Infiltrator™
Water Technologies
Part of ADS

Missouri

Design and Installation Manual for Low Pressure Pipe Systems in Missouri

Low Pressure Pipe



Infiltrator Products in Missouri	
CHAMBERS	2
EZFLOW	4
SIZING INFORMATION	5
WORKSHEET	9
INSTALLATION INSTRUCTIONS	10
APPROVAL	12
WARRANTY	15

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

Missouri

CHAMBERS

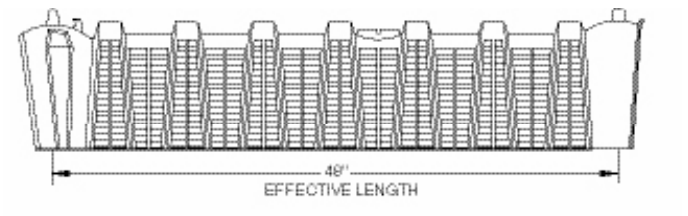
Quick4 Equalizer 24

Nominal Chamber Dimensions	
Size:	16”W x 53”L x 11”H
Effective Length:	48”
Chamber LPP Rating:	5 sf/lf
Invert Elevation:	Varies by pipe size

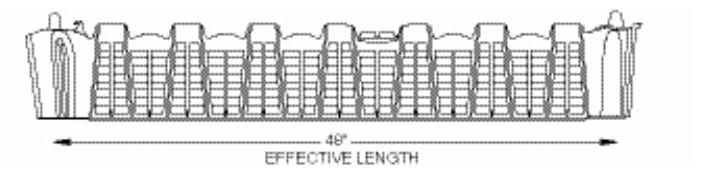
Quick4 Equalizer 24 Low Profile (LP)

Nominal Chamber Dimensions	
Size:	16”W x 53”L x 8”H
Effective Length:	48”
Chamber LPP Rating:	5 sf/lf
Invert Elevation:	Varies by pipe size

