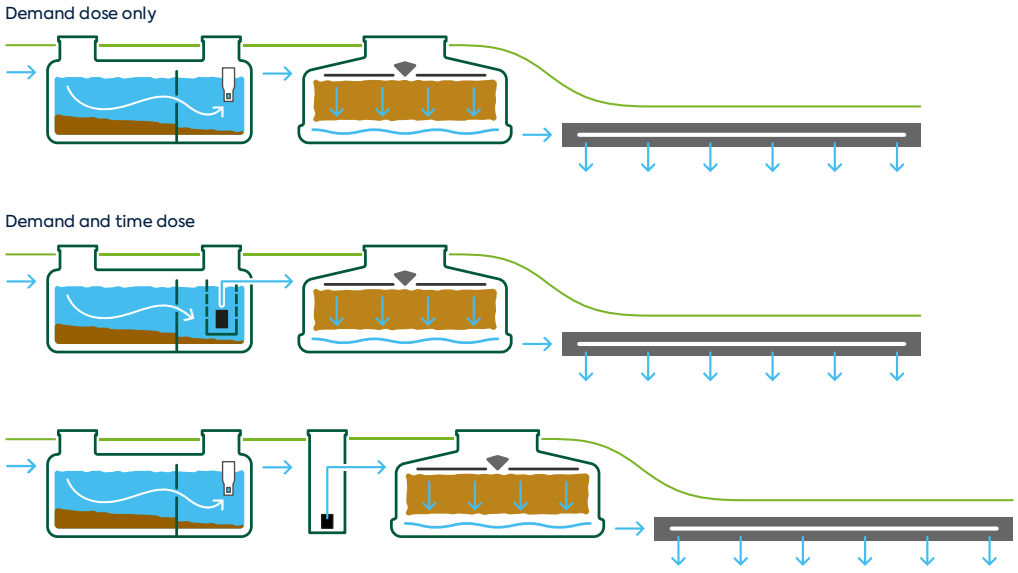
When wastewater reaches the Ecoflo biofilter, a central tipping bucket evenly scatters the wastewater onto both sides of the biofilter. Both sides are equipped with specially designed plates that evenly distribute the wastewater onto the filtering medium. The wastewater then trickles through the filtering medium, and its organic matter is decomposed by the microorganisms attached to the medium. Finally, the treated wastewater is discharged into the environment by infiltration in a soil absorption system or a dispersal bed.

The site-specific design will determine the final effluent dispersal method. Effluent may be either discharged directly to a pad located underneath the Ecoflo biofilter unit (open-bottom models) or piped into a trench, pressurized system, or other effluent dispersal method, as applicable.

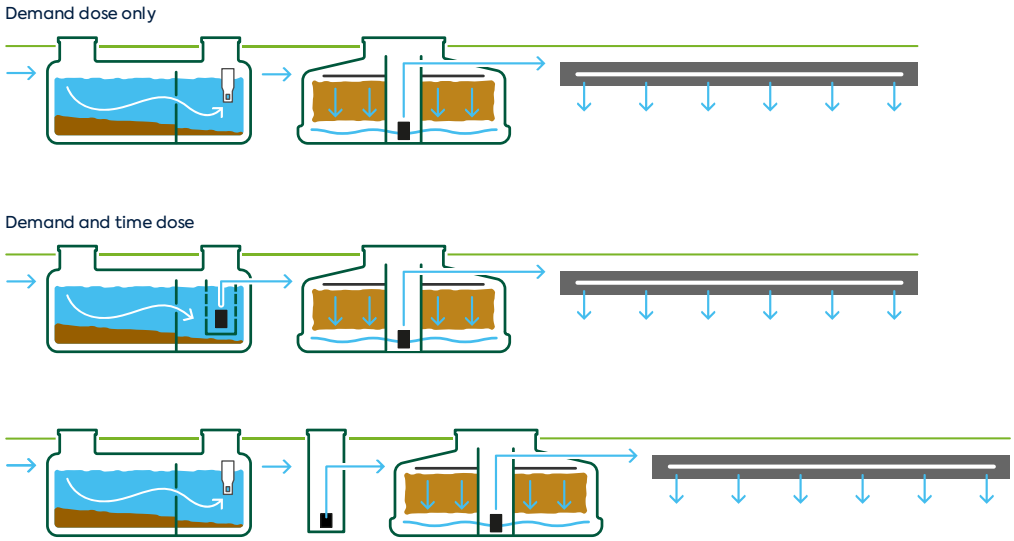
- Open bottom: soil infiltration underneath the Ecoflo biofilter to a Type A dispersal bed. Demand and time-dose influent.



