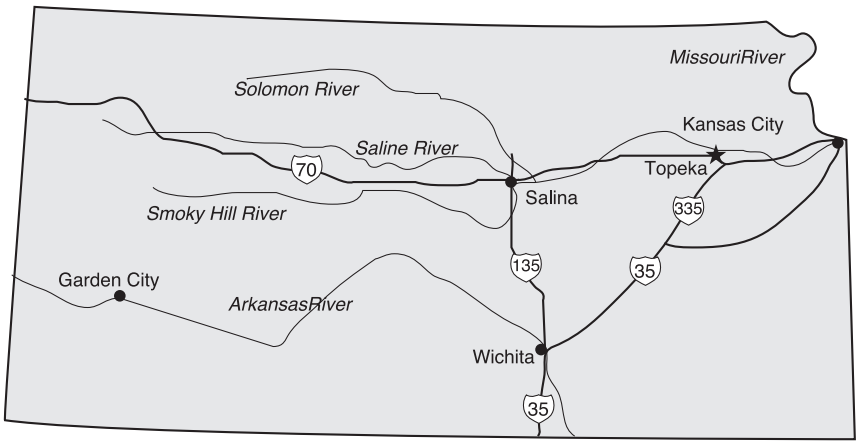
Infiltrator™
Water Technologies
Part of ADS

Kansas

# Design and Installation Manual for Low Pressure Pipe Systems in Kansas

## Low Pressure Pipe

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## LOW PRESSURE PIPE SYSTEMS

This Onsite Wastewater System (OWS) manual provides design, construction, inspection, operation, and maintenance specifications for a Low Pressure Pipe System. This manual can be used as a reference to develop a plan to achieve an Environmental Health Department approval. The design provides equal distribution of effluent from a pump tank to the Low Pressure Pipe (LPP) System. To ensure that equal distribution is achieved, specifications in Tables 1, 2 and 3 should be followed. Infiltrator Water Technologies accepts no responsibility in the design of the system.

This manual provides a brief description of each product with its sizing specifications. Installation requirements are provided on the following pages.

**For more detailed design information, please contact Infiltrator Water Technologies at 1-800-221-4436**

Kansas

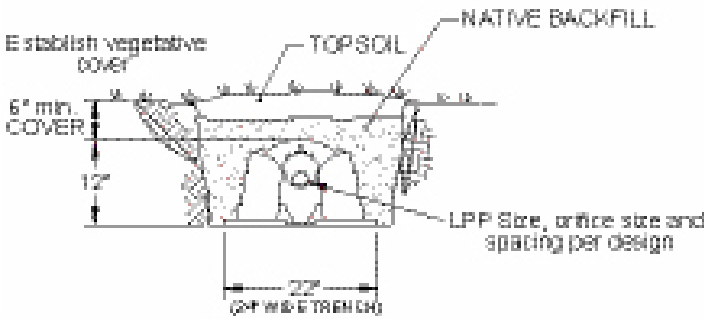
# CHAMBERS

## Quick4 Equalizer 36

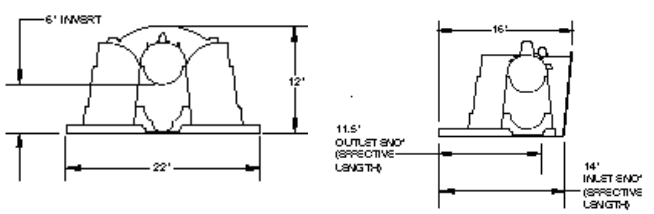
| Nominal Chamber Dimensions | |
|---|---|
| Size: | 22”W x 53”L x 12”H |
| Effective Length: | 48” |
| Chamber Rating: | 5 sf/lf |
| Required Invert Elevation: | Varies by pipe size |

CHAMBER: SIDE VIEW


CHAMBER LPP TRENCH DETAIL




ENDCAP: FRONT VIEW, SIDE VIEW

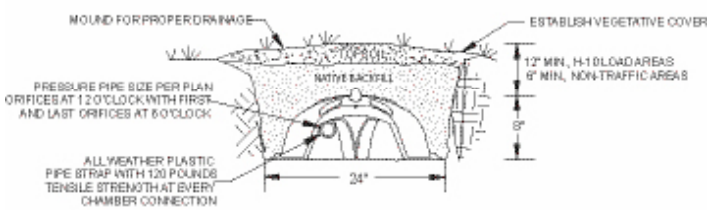



## Quick4 Plus Equalizer 36 Low Profile (LP)

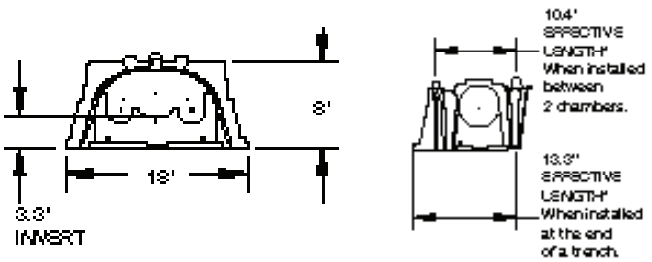
| Nominal Chamber Dimensions | |
|---|---|
| Size: | 22”W x 53”L x 8”H |
| Effective Length: | 48” |
| Chamber Rating: | 5 sf/lf |
| Required Invert Elevation: | Varies by pipe size |