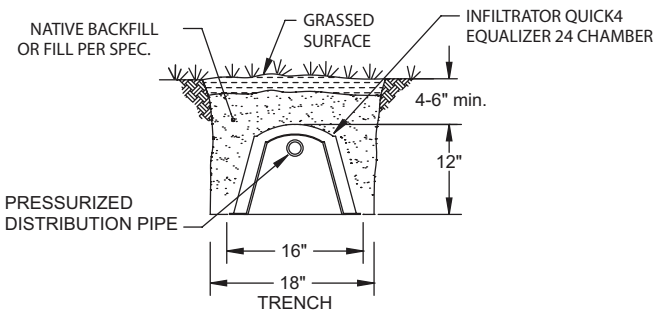
CHAMBER: SIDE VIEW



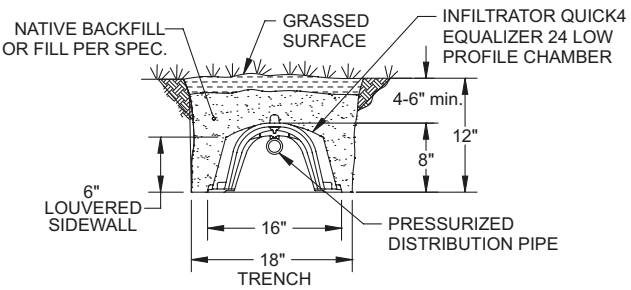
CHAMBER: SIDE VIEW



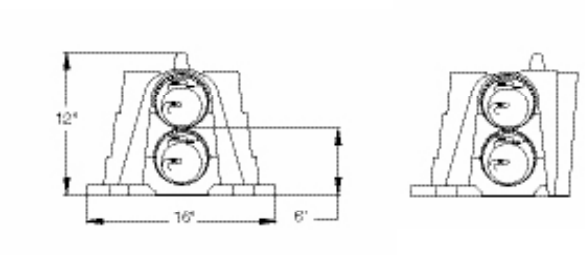
CHAMBER LPP TRENCH DETAIL



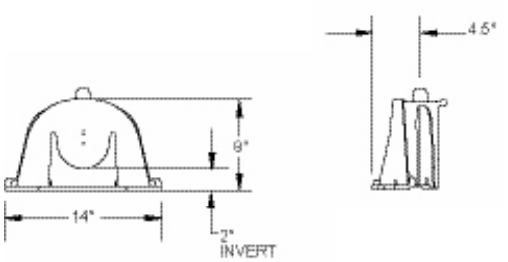
CHAMBER LPP TRENCH DETAIL



MULTIPORT ENDCAP: FRONT VIEW, SIDE VIEW



ENDCAP: FRONT VIEW, SIDE VIEW

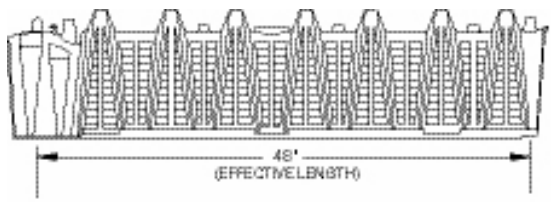


CHAMBERS

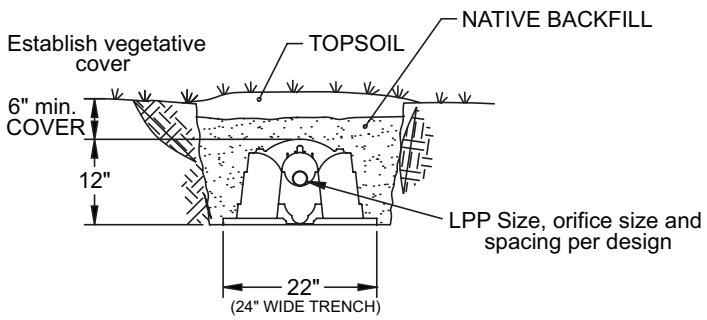
Quick4 Equalizer 36

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

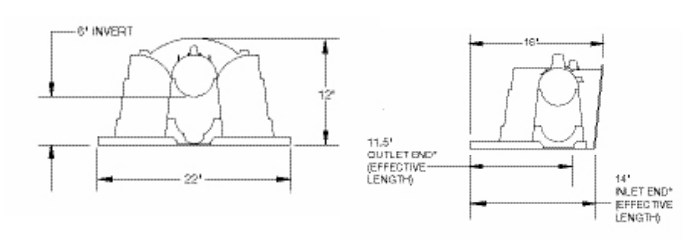
CHAMBER: SIDE VIEW



CHAMBER LPP TRENCH DETAIL



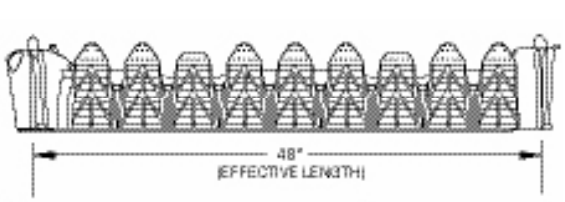
ENDCAP: FRONT VIEW, SIDE VIEW



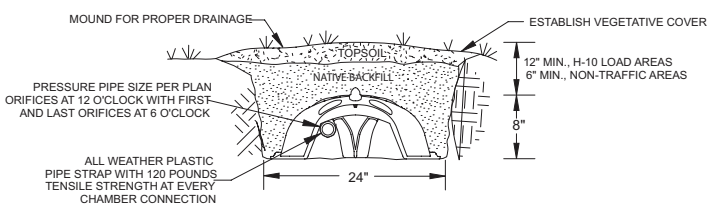
Quick4 Plus Equalizer 36 Low Profile (LP)