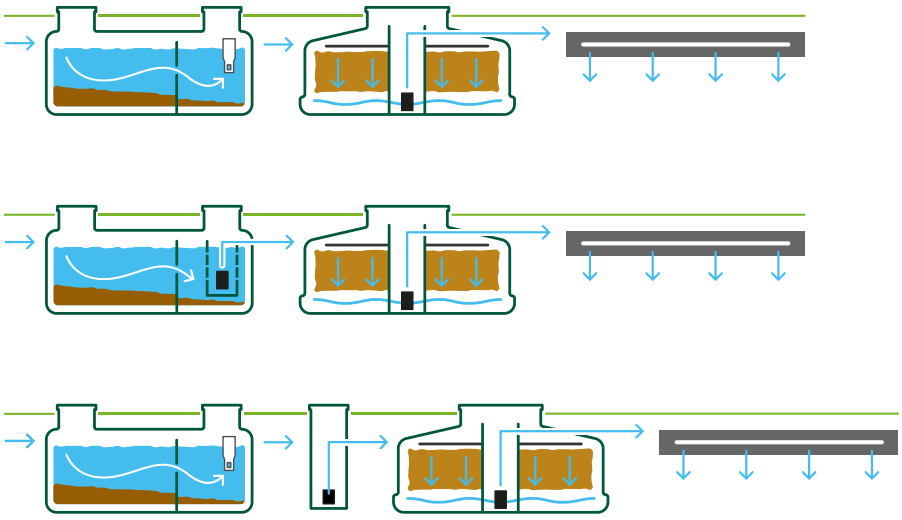
- Closed bottom – gravity discharge to a Type A or B dispersal bed. Demand and time-dose influent.



- Closed bottom – pumped discharge to a Type A or B dispersal bed, or shallow buried trench. Demand and time-dose influent.



- Shallow buried trench. Time-dose influent only.



The Ecoflo biofilter can also be used for commercial, institutional, communal, and municipal applications when the wastewater to be treated is comparable to domestic wastewater. Please contact Premier Tech's Customer Service team for more information on these applications.

3.7. Design criteria

Usually, the model and the number of Ecoflo biofilters are determined by the number of bedrooms in the home or by the total domestic wastewater flow per day. The selection of the model also depends (without limitation) on the available surface area, the topography of the lot, the depth of the seasonal high groundwater table, and the type, permeability, and depth of the natural soil on site.

There are many different models of Ecoflo biofilter and each model has different characteristics. The letters and numbers associated with the Ecoflo biofilter specify the model's characteristics, as presented in Table 2 with model STB-570PR as reference:

Table 2: Ecoflo biofilter design nomenclature

STB	refers to the Ecoflo discharge method	ST = Open bottom **STB = Closed bottom**
570	refers to the daily flow capacity	500 = From 1,600 to 2,000 L/d **570 = From 1,755 to 2,200 L/d** 650 = From 2,000 to 2,500 L/d 730 = From 2,250 to 2,810 L/d 750 = From 2,310 to 2,890 L/d 840 = From 2,600 to 3,250 L/d
P	refers to the material of the shell	No mention = Fibreglass **P = Polyethylene** B = Concrete
R	refers to the disposal mode	No mention = No pump **R = With integrated pump**

Therefore, the STB-570PR model refers to a polyethylene, closed-bottom Ecoflo biofilter with a daily treatment capacity of 1,755 to 2,200 L/d (depending on the configuration), and with an integrated pump.

Table 3 summarizes the system's capacity depending on different Ecoflo biofilter models.

Table 3: Ecoflo biofilter available models

	Polyethylene	Concrete	Fibreglass
Open bottom	ST-570P ST-730P	N/A	ST-500 ST-650 ST-750
Closed bottom – gravity discharge	STB-570P STB-730P	STB-650B STB-840B	N/A
Closed bottom – pump discharge	STB-570PR STB-730PR	STB-650BR STB-840BR	N/A

Please contact your local Premier Tech regional coordinator for model availability and approvals in your area. Consult the technical data sheets at *premiertechaqua.com/en-ca/pro-space* for additional information on these models, such as storage capacities, dimensions, weight, etc.

3.8. Discharge pump (when applicable)

As presented in Table 3, some Ecoflo biofilter models housed in concrete or polyethylene shells come with a closed-bottom configuration that includes a discharge pump vault. This allows the final treated effluent to be pumped toward the site-specific final dispersal method. The integrated pump vault includes a pump, a float tree, an ON/OFF float, an alarm float, and an alarm box.

This configuration offers a certain built-in capacity for dosing and storage. In case of emergency, water can accumulate in the filter bed for a limited period of time without adversely affecting the performance of the system. These details are presented on each product's technical data sheet.