CHAMBER: SIDE VIEW


CHAMBER LPP TRENCH DETAIL



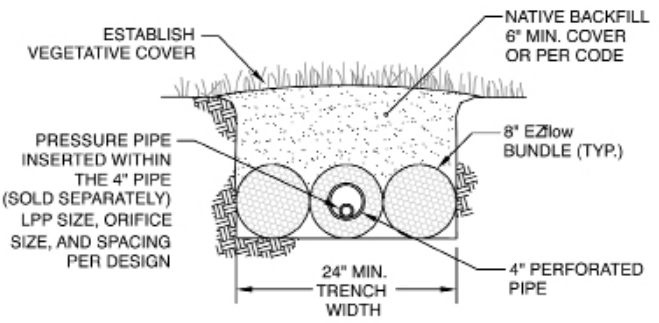

ENDCAP: FRONT VIEW, SIDE VIEW

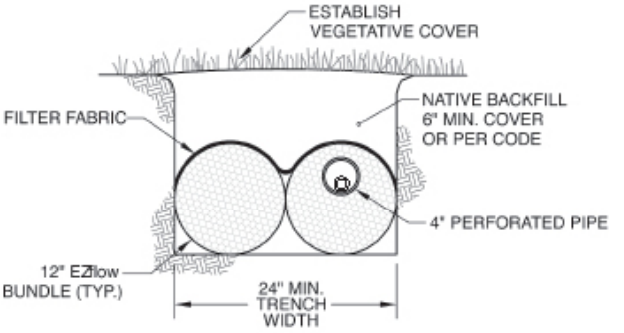


# EZFLOW

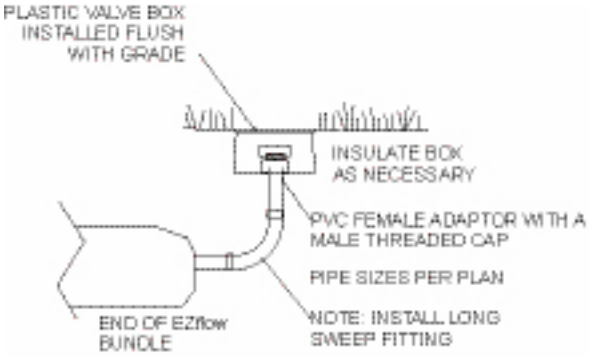
| EZflow 0803 | |
|---|---|
| Nominal Dimensions | |
| Size: | 8” dia x 10 ft |
| Effective Length: | 10 ft |
| Rating: | 5 sf/lf |
| Invert Elevation: | Varies |

| EZflow 1202 | |
|---|---|
| Nominal Dimensions | |
| Size: | 12” dia x 10 ft |
| Effective Length: | 10 ft |
| Rating: | 5 sf/lf |
| Invert Elevation: | Varies |



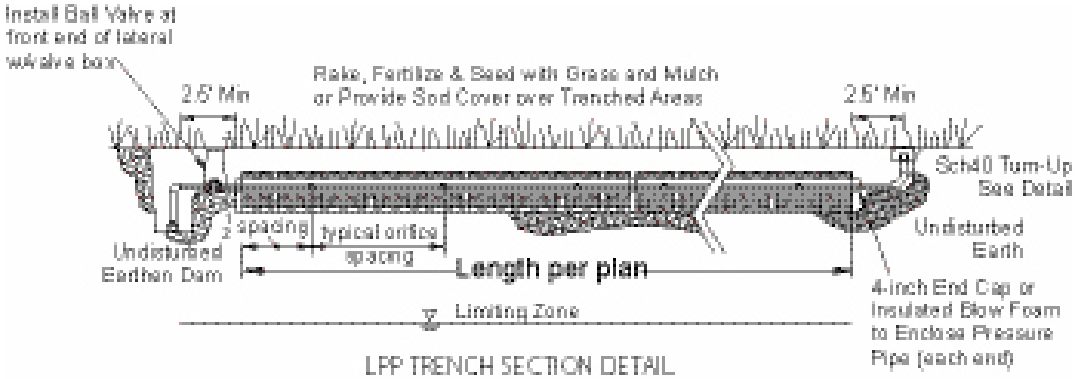




### EZflow Flush Assembly




FLUSH ASSEMBLY TURN-UP DETAIL

### EZflow Trench Section Detail




LPP TRENCH SECTION DETAIL

## SIZING INFORMATION

| TABLE 1: FLOWS AND LOADS | |
|---|---|
| Design Wastewater Flow (DWF) for a single family residence. | 150 gallons per day per bedroom |
| Number of effluent doses | Must conform to the requirements of the receiving component design |
| Wastewater particle size | < 1/8 inch diameter |
| Volume of a single dose to a distribution cell | > 5 times the void volume of the distribution lateral(s) and = 20% of the Design Wastewater Flow |
| Head pressure at distal end of lateral(s) | 3.0 ft. for 5/32 inch orifices |
| Network pressure compensation for fittings | = Distal head pressure x 30 percent |
| Flow velocity in force main and manifold | > 2 ft/sec and < 10 ft/sec |

**TABLE 2: DISCHARGE RATES IN GALLONS PER MINUTE FROM ORIFICIES[1]**

| Pressure (ft) | Orifice Diameter (in) | | | |
|---|---|---|---|---|
| | 1/8 | 5/32 | 3/16 | 1/4 |
| 2.5 | NP | NP | 0.66 | 1.17 |
| 3 | NP | NP | 0.72 | 1.28 |
| 3.5 | NP | 0.54 | 0.78 | 1.38 |
| 4 | NP | 0.58 | 0.83 | 1.47 |
| 4.5 | NP | 0.61 | 0.88 | 1.56 |
| 5 | 0.41 | 0.64 | 0.93 | 1.65 |
| 5.5 | 0.43 | 0.68 | 0.97 | 1.73 |
| 6 | 0.45 | 0.71 | 1.02 | 1.80 |
| 6.5 | 0.47 | 0.73 | 1.06 | 1.88 |
| 7 | 0.49 | 0.76 | 1.10 | 1.95 |
| 7.5 | 0.50 | 0.79 | 1.14 | 2.02 |
| 8 | 0.52 | 0.81 | 1.17 | 2.08 |
| 8.5 | 0.54 | 0.84 | 1.21 | 2.15 |
| 9 | 0.55 | 0.86 | 1.24 | 2.21 |
| 9.5 | 0.57 | 0.89 | 1.28 | 2.27 |
| 10 | 0.58 | 0.91 | 1.31 | 2.33 |

**NOTE:** [1]Table is based on discharge in GPM = 11.79 x Orifice Diameter$^2$ in Inches x (Pressure in Feet)$^{1/2}$. NP means Not Permitted.
Source: *Pressure Distribution Network Design* by James C. Converse, January 2000.