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

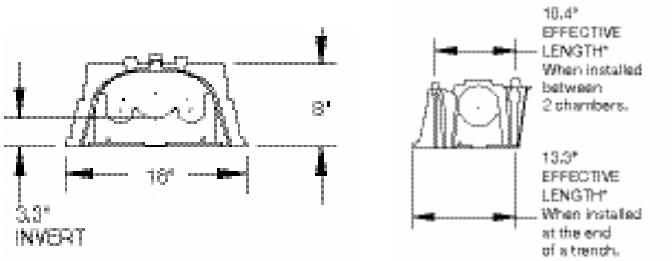
CHAMBER: SIDE VIEW



CHAMBER LPP TRENCH DETAIL

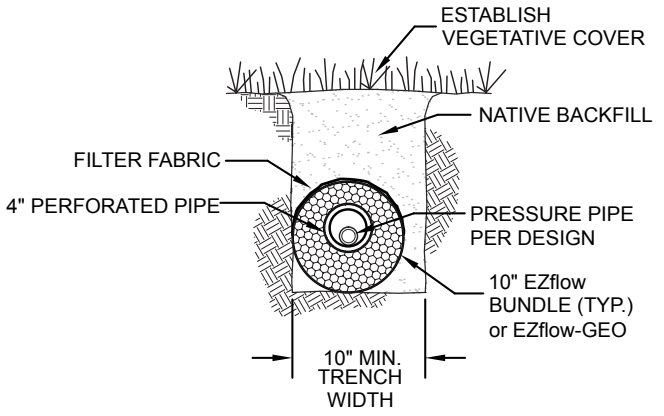


ENDCAP: FRONT VIEW, SIDE VIEW

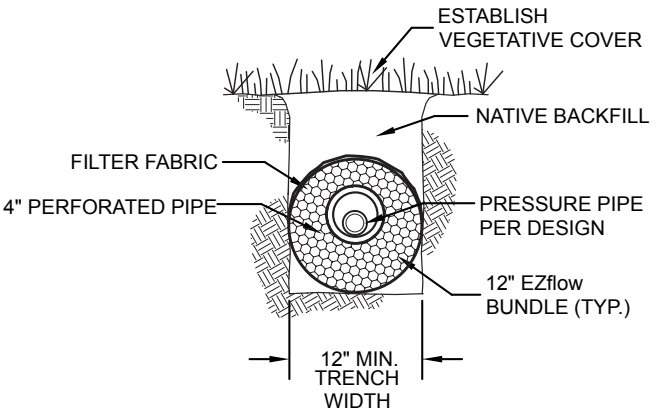


EZFLOW UNITS

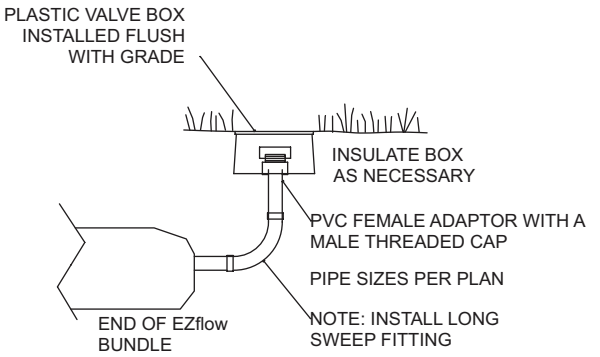
EZflow 1001P	
Nominal Dimensions	
Size:	10” dia x 10 ft
Effective Length:	10 ft
Rating:	5 sf/lf
Invert Elevation:	Varies



EZflow 1201P	
Nominal Dimensions	
Size:	12” dia x 10 ft
Effective Length:	10 ft
Rating:	5 sf/lf
Invert Elevation:	Varies