Consult the technical data sheets at *premiertechaqua.com/en-ca/pro-space* for additional details on integrated pump vaults for these models, including their built-in storage, dosing capacities, dimensions, etc.

Depending on application and site conditions, additional volume for dosing and/or emergency may be required and provided with an additional independent dosing tank.

The pump provided with those models has the following characteristics:

- 0.4 hp
- 6.6 Amps
- 1 phase, 60 Hz, 115 V

Figure 1 represents the performance curve of the integrated pump supplied with applicable Ecoflo biofilter models. If you have questions about the interpretation of this curve, please do not hesitate to contact Premier Tech.

The pumping unit uses 0.25 kWh per day.

When used as a lifting station, the maximum length of the force main (flexible pipe) from the pump's outlet, using a Ø 25 mm (1") pipe, depends on the head (difference in elevation between the base of the pump and the end of the pressurized pipe). The maximum length of the forced main (flexible pipe) from the pump's outlet, using a Ø 38 mm (1-1/2") pipe, is limited by the volume of water that returns to the Ecoflo biofilter once the pump has stopped running.

Table 4 presents the different allowable pipe lengths between the Ecoflo biofilter unit and discharge location.

Figure 1: Performance curve of 0.4 hp pump

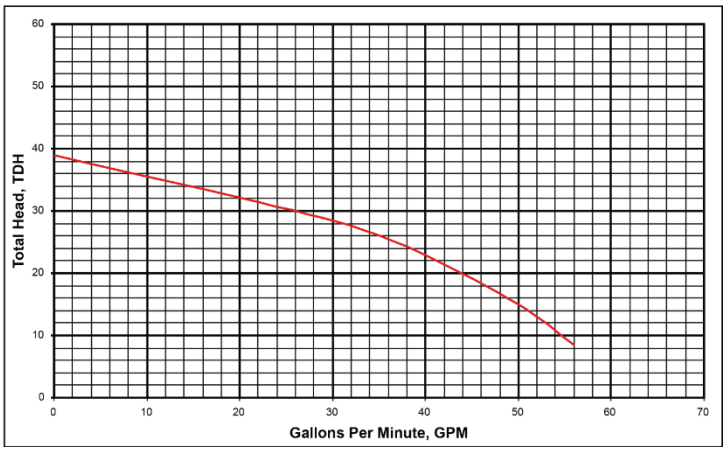


Table 4: Allowable pipe lengths after the Ecoflo biofilter with integrated pump

Head height	7.5 m (25')	6 m (20')	4.5 m (15')	3 m (10')	1.5 m (5')
Maximum length of the Ø 25 mm (1") pipe	7.5 m (25')	18 m (60')	21 m (70')	24 m (80')	27 m (90')
Maximum length of the Ø 38 mm (1-1/2") pipe	30 m (100')	30 m (100')	60 m (200')	60 m (200')	60 m (200')

If a different pump is required, the warranties related to system malfunctions and pump failures will be void.

It is the designer's responsibility to make sure that the pumping station configuration and sizing meet local requirements.

For pressure and timed dose application as required for shallow buried trench, refer to section 5.2.2.

3.9. Flow divider

When an installation consists of three or more Ecoflo biofilter units or two Ecoflo biofilter units that cannot be fed by gravity, special attention must be given to even the flow distribution between the units.

Premier Tech offers several pressurized flow dividers. For more information on these products, consult the peripherals section at *premiertechaqua.com/en-ca/pro-space*.

3.10. Commercial applications

The Ecoflo biofilter can also be used for commercial, institutional, communal, and municipal applications when the wastewater to be treated is comparable to domestic wastewater. For these applications, due consideration shall be given to the organic loading rate applied to the Ecoflo biofilter. Depending on Ecoflo biofilter configuration, applicable loading rates are:

- Demand-dose configuration: 45mg $CBOD_5/m^2$-d
- Time-dose configuration: 55mg $CBOD_5/m^2$-d

Please contact Premier Tech's Customer Service team for more information on these applications.

3.11. Lifespan of the filtering medium

The effective life of the Ecoflo biofilter filtering medium is estimated to be a minimum of 10 years under the following conditions:

- The system has been operated at or under design flow and loadings.
- The system has been designed and installed in accordance with Premier Tech's guidelines.
- The system has been maintained in accordance with Premier Tech's guidelines by a Premier Tech trained and authorized service provider, has been operated under an ongoing service contract, and complies with all administrative authority permit conditions.