**TABLE 3: VOID VOLUME FOR VARIOUS DIAMETER PIPES BASED ON NOMINAL I.D.[1]**

| Nominal Pipe Size | Gallons per Foot |
|---|---|
| ¾ | 0.023 |
| 1 | 0.041 |
| 1-1/4 | 0.064 |
| 1-1/2 | 0.092 |
| 2 | 0.163 |
| 3 | 0.367 |
| 4 | 0.65 |
| 6 | 1.469 |

**NOTE:** [1]Table is based on - $\pi(d/2)_2$ x 12”/ft π231 cu.in./cu.ft.
Where: d = nominal pipe size in inches.
Source: *Pressure Distribution Network Design* by James C. Converse, January 2000.

## SIZING INFORMATION

**TABLE 4: FRICTION LOSS (FOOT/100 FEET) IN PLASTIC PIPE**

| | NOMINAL PIPE SIZE | | | | | | |
|---|---|---|---|---|---|---|---|
| Flow in GPM | 3/4 | 1 | 1-1/4 | 1-1/2 | 2 | 3 | 4 |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | 3.24 | | | | | | |
| 4 | 5.52 | | | | | | |
| 5 | 8.34 | 2.06 | | | | | |
| 6 | 11.68 | 2.88 | | | | | |
| 7 | 15.53 | 3.83 | | | | | |
| 8 | 19.89 | 4.91 | 1.66 | | | | |
| 9 | 24.73 | 6.10 | 2.06 | | | | |
| 10 | 30.05 | 7.41 | 2.50 | | | | |
| 11 | 35.84 | 8.84 | 2.99 | | | | |
| 12 | 42.10 | 10.39 | 3.51 | 1.44 | | | |
| 13 | 48.82 | 12.04 | 4.07 | 1.67 | | | |
| 14 | 56.00 | 13.81 | 4.66 | 1.92 | | | |
| 15 | | 15.69 | 5.30 | 2.18 | | | |
| 16 | | 17.68 | 5.97 | 2.46 | | | |
| 17 | | 19.78 | 6.68 | 2.75 | | | |
| 18 | | 21.99 | 7.42 | 3.06 | | | |
| 19 | | 24.30 | 8.21 | 3.38 | | | |
| 20 | | 26.72 | 9.02 | 3.72 | 0.92 | | |
| 25 | | 40.38 | 13.63 | 5.62 | 1.39 | | |
| 30 | | | 19.10 | 7.87 | 1.94 | | |
| 35 | | | 25.41 | 10.46 | 2.58 | | |
| 40 | | | 32.53 | 13.40 | 3.30 | | |
| 45 | | | | 16.66 | 4.11 | 0.57 | |
| 50 | | | | 20.24 | 4.99 | 0.69 | |
| 60 | | | | | 7.00 | 0.97 | |
| 70 | | | | | 9.31 | 1.29 | |
| 80 | | | | | 11.91 | 1.66 | 0.41 |
| 90 | | | | | 14.81 | 2.06 | 0.51 |
| 100 | | | | | 18.00 | 2.50 | 0.62 |
| 125 | | | | | | 3.78 | 0.93 |
| 150 | | | | | | 5.30 | 1.31 |
| 175 | | | | | | 7.05 | 1.74 |
| 200 | | | | | | 9.02 | 2.23 |
| 250 | | | | | | | 3.36 |
| 300 | | | | | | | 4.71 |
| 350 | | | | | | | 6.27 |

**NOTES:** The gray areas on the left side of the above table are velocities that exceed 10 feet per second and the gray areas on the right side of the table are velocities that are below 2 feet per second.

Table is based on Hazen-Williams Formula:
$h = 0.002082L \times (100/C)^{1.85} \times (gpm^{1.85} / d^{4.8655})$
Where: h = feet of head L = length in feet C = Friction factor from Hazen-Williams (145 for plastic pipe)
gpm = gallons per minute d = Nominal pipe size

* Velocities exceeding 10 feet per second are too great for various flow rates and pipe diameter.

Source: *Pressure Distribution Network Design* by James C. Converse, January 2000.

## Before You Begin

**Quick4 Plus Chambers may only be installed according to State and/or local regulations. If unsure of the installation requirements for a particular site, contact the local unit of government.**

All systems require a design, which includes a thorough site and soil evaluation of system sizing and the issuance of a local permit to construct the system. The system installer must schedule required regulatory inspections.

**Materials and Equipment Needed**

- ☐ Quick4 Plus Chambers
- ☐ Endcaps
- ☐ PVC Pipe and Couplings
- ☐ Backhoe
- ☐ Laser, Transit or Level
- ☐ Shovel and Rake
- ☐ Tape Measure
- ☐ Utility Knife
- ☐ Hole Saw*
- ☐ 2-inch Drywall Screws*
- ☐ Screw Gun*
- ☐ Small Valve-cover box*
- ☐ 4-inch Cap for Inspection Port

*Optional

**These guidelines for construction machinery must be followed during installation.**

- ☐ Avoid direct contact with chambers when using construction equipment. Chambers require a 12-inch minimum of compacted cover to support a wheel load rating of 16,000 lbs/axle or equivalent to an H-10 AASHTO load rating.
- ☐ Only drive across the trenches when necessary. Never drive down the length of the trenches.
- ☐ To avoid additional soil compaction, never drive heavy vehicles over the completed system.

## Excavating and Preparing the Site

**NOTE:** As is the case with conventional systems, do not install the systems in wet conditions or in overly moist soils, as this causes machinery to smear the soil.

**1.** Stake out the location of all chamber lines. Set the elevations of the tank, pipe, and system bottom.
**2.** Install sedimentation and erosion control measures. Temporary drainage swales/berms may be installed to protect the site during rainfall events.
**3.** Excavate and level the trenches with proper center-to-center separation. Verify that the bottom of the system is level and that it is at least 3 feet above the limiting layer.

**NOTE:** Over excavate the trench width in areas where the chamber line will contour.

**4.** Rake the bottom and sides if smearing has occurred while excavating. Remove any large stones and other debris. Do not use the bucket teeth to rake the trench bottom. Minimize or avoid walking in the trench to prevent compaction, loss of soil structure, and the subsequent reduction in the soil's infiltrative capacity.