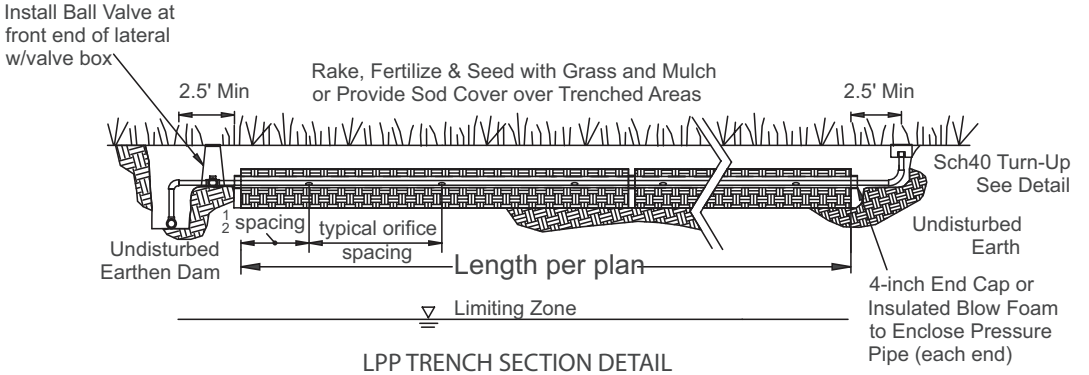


EZflow Flush Assembly



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.	120 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)	> 2.5 ft. for 1/4 and 3/16 inch orifices, and > 3.5 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: SIZE AND ORIENTATION	
Diameter of force main	< 6 inch
Diameter of manifold	> 1-1/4 inch, but not > 3 inch
Diameter of lateral	> 1 inch, but not > 2 inch
Diameter of discharge orifice	= 5/32, 3/16 or 1/4 inch
Distance between laterals	>5 feet
Lateral trench width	> 8 inches, but not > 24 inches
Distance from lateral to edge of distribution cell	< 1/2 the distance between laterals, but not >5 feet
Distance from lateral trench bottom to limiting conditions	> 1 foot above rock, water-impeding formation, seasonally high water table, or where there is evidence of chroma 2 mottles
Distance from discharge orifice to end of distribution cell	> 2.5 feet, but not > 5 feet
Elevation of laterals	Level or < 1 inch slope back to manifold
Orifice Orientation	Pointing upward with the last orifice on each end pointing down
Orifice Spacing	< 2 feet, but not > 8 feet
Orifice Shields	Must be used on each orifice if using stone

NOTES:
1. Tables 1 and 2 based upon Missouri State Code and LPP best practices.
2. Per state regulations LLP systems in Missouri must be designed by a MO registered professional engineer.

TABLE 3: OTHER SPECIFICATIONS	
Connection to manifold or laterals	By use of tee patterned fitting or 90 degree elbow
Turn ups / Ball Valves	Provide a means of setting residual head and flushing out all laterals. Ball Valves are installed at the beginning of the lateral and turn-ups are installed at the end of the lateral both in a protective enclosure
Pump	Rated by pump manufacturer as an effluent or sewage pump
Piping material	Schedule 40
Dose tank or compartment volume employing one pump	Have capacity to store 1-1/2 day's flow above the pump on level or a minimum of 500 gallons
Access to pump	Means of removing pump while maintaining compliance with confined space entry requirements must be provided
Alarm or warning system	Provide an audible and visual alarm
LPP systems on a sloping site	< ten percent slope LPP absorption fields may be installed on slopes greater than 10%, but require special design procedures to assure proper distribution of effluent over the absorption field.

TABLE 4: 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 5: 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 6: 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.

WORKSHEET

1. _____ **gpd** daily wastewater flow

2. _____ **gal/ft^2/day** Design load rate

3. _____ **ft^2** Effective absorption area (line 1 / line 2)

4. _____ **ft** Trench rating

5. _____ **ft** Total linear feet of trench (line 3 / line 4)

6. _____ **ft** Lateral length (Not to exceed 70ft / line limit to 1000 lineal feet per zone)

7. _____ Number of zones

8. _____ Trenches per zone

9. _____ **in** Trench width

10. _____ **ft** Orifice spacing

11. _____ Number of orifices per lateral (line 6 / line 9)

12. _____ **in** Orifice diameter

13. _____ **ft** Distal pressure requirement (based on orifice diameter, see Table 1)

14. _____ **gpm** Orifice discharge rate

15. _____ **gpm** Lateral discharge rate (line 11 x line 14)

16. _____ **gpm** Zone discharge rate (line 12 x line 8)

17. _____ **in** Choose the lateral diameter

18. _____ **in** Choose the manifold diameter (Table 6)

19. _____ **ft** Force main length

20. _____ **in** Force main diameter

21. _____ **ft** Friction loss (friction loss in ft/100ft x line 19 / 100ft) (Table 6)

22. _____ **ft** network pressure compensation[losses due to fittings,etc. (.3 x line 13)]

23. _____ **ft** Vertical lift (pump off to lateral elevation)

24. _____ **TDH** Total Dynamic Head (TDH) (sum of #13, #21, #22, #23)

25. _____ **%** Estimated slope of site

26. _____ **gal** Dose volume based on system type

27. _____ **gal** Drain back

28. _____ **gal** Actual dose volume (#26 + #27)

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.