After 10 years, the filtering medium is analyzed by one of Premier Tech's authorized agents. Under normal usage, if the filtering medium has not been abused and the operating guidelines have been respected, it may not need to be replaced and can be used for additional years. However, the Ecoflo biofilter's filtering medium must be replaced before the system's treatment capacity and performance begins to deteriorate. The filtering medium is easily pumped out using a truck adapted to pump out septic tank sludge. The new filtering medium is then installed by an authorized agent.

3.12. Final dispersal

The final dispersal system must be designed in accordance with Premier Tech's guidelines (refer to section 5) and/or local regulations.

4. Location of wastewater system components

4.1. Septic tank installation conditions

The primary/septic tank, equipped with an effluent filter, must be located:

- Where there is no motorized vehicle traffic;
- where it is accessible at all times for maintenance and emptying; and
- in an area that is not likely to be flooded and where it will not be submerged (depending on the situation, a drain may be required around the septic tank to prevent installation of the septic tank in groundwater).

The septic tank must be installed as specified by the septic tank manufacturer. The septic tank must be watertight and be used for disposal of domestic wastewater only (i.e. no roof water, surface water, or discharge from footing drains). The septic installation must be installed in accordance with the minimum clearance prescribed by local regulations.

4.2. Ecoflo biofilter installation conditions

The Ecoflo biofilter must be installed according to the following recommendations:

- NEVER cover or bury the lid of an Ecoflo biofilter.
- The lid of the Ecoflo biofilter must be at least 50 mm (2") above the surface of the landscaped lot.
- Ensure an upslope interceptor drain is installed to direct surface and/or groundwater away from the Ecoflo biofilter and soil absorption system;
- NEVER connect a drain pipe, roof gutter, sump pump, or air conditioning drain to the septic system.
- Make sure the ground cover grows back quickly to prevent soil erosion.
- Respect at all times the minimum distances presented in Table 5.

Table 5: Minimum distances to respect for Ecoflo biofilter

	Fibreglass	Polyethylene	Concrete
Riser allowance	No additional riser allowed	No additional riser allowed	Maximum one 8" additional riser
Base of excess backfill, slope, or embankment (A)	5 m (16')	4 m (13')	3 m (10')
Parking area (B)	5 m (16')	4 m (13')	3 m (10')
Vehicle or object weighing more than 225 kg (500 lb) (C)	5 m (16')	4 m (13')	3 m (10')
Retaining wall (D)	5 m (16')	4 m (13')	3 m (10')
Tree	3 m (10')	N/A	N/A
Finished landscaping vs. base of Ecoflo biofilter lid (E)	50 mm (2")		
Groundwater vs. base of Ecoflo unit (Fp) (see Figure 3)	300 mm (12") below the bottom the Ecoflo biofilter	Up to the base	Gravity: Up to the base Pumped: Below inlet invert

Figure 2: Minimum distances to respect for Ecoflo biofilter

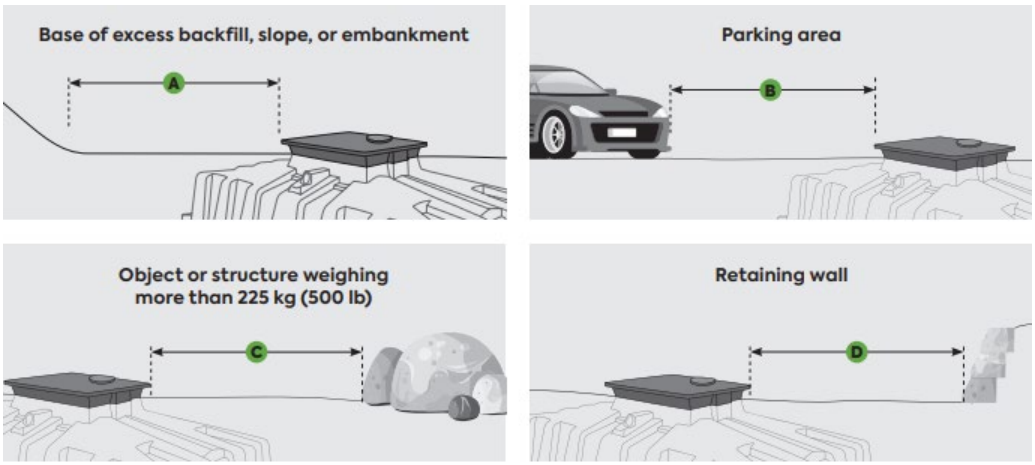
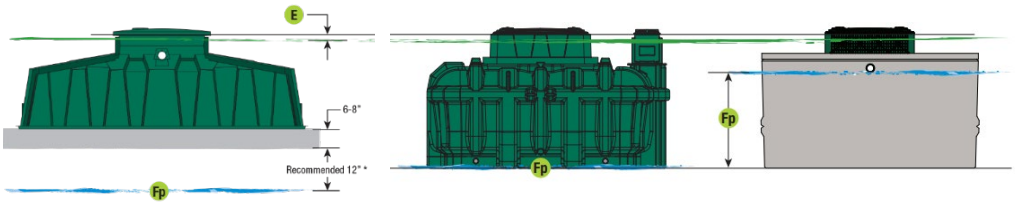


Figure 3: Seasonal high groundwater (SHGW) levels to respect for Ecoflo biofilter installations



It is very important to advise everyone involved (installer, landscaper, owner, snow removal service, etc.) of the above recommendations so they do not damage the components of the wastewater treatment system.