**NOTE:** Raking to eliminate smearing is not necessary in sandy soils. In fine textured soils (silts and clays), avoid walking in the trench to prevent compaction and loss of soil structure.

**5.** Verify that the bottom of the system is level using a level, transit or laser.

## Installing the Chambers and Endcaps

**1.** To allow pressure laterals to drain after each dose, drill a hole in the bottom of the pipe at the end of the pressure line. Place the snap-off splash plate or a paving block at the bottom of the trench to protect the infiltrative surface from erosion.
**2.** With a hole saw, drill out the appropriate diameter hole to accommodate the pressure lateral pipe.
**3.** Insert the pressure lateral pipe into the end cap's drilled opening and slide it into the manifold pipe. Glue the pressure lateral pipe to the manifold pipe.
**4.** With the pressure lateral pipe through the end cap, place the back edge of the end cap over the inlet end of the first chamber. Be sure to line up the locking pins on the top of both the chamber and endcap.

**2.** Drill pressure pipe hole.

**4.** Place endcap over inlet end.

**NOTE:** Health departments may require a wet-run pressure check to be done prior to chamber installation when the pipe is laying on the ground. Check with your local health department for the proper procedure.

**5. Method A**
Secure the pressure lateral pipe to the top of the first chamber with a plastic pipe strap at the outlet end of the unit. Slide the strap up through a slot in the chamber top, down through the other slot, and cinch the two ends around the pipe.

**6. Method B**
With the holes pointing up, stabilize the pressure lateral pipe on the ground to prevent it from moving.

**5.** Secure pressure pipe.

**7.** Lift and place the next chamber onto the previous one at a 45-degree angle. Line up the chamber end between the connector hook and locking pin at the top of the first chamber. Lower it to the ground to engage the interlocks.

**8. Method A**
Secure the lateral pipe to the top of the next chamber once in place. Follow the same method in Step 5.

**9.** Continue interlocking chambers and securing the pipe until the trench is completed.

**10.** Before attaching the final end cap, it may be necessary to remove the tongue of the connector hook on the last chamber with a pair of pliers depending on your pipe diameter.

**11.** Insert the pressure lateral pipe through the hole in the final end cap and slide the end cap toward the last chamber. Lift the end cap over the modified connector hook and push straight down to secure it to the chamber.

**11.** Lateral pipe through endcap.

**NOTE:** If cleanout extensions are required, use a hole saw to cut a hole in the top of the Quick4 Plus All-in-One 8 Endcap so the pressure lateral pipe with an elbow can extend to the ground surface. For cleanout access, use the "Installing Optional Inspection Ports" section in the general installation instructions.

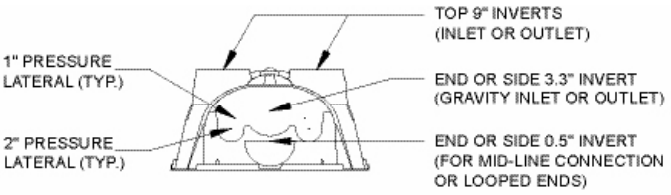
**12.** If installing multiple rows of chambers, follow Steps 1-9 to lay the next row of chambers parallel to the first. Keep a minimum separation distance between each row of chambers as required by local code.

**Advantages of Method A**

- Pipe and orifice placed closer to the chamber dome offer improved distribution.
- Pipe positioned at the top of the chamber places it well above effluent.
- Plastic pipe hanger easily secures pipe in place.

**Advantages of Method B**

- Pipe resting on the trench bottom allows easy installation and maintenance.
- Stabilizing "T's" keep pipe level.
- System promotes efficient pressure checks.
- Pipe resting on the trench bottom allows easier inspections if monitoring ports are installed.




## COVERING THE SYSTEM

**Before backfilling, the system must be inspected as required by State regulations. Create an as-built drawing at this time for future records.**

**1.** Backfill the trench by pushing fill material over the chambers with a backhoe. Keep a minimum of 12 inches of compacted cover over the chambers before driving over the system.

**NOTE:** Do not drive over system while backfilling in sand.

**2.** It is best to mound several inches of soil over the finish grade to allow for settling. This also ensures that runoff water is diverted away from the system.

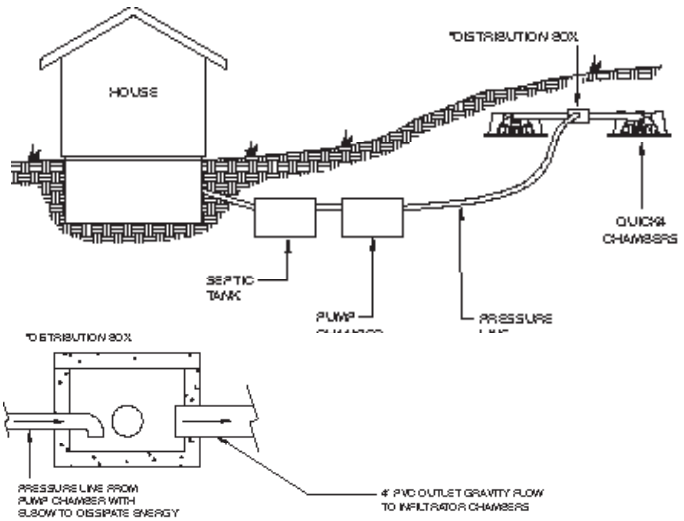
**3.** After the system is covered, the site should be seeded or sodded to prevent erosion.

**NOTE:** If the system is for new home construction, it is important to leave marking stakes along the boundary of the system. This will show contractors where the site is located so they will not cross it with equipment or vehicles.

## PUMP UP DISTRIBUTION SYSTEMS

In a pump up system, the effluent is pumped to a distribution box which receives a predetermined dosing volume of effluent. It is then gravity fed to the leaching area and distributed to the rows or trenches within the leachfield. This design is commonly confused with a pressure dosed system because the two share much of the same equipment. The main difference between the two lies in how the effluent is distributed within each trench. In a pressure dosed system, the effluent is distributed throughout the trench with a pressurized pipe. In a pump up system, the effluent is gravity fed as shown in the figure below.