2. Drill pressure pipe hole.

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.



4. Place endcap over inlet end.

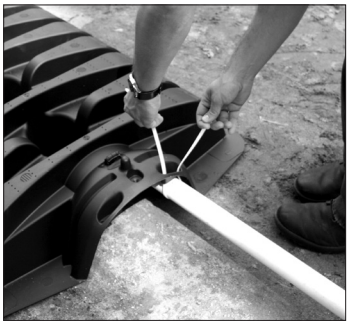
NOTE: Health departments may require a wet-run pressure check to be done prior to chamber installation when the pipe is laying on the ground. Check with your local health department for the proper procedure.

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.

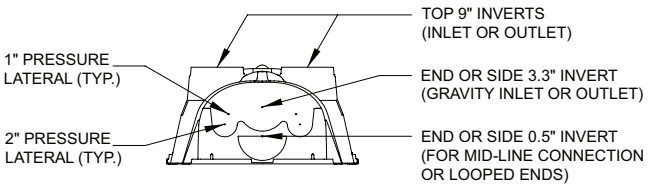
12. If installing multiple rows of chambers, follow Steps 1-9 to lay the next row of chambers parallel to the first. Keep a minimum separation distance between each row of chambers as required by local code.

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.



INSTALLATION INSTRUCTIONS – EZFLOW

Illinois Department of Health granted approval per the Private Sewage Disposal Licensing Act and Code, for use of Infiltrator Water Technologies EZflow 801-P-GEO, 1001-P-GEO, 1201-P-GEO
and 1202-GEOO drainfield products.

The EZflow 801-P-GEO, 1001-P-GEO, 1201-P-GEO and 1202-GEO are approved as a new technology system at the specified sizing:

801-P-GEO	5 SF/FT
1001-P-GEO	5 SF/FT
1201-P-GEO	5 SF/FT
1202-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

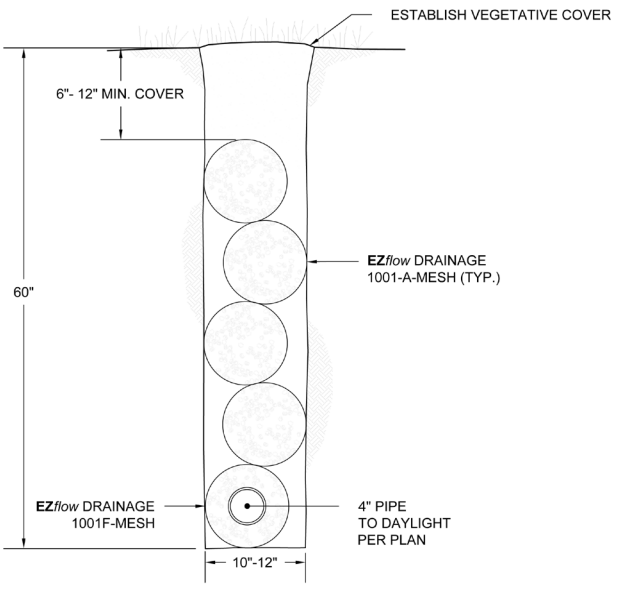
EZFlow may only be installed according to State and/or local regulations. If unsure of the installation requirements for a particular site, contact the local unit of government.

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.