By respecting these guidelines, you are contributing to the proper operation of the wastewater treatment system.

5. Effluent discharge

IMPORTANT! THIS IS A CRUCIAL STEP FOR EVERY SEPTIC INSTALLATION.

The Ecoflo biofilter provides a variety of disposal/dispersal methods of the treated effluent (depending on local regulations). Here are possible methods according to OBC:

- Type A Dispersal Bed
- Type B Dispersal Bed
- Shallow Buried Trenches
- Absorption Trench (L=QT/300)
- Filter Beds (100L/m2/d)

Ecoflo biofilter treated effluent can be discharged either by gravity or pumped to the final dispersal area. With open-bottom Ecoflo biofilter models, the treated effluent is discharged directly beneath the Ecoflo biofilter. For closed-bottom models, the treated effluent can be discharged either by gravity or pumped toward one of the dispersal methods mentioned above.

5.1. Hydraulic conductivity

Site assessment and soil conditions are critical to determine the appropriate type of treated effluent discharge. An accurate assessment of the soil's hydraulic conductivity is essential in planning any septic installation. This assessment should be performed in accordance with local regulations and will determine if subsurface discharge is possible. Adequate sizing of the soil absorption system relies on the determination of the soil's infiltrative capacity and will ensure adequate infiltration of the treated effluent into the soil at all times. The soil's infiltrative capacity is often expressed as a percolation rate (average time, in minutes, that is required for water to drop 1 cm in the soil), which can be determined by a qualified individual through a field permeability test, a laboratory soil particle-size analysis, or any other method approved by local regulations.

5.2. Subsurface discharge

Once the soil characteristics have been established, determine the size of the soil absorption system required to receive the treated effluent of the Ecoflo biofilter(s). The shape of the soil absorption system may vary depending on site constraints and applicable regulations.

The Ecoflo biofilter's treated effluent meets the requirements to be discharged into a Type A or B dispersal bed, shallow buried trench, filter bed (surface loading of maximum 100 L/m^2), or absorption trench sized with a one-third length reduction (L = QT/300).

5.2.1. Type A Dispersal Bed

Tables 6 and 7 present typical Type A dispersal bed sizing for demand and time-dose options, respectively.

Table 6: Demand-dose configuration (308 L/m²-d)

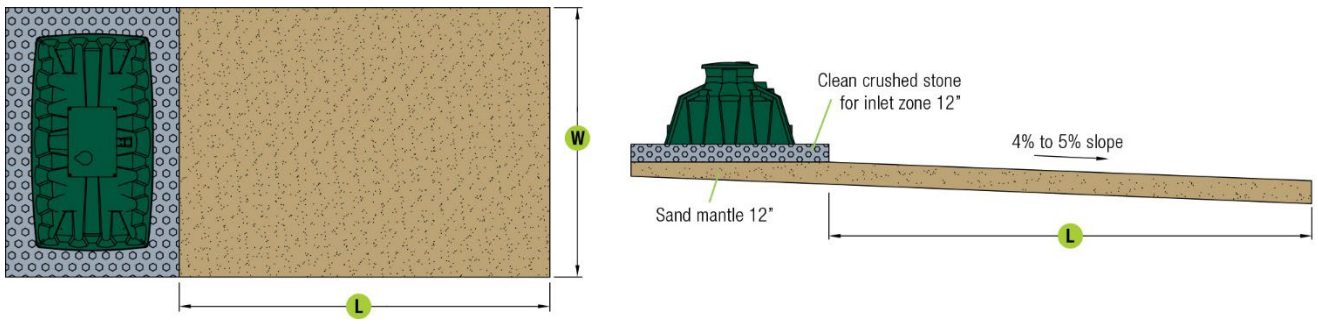
Ecoflo Model	Daily Flow (Q)	T < 15 min/cm		T > 15 min/cm			
		Stone Area	Sand Area	Stone Area	Sand Area		
		A = Q/75	The larger of Y and A=QT/850	A = Q/75	The larger of A = [Y + W*L] and A = QT/400	Min. width (W)	Min. length downstream from Ecoflo shell (L)
ST-500	1,600 L/d	21 m²	21 m² or 1.88*T	21 m²	89 m² or 4.0*T	4.5 m	15 m
STB-570P/PR	1,755 L/d	23 m²	23 m² or 1.88*T	23 m²	98 m² or 4.4*T	5.0 m	15 m
ST-650 STB-650B/BR	2,000 L/d	27 m²	27 m² or 2.35*T	27 m²	124 m² or 5.0*T	6.5 m	15 m
STB-730P/PR	2,250 L/d	30 m²	30 m² or 2.65*T	30 m²	142 m² or 5.6*T	7.5 m	15 m
ST-750	2,310 L/d	31 m²	31 m² or 2.72*T	31 m²	143 m² or 5.8*T	7.5 m	15 m
STB-840B/BR	2,600 L/d	35 m²	31 m² or 3.06*T	35 m²	148 m² or 6.5*T	7.5 m	15 m