## PUMP UP SYSTEM ILLUSTRATION



# INSTALLATION INSTRUCTIONS – EZFLOW

See local Environmental Health Department for use of Infiltrator Water Technologies EZflow brand 0803H/0803H-GEO and 1202H/1202H-GEO drainfield products. Please see local county for permit approval.

The EZflow 803H/0803H-GEO and 1202H/1202H-GEO are approved as a new technology system at the specified sizing:

| | |
|---|---|
| 0803H/0803H-GEO | 5 SF/FT |
| 1202H/1202H-GEO | 5 SF/FT |

Any site where EZflow products are installed must meet the same site, soil, soil evaluation, repair area, construction, and all other requirements imposed for a standard gravel drainfield.

## MATERIALS & EQUIPMENT NEEDED

- EZflow Bundles
- Pipe for Header and Inlet
- Laser, Transit or Level
- EZflow Internal Pipe Couplers
- Backhoe
- Shovel & Rake

## INSTALLATION INSTRUCTIONS

The instructions for EZflow products are given below. This product must be installed in accordance with the appropriate state regulations and codes.

In cases where linear footage required is not in multiples of 10, the installer may (a) reduce the product to needed length and refasten netting to the pipe or, (b) use an additional 5 or 10 feet of product to exceed the required trench length.

**1.** After the local health department has issued a permit, stake or mark the location of the trenches and lines. Then, set the tank, invert pipe, headerline/distribution box, and trench elevations. Care should be taken to maintain the required vertical separation of at least 12-inches to the seasonal groundwater table.

**2.** To prevent smearing or compaction of soil, drainfields are not to be installed in soils with textures finer than sand, loamy sand or sandy loam, or where the soil moisture content is above the point at which the soil changes from semi-solid to plastic. If smearing or glazing of trench sidewalls and bottom has occurred in clay soils, it is recommended that these soil surfaces be raked or scarified.

**3.** The center to center spacing shall be 5'.

**4.** Remove the plastic stretch wrap from the EZflow bundles prior to placing them in the trench(es). Remove any stretch wrap in the trench or bed before the system is covered.

**5.** Place the EZflow bundle(s) in the approved configuration. The center-most bundles containing pipe are joined end to end with an internal pipe coupler. The aggregate-only bundles should be butted against the other aggregate-only bundles and do not require any type of connection.

**6.** The top of each GEO cylinder contains a pre-manufactured filter fabric between the netting and aggregate. The installer shall ensure that the fabric is on top and is in contact with the fabric contained in the adjacent cylinder before backfilling. The span of fabric at each sidewall shall not exceed 180 degree reach (i.e. 9 o'clock to 3 o'clock).

**7.** The trench bottom shall be level or with a downward slope not exceeding one (1) inch per ten (10) feet.

**8.** EZflow EPS bundles are flexible and can fit in curved trenches, as needed, to avoid trees or other obstacles.

**9.** Soil material excavated from trenches, if suitable per code, should be used in backfilling and should be left mounded over the trenches until initial settling has taken place. Soil within 6" of the EPS bundles shall be loosely placed and not compacted.

## INSPECTION

Before covering the system, it shall be inspected by the department. The area of the disposal field shall not be used for vehicular traffic, parking, or underground utilities (i.e. water lines). Dozers, trucks, and other heavy vehicles shall not be allowed to run over the septic tank, drainfield or other parts of the system.

## SPECIAL PROCEDURE

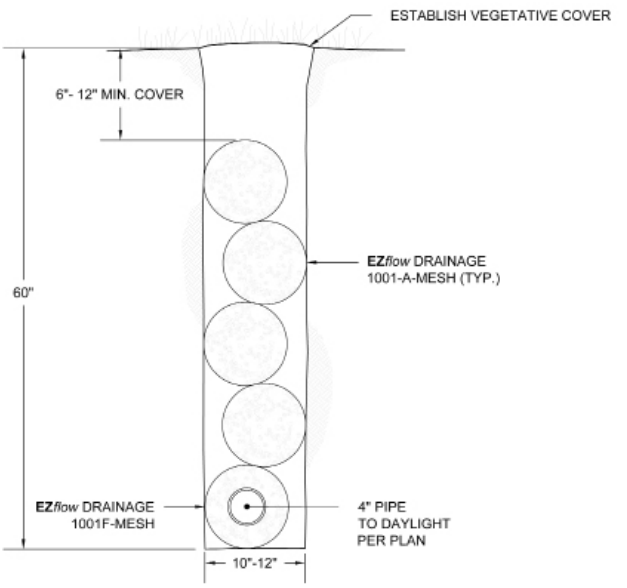
**EZFlow may only be installed according to State and/or local regulations. If unsure of the installation requirements for a particular site, contact the local unit of government.**

**1.** To allow pressure laterals to drain after each dose, drill an orifice in the bottom of the pipe at each end of the pressure line. All other orifices shall be drilled in the 12 o'clock position.

**2.** Insert the pressure line into the 4" pipe through the EZflow and push it through the entire run. Check to ensure that the orifices are in the 12 o'clock position.

**3.** Install additional rows as needed.

**NOTE:** If the site has proper grade (enough fall) or a location to daylight a drain then curtain drains may be considered. Please consult with the soil scientist for the curtain drain design.



# Kansas Low Pressure Piping (LPP) Design Guidelines

## Sizing

The absorption capacity for the soils utilizing LPP private sewage disposal systems shall be determined by local Environmental Health Department or local permitting agency. Unless stated or address within this document, the remainder of the private sewage disposal system and all other components shall be sized or in compliance with local code.

## Design

Primary treatment

LPP private sewage disposal systems for residential property may utilize an NSF Standard 40 unit, septic tank utilizing an approved effluent filter, or an alternative primary treatment unit approved by the Department. When a septic tank is used the outlet effluent filter shall have been tested and met NSF Standard 46, Section 10 requirements. LPP private sewage disposal systems for non-residential properties treating waste that is not typical of residential strength waste shall utilize an NSF Standard 40 unit or an alternative primary treatment unit approved by the Department.

Any LPP private sewage disposal system that is designed to have a daily flow of 801 gallons or above shall be timed dosed.

It is not mandatory but highly recommended that an elapsed time meter and cycle counter be incorporated for each pump in the control panel.