Missouri Department of Health and Senior Services
P.O. Box 570, Jefferson City, MO 65102-0570 Phone: 573-751-6400 FAX: 573-751-6010
RELAY MISSOURI for Hearing and Speech Impaired 1-800-735-2966 VOICE 1-800-735-2466

Margaret T. Donnelly
Director

Jeremiah W. (Jay) Nixon
Governor

May 24, 2012

Curtis Cluckey
Infiltrator Systems, Inc.
1519 Dartmouth Dr.
Liberty, MO 64068

Dear Mr. Cluckey:

The Missouri Department of Health and Senior Services (DHSS) received the EZflow by Infiltrator, Inc. Site Performance Reviews by Dr. Dennis Sievers, P.E., to complete experimental protocols. Experimental protocols for the 1202GEO gravity system and the 1202GEO, 1201PGEO and 1001PGEO low-pressure pipe (LPP) configurations were accepted by letters dated August 6, 2008 and the amended protocol including the 801PGEO LPP configuration was accepted by letter dated September 8, 2010.

The proposed 1202GEO protocol describes the system as two 12-inch diameter cylinders horizontally on the bottom of a trench for a product width of 24. Cylinders contain expanded polystyrene aggregate with a geotextile fabric along the top of the product, and at least one cylinder per trench contains a four-inch diameter perforated flexible plastic pipe. The proposed LPP protocol describes the products as 12-inch, 10-inch, or 8-inch diameter cylinders containing expanded polystyrene aggregate, a four-inch diameter perforated flexible plastic pipe, and a geotextile fabric along the top of the product. In a low-pressure pipe (LPP) system application, a 1 to 2-inch PVC distribution pipe would be housed within the corrugated pipe.

Ten (10) 1202GEO systems that had been installed for about 2.5 to 3.5 years were selected for the performance review from the ninety-five (95) installed systems that were reported. The selected systems were installed on six (6) sites where soil groups III, IVa, and V were described and on four (4) sites evaluated using percolation tests. Nine (9) of the ten (10) systems reviewed were found to be functioning as designed with no surfacing effluent. Only one of these nine was reported to have ponding in the core hole that was observed near a trench. The other one (1) of the ten (10) systems was found to have malfunctioned with surfacing effluent.

Another 1202GEO system, which was not part of the performance review, had been reported to DHSS by the property owner because of problems with surfacing effluent. Both systems that malfunctioned were in Ray County, permitted by the Planning and Zoning Commission, and designed based on percolation tests. Permit records show the systems were installed by different installers. The percolation test report for the system reviewed as part of the experimental protocol indicates the percolation test was conducted under extremely dry conditions. According to the Performance Review report for the reviewed system, soil observed from the auguring process appeared to be high in clay content. The system reported by the owner had been installed in 36-inch deep trenches or deeper, which is non-compliant with the Minimum Construction Standards and much deeper than the percolation test holes. The two system malfunctions are not apparently related to the EZflow product; the malfunctions may be related to the use of a percolation test and/or installation practices.

Thirty-seven (37) 1001PGEO and eleven (11) 801PGEO LPP systems were reported installed in soil groups III, IVa, and V. Four (4) of the 1001PGEO LPP that had been installed for over three years and eight (8) of the 801PGEO LPP that had been installed for about 2.5 to 3 years were selected for the performance review. All of the LPP systems were found to be functioning as designed; none had surfacing effluent.

Based on the satisfactory completion of the experimental protocols, EZflow by Infiltrator has been accepted by DHSS for innovative system approval of the 1202GEO gravity dispersal trench system and the 1202GEO, 1201PGEO, 1001PGEO, and 801PGEO LPP pressure distribution configurations. Innovative system approval is subject to the site requirements, minimum sizing, and operation and maintenance as discussed below. Due to the development of clogging mats and other variables influencing the long-term performance of a system, which are beyond the scope of the experimental protocol, this review and minimum sizing guidance is not a guarantee that an approved system will function in a satisfactory manner for any given period of time. Also, note that local permitting authorities may be more stringent.