Table 7: Time-dose configuration (385 L/m²-d)

Ecoflo Model	Daily Flow (Q)	T < 15 min/cm		T > 15 min/cm			
		Stone Area	Sand Area	Stone Area	Sand Area		
		A = Q/75	The larger of Y and A=QT/850	A = Q/75	The larger of A = [Y + W*L] and A = QT/400	Min. width (W)	Min. length downstream from Ecoflo shell (L)
ST-500	2,000 L/d	27 m²	27 m² or 2.35*T	27 m²	102 m² or 5.0*T	5 m	15 m
STB-570P/PR	2,200 L/d	29 m²	29 m² or 2.59*T	29 m²	112 m² or 5.5*T	5.5 m	15 m
ST-650 STB-650B/BR	2,500 L/d	33 m²	33 m² or 2.94*T	33 m²	131 m² or 6.3*T	6.5 m	15 m
STB-730P/PR	2,810 L/d	37 m²	37 m² or 3.31*T	37 m²	150 m² or 7.0*T	7.5 m	15 m
ST-750	2,890 L/d	39 m²	39 m² or 3.40*T	39 m²	151 m² or 7.2*T	7.5 m	15 m
STB-840B/BR	3,250 L/d	44 m²	44 m² or 3.82*T	44 m²	157 m² or 8.2*T	7.5 m	15 m

It is important to note that open-bottom Ecoflo biofilter models, as per Appendix Note A-8.7.7.1.(8) "Open Bottom Treatment Units", can be installed directly onto the crushed stone layer of the Type A dispersal bed as long as the unit is placed in the centre of the stone layer, where the topography is flat or uphill of the centre of the stone layer on sloping topography (see Figure 4).

Figure 4: Open-bottom mantel design



5.2.1.1 Soil depth required under the crushed stone layer

The vertical distance between the absorption bed and the limiting layer (groundwater, rock, or impervious layer) must be in accordance with local regulations. We recommend, however, to maintain at least 300 mm of unsaturated soil below the clean crushed stone layer underneath an open-bottom unit.

Table 8 summarizes the vertical separation to limiting layers (rock, water table, and soils with T< 1 min/cm and T> 50 min/cm) specified by the OBC for Type A dispersal beds.

Table 8: Vertical separation to limiting layers

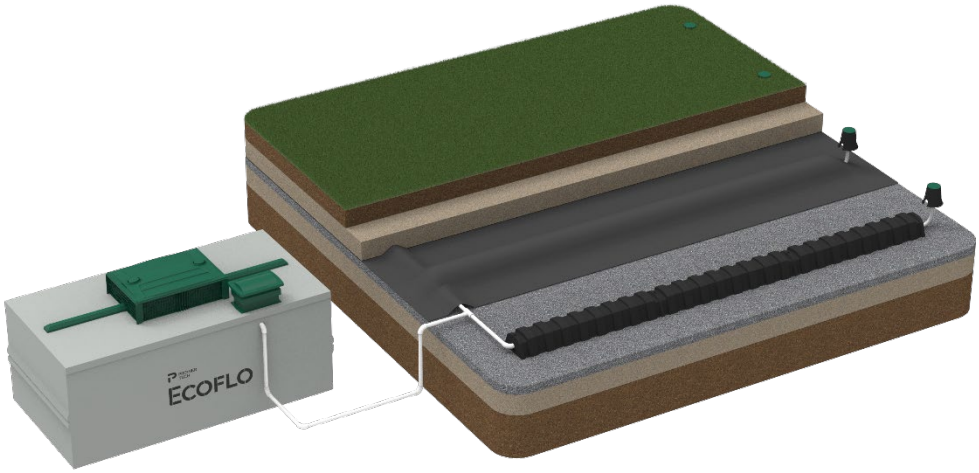
Percolation Time (T)	Vertical Separation
T < 1 min/cm	600 mm (OBC)
T > 50 min/cm	600 mm (OBC)
1 < T< 50 min/cm	Manufacturer recommends a minimum of 300 mm vertical separation under the stone layer. This vertical separation can consist of natural occurring soil/sand or imported fill, with a T time between 6 to 10 min/cm (less than 5% silt/clay).