No reduction in the size of the subsurface seepage system shall be given for utilizing a NSF Standard 40 or alternative primary treatment unit approved by the Department.

The width of the subsurface seepage system material shall determine the square feet per liner feet required for LPP private sewage disposal system. See Subsurface Seepage Systems section below.

There shall be a minimum of 12 inches of vertical separation from the bottom of the trench to any limiting layer or seasonal high water table.

Slopes

LPP private sewage disposal system shall be installed on sites with less than a 10% slope.

Pump and Dosing Chamber Tank

Submersible sewage effluent pumps with appropriate on/off controls for controlling dosing and a high water alarm shall be provided. A sump pump is not an approved pump.

The submersible sewage effluent pump shall be rated and designed to provide efficient pressure for a 3 foot squirt height for each individual distribution line at the same time to meet the total dynamic head required for the system design.

The system shall be designed to be dosed 2-8 times a day, so as to allow the field to rest and absorb effluent between doses. The dosing and resting periods allows for aerobic conditions in the soil and around the subsurface seepage system.

The dosing chamber tank shall be designed so effluent will not leave the chamber when not being dosed. This will require the use of an anti-siphon hole or other controlling measure. This will be required for private sewage disposal system with the dosing chamber tank located higher in elevation than the subsurface seepage system.

Manifold Piping

The piping material from the pump and dosing chamber tank to the manifolds and the manifold shall be 2 inch scheduled 40 pipe. A different size of pipe may be utilized for the private sewage disposal system if it is designed and certified by a Professional Engineer licensed by the State of Illinois. The piping system shall be designed to drain after each dose is complete.

Distribution Piping

The piping material from the manifold and throughout the distribution system shall be 1 ½ inch scheduled 40 pipe. A schedule 40, 90° bend turned up with a threaded end shall be installed on the distribution line at the distal end of the line for all distribution lines in the distribution piping system of the subsurface seepage system.

5/32 inch diameter holes shall be drilled every 5 feet on the top of the distribution line. One 5/32 inch diameter hole shall be drilled on the bottom of both ends of each distribution line located 1

to 2 feet from the end of the trench to allow for the distribution and manifold pipe to drain completely.

LPP private sewage disposal systems may utilize any of the following approved subsurface seepage system:

- Chambers systems
- Gravel systems
- EPS aggregate systems
- Any other subsurface seepage system that has been approved by the Department, for LPP private sewage disposal systems.

Gravel systems will be required to utilize orifice shields to protect from infiltration into the pipe if the distribution pipe is not inserted into a secondary pipe such as a corrugated or perforated pipe.

Chamber systems, EPS aggregate systems, and any other approved subsurface seepage system shall have the distribution lines suspended underneath and within the top of the subsurface seepage system. If the subsurface seepage system contains a pipe integrated within product the distribution line may be inserted within this pipe.

Minimum product height for any subsurface seepage system of an LPP private sewage disposal system is 8 inches.

The maximum trench width for a subsurface seepage system is 3 feet for a LPP private sewage disposal system.

Subsurface seepage systems shall be sized as follows:

| LPP Subsurface Seepage System Product Width (Inches) | Bottom Area Ratting (Square Feet/Linear Foot) |
|---|---|
| $8 \leq X \leq 12$ | 3.0 |
| $12 < X \leq 16$ | 4.0 |
| $16 < X \leq 36$ | 5.0 |

Ball Valves

Ball valves shall be installed between the manifold and the subsurface seepage systems on each distribution line. The ball valves shall be adjusted so as to achieve the pressure required for a 3 foot squirt height for each individual distribution line at the same time.

Each ball valve shall be housed in a compartment with access to the ground surface so that the valve can be easily accessed and adjustments can be made to the ball valves after installation.

Surface and Site Drainage

It is critical to the performance of the LPP private sewage disposal system that the following issues area address:

1. Diversion of surface water over the subsurface seepage systems.
2. Interception of shallow or seasonal perched water upslope of the system.

Addressing these issues is critical on sites with concave or lower slop positions with soils having a restrictive horizon near the surface. If these conditions occur modifications to the site to redirect or intercept surface and ground water will be required.

## Installation

Trenches

The trenches shall have a maximum depth of 18 inches. The subsurface seepage system shall be installed in native soil, but may be covered by fill. The bottom of each trench shall be level. Level for this Part shall mean plus or minus ½ inch in any direction over the entire length of the trench on each individual distribution line.

There shall be a minimum of a two feet earthen dam of undisturbed soil between the end of the subsurface seepage system and the ball valve and the 90° turn on the distal end of the distribution line. The dam must separate the subsurface seepage system trench from the ball valve and 90° turn.

Pressure Requirements

The dosing pump for the LPP private sewage disposal system shall be required to provide the required total dynamic head (TDH) to achieve the 3 foot of squirt pressure required for each distribution line.

Separation distance

The trenches of the subsurface seepage system shall have a minimum of 5 feet center-to-center spacing.

## Maintenance and Operation Inspections

LPP private sewage disposal system shall be inspected annually to ensure the system is operating as designed. The system will need to be inspected at a more frequent interval if it utilizes an NSF Standard 40 unit or if it is mandated by the manufacture of a specific component within the private sewage disposal system.

Annual routine maintenance shall at a minimum consist of the following:

- Evaluate the pump to ensure it is providing the proper dose volume. If it is not reset pressure head via the ball valves.
- Evaluate the pressure and squirt height for each individual line to ensure operation at the required design rate.
- If there is a line clogged it may require shutting off the ball valves to all other distribution lines to flush forward the individual line. Upon completion reset the ball valves for each line to achieve the 3 foot squirt height required.
- Evaluate the septic tank to assure proper function and sound condition. Determine if it needs to be serviced or pumped to remove excess solids.
- The septic tank filter located in the outlet baffle shall be inspected and cleaned as is necessary to assure performance of the filter.
- If the LPP private sewage disposal system utilizes a NSF Standard 40 unit, then this unit will have to be serviced as mandated by the manufacture or as established by the Department.
- The screens on the dosing pump need to be checked and cleaned.
- Assure that the timer or float dosing switch is properly dosing the appropriate amount of effluent and adjust the time of does or the length of the float to meet the designed requirements for the system.
- The ground surface above and around the subsurface seepage field needs to be evaluated for signs of failure or improper performance.
- Evaluate the dosing chamber tank to ensure it is in sound condition and free of solids or fats, oils and grease.