For 1202GEO gravity systems, the minimum site requirements for pipe and gravel filled gravity dispersal trenches shall apply, including provisionally suitable soil, vertical separation, and setback distances. The minimum site requirements for LPP systems shall apply to the EZflow configurations used in LPP applications, except that a greater minimum soil depth will be required for the 10-inch and 12-inch products. The soil depth, consisting of suitable or provisionally suitable soils, must be adequate to provide a minimum of twelve (12) inches of vertical separation between the bottom of the proposed dispersal trench and bedrock, water-impeding formation, or evidence of seasonally high water table. LPP systems shall be designed and bear the seal of a Missouri Professional Engineer, as required by 19 CSR 20-3.060(6)(C).

The equivalent width allowed for minimum system sizing using EZflow by Infiltrator shall be as shown in the following tables. Because of the inherent limitations of percolation tests, extra caution should be used when designing any dispersal system based on a percolation test, and more conservative sizing is recommended.

Minimum Sizing for Gravity Systems using
EZflow by Infiltrator Expanded Polystyrene Cylinders

Product	Product Width	Maximum Equivalent Width
1201GEO (one 12-inch cylinder)	12 inches	24 inches (2 feet)
1202GEO (two 12-inch cylinders)	24 inches	36 inches (3 feet)

Minimum Sizing for Low-Pressure Pipe Systems using
EZflow By Infiltrator Expanded Polystyrene Cylinders

Product	Product Width	Maximum Equivalent Width
801PGEO LPP	8 inches	5 feet – based on approved engineered LPP design
1001PGEO LPP	10 inches	
1201PGEO	12 inches	
1202GEO(two 12-inch cylinders)	24 inches	

Proper operation and regular maintenance is needed to ensure that any onsite wastewater treatment system continues to function and adequately protects public health and the environment. Proper operation includes limiting peak daily flow to the system design flow and keeping inappropriate waste out of the system. Regular maintenance activities shall follow all manufacturer's recommendations. Minimum maintenance consists of regular inspections and, as necessary, cleaning and/or adjusting sewage tanks, other pretreatment components, effluent filters, and gravity distribution devices. The soil treatment area must be inspected regularly and depressions, surface water impacts, or effluent surfacing must be corrected. Minimum maintenance of pressure distribution systems includes inspecting the pump and controls, flushing the distribution lines, checking operating pressures, and making any adjustments necessary.

DHSS will continue to track any reports of the performance of systems that were installed under the experimental protocol. Data received will be used to compare and reevaluate sizing of onsite soil treatment systems. Approval may be discontinued at any time, if warranted by subsequent field experience with the innovative systems.

If you have questions, please feel free to contact Jim Gaughan or me at (573) 751-6095.

Sincerely,

Mark Jenkerson, Chief
Bureau of Environmental Health Services

cc. Dave Lentz, Infiltrator Systems, Inc.
James Gaughan, P.E., Onsite Wastewater Treatment Program

WARRANTY: STANDARD

INFILTRATOR WATER TECHNOLOGIES STANDARD LIMITED WARRANTY

(a) The structural integrity of each chamber, endcap and other accessory manufactured by Infiltrator (collectively referred to as "Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's installation instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one year from the date upon which a septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required for the septic system by applicable law, the one (1) year warranty period will begin upon the date that installation of the septic system commences. In order 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 those Units determined by Infiltrator to be defective and covered by this Limited Warranty. 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 chamber system (chamber, endcap or other accessory) is manufactured by anyone other than 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 this Limited Warranty in any manner whatsoever, or to 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: 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.

Infiltrator™
Water Technologies
Part of ADS

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U.S. Patents: 4,759,661; 5,017,041; 5,156,488; 5,336,017; 5,401,116; 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844 Canadian Patents: 1,329,959; 2,004,564 Other patents pending. Infiltrator, Equalizer, Quick4, and SideWinder are registered trademarks of Infiltrator Water Technologies. Infiltrator is a registered trademark in France. Infiltrator Water Technologies is a registered trademark in Mexico. Contour, MicroLeaching, PolyTuff, ChamberSpacer, MultiPort, PosiLock, QuickCut, QuickPlay, SnapLock and StraightLock are trademarks of Infiltrator Water Technologies. PolyLok is a trademark of PolyLok, Inc. TUF-TITE is a registered trademark of TUF-TITE, INC. Ultra-Rib is a trademark of IPEX Inc.

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