5.2.2 Shallow Buried Trench

5.2.2.1 General consideration

A shallow buried trench leaching bed is a pressurized distribution system which delivers regular timed doses of effluent to small diameter laterals (typically PVC/ABS pipe) supported inside a plastic chamber. The laterals are perforated at regular intervals on the top of the pipe (12 o'clock position) and are provided with an adequate number of orifices on the bottom (six o'clock position), which provide self-drainage to prevent freezing during cold weather.

The footprint of a shallow buried trench system is much smaller than a conventional absorption trench system, because the soil is not relied upon for any significant portion of the treatment. Shallow buried trenches may be installed in native soil or leaching bed fill with a T-time between 1 and 125 min/cm, to maintain a minimum of 900 mm vertical separation to high ground water table or rock.



Components of a shallow buried trench system typically include:

- Dosing pump chamber and pump equipped with timer controls
- Force main from dosing chamber to distribution manifold
- Manifold (header) assembly
- 25 mm – 38mm (1" – 1.5") diameter pressure pipe laterals with generally 3 mm (1/8") diameter orifice holes spaced evenly along the top of the lateral, and 3 mm drain holes on the bottom
- Pipe support/orifice shields to keep the lateral off the bottom of the trench
- Leaching chamber covering the laterals. Chambers with a wide resting foot are preferred.
- Geotextile over the chambers
- "Sweep 90" fitting extending to within 10 cm of finished grade at the end of each lateral, equipped with a ball valve if desired and terminated in a threaded cap.

Shallow buried trenches are sized according to Table 8.7.3.1. of the OBC. For typical details of SBT installation and other relevant information you can refer to "OOWA's best practices series: Shallow buried trench guidance document". The tables 8 and 9 presents typical shallow buried trench sizing for demand and time-dose options, respectively.

Table 8: Demand-dose configuration (385 L/m²-d)

Ecoflo Model	Daily Flow (Q)	Total length of runs (m) function of soil T (min/cm)		
		1 < T < 20	20 < T < 50	50 < T < 125
STB-570PR	1,755 L/d	24	36	59
STB-650BR	2,000 L/d	27	40	67
STB-730PR	2,250 L/d	30	45	75
STB-840BR	2,600 L/d	35	52	87

Table 9: Time-dose configuration (385 L/m²-d)

Ecoflo Model	Daily Flow (Q)	Total length of runs (m) function of soil T (min/cm)		
		1 < T < 20	20 < T < 50	50 < T < 125
STB-570PR	2,200 L/d	30	44	74
STB-650BR	2,500 L/d	34	50	84
STB-730PR	2,810 L/d	38	57	94
STB-840BR	3,250 L/d	44	65	109

The number of trenches or runs or laterals required could then be determined, based on the 30 m maximum trench length as specified in Clause 8.7.3.2.(2)(a) as well as the area available on site. It is calculated by dividing the total length (as calculated in table 8 and 9 above) by the desired lateral length, typically between 6 m and 30 m maximum per lateral.

If installing shallow buried trenches in fill, it is preferable/recommended to use the T-time of the underlying native receiving soil to calculate the length of trench required. This provides sufficient trench length to transition effluent into the native soil. However, if the T-time of the fill is used to calculate the trench length, the contact area of the base of the fill material should be carefully considered, as the pipe length provided may be insufficient to transition effluent into lower permeability underlying soils.

The contact area at the base of a fill system and the requirement of the mantle is an important element to carefully consider. It must be considered that the intention of the loading area, including or not including a mantle extension, is to provide sufficient contact area between the imported fill and the native receiving soils in order to safely transition treated effluent from the fill to the native soils without causing a public health or environmental risk. Generally speaking, less permeable native soils require a larger area for the mantle.

5.2.2.2 System layout and calculation

To keep the calculation of an SBT system design as simple as possible, it implies that the design should comprise equally sized lateral lengths, and zones as required.

SBT design must account for elevation differences, pressure drop in the pump system, force main, distribution valve(s), distribution manifold, and the laterals themselves, all of which must be included in the calculation. PTWE has developed a calculation spreadsheet that is customized to account for all of these factors.