# Kansas Health Department

## Low Pressure Piping (LPP) Private Sewage Disposal (PSD) System Worksheet

Date: _____ Name (Site/Owner): _____

Address: _____

PSD Installation Contractor: _____ License #: _____

### LPP private sewage disposal system constants for the State of Kansas

Schedule 40, 1½ inch distribution lines
Schedule 40, 2 inch manifold lines
3 foot of pressure head
5/32 hole diameter every 5 foot
5 foot minimum center-to-center spacing on subsurface seepage trenches

### CHECKLIST

Depth of trench: _____

Slope: _____

Designed Daily Flow: _____

Septic Tank Size: _____

Dose Chamber Tank Size: _____

Dosing Chamber Tank Manufacturer:

_____

Total Lateral Line Length: _____

Limiting Layer: _____

Depth to Limiting Layer: _____

Dosing Volume: _____

TDH: _____

Measured Length + Fitting Loss = _____

Pumping: ❍ Uphill ❍ Downhill

Curtain Drain: ❍ Yes ❍ No

Completed worksheet: ❍ Yes ❍ No

Distance Between Trenches: _____

Elevation of Highest Point on Supply line: _____

Dosing Chamber Tank Elevation: _____

Septic Tank Elevation: _____

Brand of Effluent Pump: _____

Size of Effluent Pump: _____

Brand of Effluent Filter in Septic Tank:

_____

Number of subsurface seepage trenches: _____

Total Square Feet:

_____ GPM at _____ Ft. of Head

❍ Name: _____

❍ Soil Analysis Provided by: _____

# KANSAS LPP WORKSHEET

## Determine Maximum Daily Design Flow

**Residential**

**(1)** ____ bedrooms at 200 gallons/day/bedroom = _____ gallons/day

**Non-residential**

**(2)** Gallons/day determined by Code Appendix A, Illustration A = _____ gallons/day

## Absorption Area

**Residential**

**(3)** Design Group: ____ **(4)** Square feet/ bedroom: _____

**(5)** Total Square Feet **(1) x (4) =** _____ Square Feet

**Non-residential**

**(6)** Loading rate from soil analysis & Appendix A, Illustration A of the Code: ____

**(7)** Square feet/Day **(2)** ÷ **(6)** = _____

**Liner feet of subsurface seepage system:**

**(8)** Residential **(5)** ÷ (Bottom Area Ratting (**Table 1** below): _____ Liner Feet

**(9)** Non-residential **(7)** ÷ (Bottom Area Ratting (**Table 1** below): _____ Liner Feet

**(10)** Number of Lateral Lines*: _____ ***(*Note: Lateral Lines cannot exceed 70 feet.)***

**(11)** Length of lateral lines: _____

**Table 1**

| LPP Subsurface Seepage System Product Width (Inches) | Bottom Area Ratting (Square Feet/Linear Foot) |
|---|---|
| $8 \leq X \leq 12$ | 3.0 |
| $12 < X \leq 16$ | 4.0 |
| $16 < X \leq 36$ | 5.0 |

## Dosing Rate

Holes

**(12)** Holes per line ( ___ (feet in each line) ÷ 5 (Spacing in feet between holes) = _____

**(13)** Total number holes (**(12) x (10)) =** _____

Flow Rate

5/32 inch holes at 3 feet pressure head = .50 gallons/minute (GPM).

**(14)** Flow rate (.50 (GPM) x **(13)** = _____ GPM

**Total Dynamic Head (TDH) = Static Head (15) +Operating Head (16) +Friction Head (19)**

**(15)** Static Head (vertical distance from pump turn off level to the point of discharge) = _____

**(16)** Operating Head = 3 (feet of pressure)

**(17)** (Total pipe length in distribution system) + (Total of all equivalents for every fittings (Table 3)

= ____ feet

**Table 2 – Friction loss per 100 Feet of Plastic Pipe**

| Flow Rate GPM | Pipe size (inches) 1 ½ | 2 |
|---|---|---|
| 5 | 0.20 | |
| 6 | 0.30 | |
| 7 | 0.40 | |
| 8 | 0.50 | |
| 9 | 0.60 | |
| 10 | 0.70 | 0.20 |
| 12 | 1.10 | 0.30 |
| 14 | 1.30 | 0.40 |
| 16 | 1.70 | 0.50 |
| 18 | 2.10 | 0.60 |
| 20 | 2.50 | 0.90 |
| 21 | | 0.95 |
| 25 | 3.80 | 1.30 |
| 30 | 5.20 | 1.80 |
| 35 | | 2.40 |
| 40 | | 3.10 |
| 45 | | 3.80 |
| 50 | | 4.70 |

**Table 3 – Friction Losses Through Plastic Fittings In Terms of Equivalent Lengths of Plastic Pipe**

| Type of Fitting | Nominal Size Fitting & Pipe (Inches) Equivalent Length of Pipe – Feet 1 ½ | 2 |
|---|---|---|
| 90° Standard Elbow | 8.0 | 9.0 |
| 45° Elbow | 3.0 | 4.0 |
| Standard Tee | 9.0 | 11.0 |
| Check Valve | 13.0 | 17.0 |
| Coupling or Quick Disconnect | 1.0 | 2.0 |
| Ball Valve | 1.1 | 1.4 |

**(18)** **(17)** ÷ 100 = _____ (This gives you feet in 100' increments)

**(19)** Calculate Friction Head = **(18)** multiplied by the value for the flow rate **(14)** in Table 2.
**(18)** x (value from **(14)** for 2" pipe in **Table 2**) = ____ Friction head in gal/min in 2" pipe.

**TDH = (15) + (16) + (19) = _____**

The TDH value will allow you to determine what type of pump will be best for the system size and design. To assure proper design and performance make sure that you use the right pump curve chart that is designed for the system specifications and type of pump to be used. Compare the TDH in feet by the total gallons per minute, to assure the correct pump size.

**Dosing Volume**

**Volume Dose = Volume Supply Lines + Volume Lateral Lines**

**(20)** Supply line = ____ feet of 2 inch pipe

**(21)** Volume Supply = **(20)** ÷ 100 ft.) X 16.2 gallons (gallons/100 feet of Sch. 40) = _____ gallons

**(22)** Lateral Lines = _____ feet (total of 1¼ inch pipe)

**(23)** Volume Lateral = **(22)** ÷ 100 ft.) x 9.2 gallons (gallons/100 feet of Sch. 40) = _____ gallons

**(24)** Volume Dose = **(21)** + **(23)**

**(25)** Gallons per inch for the dose tank being used = _____ (provided by manufacturer of tank.)

**(26)** Dosing volume = **(2)** ÷ (number of doses per day *(2 to 8)* + **(24)** = _____ gallons

**(27)** Minimum Tank capacity required = **(2)** + **(26)** = ____ gallons *(500 gallon minimum)*

**(28)** Float switch depth = **(26)** ÷ **(25)** = _____ inches.

**(29)** Timed Dosing = **(26)** x **(14)** = ___ pump run time in minutes.

# WARRANTY: EZFLOW

## INFILTRATOR WATER TECHNOLOGIES EZFLOW LIMITED WARRANTY

a) The structural integrity of each EZflow by Infiltrator expanded polystyrene drainfield system and other accessories manufactured by EZflow by Infiltrator ("Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one year from the date that the septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required by applicable law, the warranty period will begin upon the date that installation of the septic system commences. To exercise its warranty rights, Holder must notify Infiltrator in writing at its Corporate Headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for Units determined by EZflow by Infiltrator to be covered by this Limited Warranty. EZflow by Infiltrator's liability specifically excludes the cost of removal and/or installation of the Units.

(b) THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE UNITS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

(c) This Limited Warranty shall be void if any part of the EZflow system is manufactured by anyone other than EZflow by Infiltrator. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage are damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting or improper sizing, excessive water usage, improper grease disposal, or improper operation; or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty. Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party.
For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Infiltrator's installation instructions.

(d) No representative of Infiltrator has the authority to change or extend this Limited Warranty. No warranty applies to any party other than the original Holder.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of Units should contact Infiltrator's Corporate Headquarters in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of Units.

# WARRANTY: STANDARD

## INFILTRATOR WATER TECHNOLOGIES, LLC ("INFILTRATOR")

### INFILTRATOR® SEPTIC TANK LIMITED WARRANTY FIVE (5) YEAR MATERIALS AND WORKMANSHIP LIMITED WARRANTY

(a) This limited warranty is extended to the end user of an Infiltrator Tank. A Tank manufactured by Infiltrator, when installed and operated in accordance with Infiltrator's installation instructions and local regulation by a licensed installer, is warranted to you: (i) against defective materials and workmanship for five (5) years after installation. Infiltrator will, at its option, (i) repair the defective product or (ii) replace the defective materials. Infiltrator's liability specifically excludes the cost of removal and/or installation of the Tank.

(b) In order to exercise its warranty rights, you must notify Infiltrator in writing at its corporate headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect.

(c) YOUR EXCLUSIVE REMEDY WITH RESPECT TO ANY AND ALL LOSSES OR DAMAGES RESULTING FROM ANY CAUSE WHATSOEVER SHALL BE SPECIFIED IN SUBPARAGRAPH (a) ABOVE. INFILTRATOR SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND, HOWEVER OCCASIONED, WHETHER BY NEGLIGENCE OR OTHERWISE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITA- TION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

(d) THIS LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY GIVEN BY INFILTRATOR AND SUPERSEDES ANY PRIOR, CONTRARY, ADDITIONAL, OR SUBSEQUENT REPRESENTATIONS, WHETHER ORAL OR WRITTEN. INFILTRATOR DISCLAIMS AND EXCLUDES TO THE GREATEST EXTENT ALLOWED BY LAW ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FINESSE FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. NO PERSON (INCLUDING ANY EMPLOYEE, AGENT, DEALER, OR REPRESENTATIVE) IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY CONCERNING THIS PRODUCT, EXCEPT TO REFER YOU TO THIS LIMITED WARRANTY. EXCEPT AS EXPRESSLY SET FORTH HEREIN, THIS WARRANTY IS NOT A WARRANTY OF FUTURE PERFORMANCE, BUT ONLY A WARRANTY TO REPAIR OR REPLACE.

(e) YOU MAY ASSIGN THIS LIMITED WARRANTY TO A SUBSEQUENT PURCHASER OF YOUR HOME.

(f) NO REPRESENTATIVE OF INFILTRATOR HAS THE AUTHORITY TO CHANGE THIS LIMITED WARRANTY IN ANY MANNER WHATSOEVER, OR TO EXTEND THIS LIMITED WARRANTY.

(g) NO WARRANTY OF ANY KIND IS MADE WITH REGARD TO ANY PRODUCT, COMPONENTS, DEVICES, MEDIA OR TREATMENT UNITS WHICH ARE MANUFACTURED BY OTHERS AND ARE INSTALLED IN AN INFILTRATOR TANK. USE OF THESE PRODUCTS ARE AT YOUR OWN RISK.

(h) THE INFILTRATOR TANK IS DESIGNED TO BE BURIED UNDERGROUND. NO WARRANTY OF ANY KIND IS MADE IF YOUR TANK IS NOT BURIED UNDERGROUND AS SPECIFIED IN THE PRODUCT'S INSTALLATION INSTRUCTIONS.

CONDITIONS AND EXCLUSIONS

There are certain conditions or applications over which Infiltrator has no control. Defects or problems as a result of such conditions or applications are not the responsibility of Infiltrator and are NOT covered under this warranty. They include failure to install the Tank in accordance with instructions or applicable regulatory requirements or guidance, altering the Tank contrary to the installation instructions and disposing of chemicals or other materials contrary to normal tank usage.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of a Tank should contact Infiltrator's corporate headquarters in Old Saybrook, Connecticut, prior to such purchase to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of a Tank.

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C103 0316

**Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4436**