A summary of design elements is as follows:

- Specify force main and manifold length and determine their sizing – internal diameter. Typical force main sizing should be between 32 mm (1.25" nominal), and 50 mm (2" nominal).
- Specify the static elevation difference between the low water level in the dosing pump chamber and the highest element in the system (either the highest lateral or distribution valve), and then add the required residual pressure (minimum 600 mm as per Sentence 8.7.6.1.(2) at the furthest lateral).
- Determine the number of runs and their length as explained in the previous section.
- Specify an orifice spacing: The recommended orifice spacing is 0.6 m to 1.2 m along the lateral for even distribution of effluent. Typically, 0.6 m is used. Number of orifices per laterals and space of orifice to edge can then be calculated.
- Specify a number of drain orifices. Drain orifices must be evenly spaced, facing downward, on each lateral to allow drain-out and prevent freezing between pump cycles. It is recommended to have a drain orifice at approximately 3 m spacing. Drain orifices must also be included in the flow/pressure calculation.
- Specify an orifice size: The minimum size is 3 mm (1/8" nominal). Typically, orifice size will be 1/8" up 3/16". Note that the orifice size is very important in the flow/pressure calculation, and their spacing can be varied to modify the flow.
- Specify a distal squirt height: a minimum of 2 ft is required, and 5 ft is suggested as a design specification. Distal squirt height specified values are used in the iterative process to determine the actual discharge rate the pump is in function of system design. By selecting different Squirt Heights, a System Curve can be plotted, using the newly calculated Total Head and Capacity, that intersects the Pump Performance Curve. The point of intersect indicates the actual system discharge flow rate.
- From these data it is possible to calculate the flow through each lateral and the total discharge rate.
- Evaluate pump discharge assembly and system fittings losses – typical value for Ecoflo pump discharge set up and assembly, pressure drop is around 5 to 7 feet head losses.
- Calculate pressure drop in the pump discharge, forcemain, fittings, valves, etc. up to the manifold.
- Calculate the pressure drop in the lateral, accounting for flow reduction at each orifice. It is recommended to design the orifice sizing and spacing so that the difference in flow within the laterals has less than 5% between the first orifice and last orifice. Typical lateral sizing should be between 25 mm (1" nominal, minimum), and 40 mm (1.5" nominal). If your proposed design results in a 5% or greater rate of discharge between first and last orifice in a lateral, change the design. Reduce lateral lengths, increase orifice spacings, reduce orifice size, increase pipe sizes - any or all of which will reduce flows and/or reduce head losses.

For systems presenting a static head greater than 20 ft and/or force main longer than 100 ft with 1.5" diameter, contact our local coordinator for design support.

5.2.2.3 SBT time dosing

The pump is sized to account for not only the friction losses in the pipe network (manifold and distribution laterals) and the static losses due to elevation head, but also to provide a residual pressure head of at least 600 mm at the point furthest from the pump. This ensures the entire footprint of the leaching bed is utilized and provides a more efficient distribution and use of the soil absorption system. Calculation allows the determination of the flow and pressure requirements. Common practice is to base time dosing on 75% of daily design flows. From the intersect of the System Curve and Pump Performance Curve, use the flow rate in Liters/second divided into the volume to be pumped daily. The result is the total Daily Run Time in seconds for the pump.

Pump chambers need to be sized adequately to provide sufficient volume for dosing with additional reserve capacity in the event of alarms and pump/float failure and service/replacement timeline. The Ecoflo system doses the SBTs directly from the treatment unit without the need for an additional dosing pump chamber. Two-level float switches provide a low-level cut-off point, minimum start level, and high-level alarm.

The dosing pump chamber in an SBT system is intended to act as an equalization tank and must have sufficient volume to balance the flow over 24 hours. Pump runtime ON can be adjusted to ensure that the Ecoflo built in dosing volume suffice to equalize the flow to the SBT over the 24 hours period.

Please consult the technical drawings for typical installations, which can be found at *ptzone.premiertechaqua.com*. Consult the OBC for further design requirements.

Always consider the following when designing a soil absorption system:

- Soil assessments must be performed in accordance with local regulations to determine the type of soil and the depth of any limiting layers (groundwater, bedrock, or impervious layers).
- When referring to groundwater, the **seasonal high groundwater level** must be considered.
- The profile of final grade must be such that runoff water flows away from the septic system.
- The shape of the soil absorption system may vary according to site conditions.
- Various means can be used to promote infiltration in low-permeability soils. Contact your local distributor or Premier Tech for suggestions.

The material used for the backfill must not contain any organic matter or impermeable soil, stones, or debris.

If you have any questions or comments,
do not hesitate to contact Premier Tech at +1 800 632-6356.

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