

GEOFLOW, INC. MAINTENANCE AND OPERATION GUIDELINES

Adapted from Geoflow Design and Installation Manual dated Feb 2001.
See complete Design and Installation Manual online at www.geoflow.com or
telephone 800-828-3388 for a free copy.

Geoflow, Inc.

May 5, 2001

AS-BUILT SYSTEM DESCRIPTION:

1. Site Name: _____
2. Site Address including State: _____

3. Dripfield Designed by: _____
4. Dripfield Installed by: _____
5. Date of Installation: _____
6. Daily design flow: _____ gpd
7. Soil percolation rate: _____
8. Is there secondary treatment on this job site? _____ Yes _____ No
If "Yes" to question 8 above, please name manufacturer and model number _____
9. Number of zones in dripfield _____
If more than 1 zone, please describe valve (size, manufacturer, part number, type) _____
10. Amount of dripline installed in each zone.
Zone 1 _____ ft. Zone 2 _____ ft. Zone 3 _____ ft. Zone 4 _____ ft.
11. Wasteflow dripline model number &/or description. _____
12. Flow rate per zone.
Zone 1 _____ gpm Zone 2 _____ gpm Zone 3 _____ gpm Zone 4 _____ gpm
13. Pump manufacturer, model number and number of pumps _____
14. Vortex filter model number &/or description _____
If more than one zone, do the zones (a) share one filter or (b) each have their own filter? _____
15. Pressure in each zone:
Zone 1 _____ psi Location pressure measured _____
Zone 2 _____ psi Location pressure measured _____
Zone 3 _____ psi Location pressure measured _____
Zone 4 _____ psi Location pressure measured _____
16. Size of feed manifold inches. _____ Depth of feed manifold _____ inches.
17. Size of flush manifold inches. _____ Depth of flush manifold _____ inches.
18. Size of filter flush valve _____ inches. Is filter flush valve manual or automatic? _____
19. Size of field flush valve _____ inches. Is the field flush valve manual or automatic? _____
If more than one zone, do the zones (a) share one flush valve or (b) each have their own flush valves? _____
20. Was any fill material supplied on the dripfield? _____
If "yes" to 19 above please describe fill quality and quantity added. _____

21. Please provide owner with as-built drawings, including but not limited to direction of drip lines,
location of air vents, location of pressure regulators if applicable, location of Headworks (filter and valves) and location of pump tank.

SYSTEM COMPONENTS :

A typical drip system installation will consist of the elements listed below:

1. Wasteflow® Dripline

WASTEFLOW lines carry the water into the dispersal/reuse area. Wasteflow lines are connected to the supply and return with Compression or Lockslip fittings. Standard spacing between lines and emitters is 24" on center. The dripline has no joints that may pull apart during installation and is ideal for tractor mounted burying machines. It is sold in 500-ft rolls. For export 400-m rolls are available. Rolls of alternative lengths may be special ordered.

Wasteflow dripline features:

a) Rootguard®

The risk of root intrusion with an emitter slowly releasing nutrient rich effluent directly into the soil is well known to anyone who has observed a leaking sewer pipe. Geoflow has an exclusive license for rootguard, to protect emitters from root intrusion. Rootguard carries a 15-year warranty against root intrusion.

b) Turbulent flow path

Wasteflow drip emitters are pre-inserted in the tube 6", 12" or 24" apart with 24" being the most popular. Angles in the emitter flow path are designed to cause turbulence in order to equalize flow between emitters and keep the emitters clean. Geoflow emitters boast large flow paths, which, coupled with turbulent flow, have proven over the years to be extremely reliable and dependable.

c) Antibacterial

Geoflow's Wasteflow has an inner lining impregnated with an antibacterial, Geoshield DM-50, to inhibit bacterial growth on the walls of the tube and in the emitter.

d) Wasteflow Classic and Wasteflow PC Dripline

For Wasteflow Classic the flow rate delivered by the emitter is a function of the pressure at the emitter. Wasteflow PC will have a constant flow rate at all pressures from 7 to 60 psi - to ensure a long life the recommended operating range is 10 to 45 psi.

WASTEFLOW Classic Specification

The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with turbulent flow, drip emitters bonded to the inside wall. The drip emitter flow passage shall be 0.053" x 0.053" square. The tubing shall have an outside diameter (O.D.) of approximately .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be a bacterial protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24" (or 12") apart. The turbulent flow emitters shall be molded from virgin polyethylene resin. The turbulent flow emitters shall have nominal discharge rates of 1.3 gallons per hour at 20 psi. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of 15 years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. WASTEFLOW Classic dripline shall be Geoflow model number WF16-4-24 or WF16-4-12.

WASTEFLOW PC Specification

The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with turbulent flow, drip emitters bonded to the inside wall. The drip emitter flow passage shall be 0.032" x 0.045" square. The tubing shall have an outside diameter (O.D.) of approximately .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be a bacterial protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24" (or 12" or 6") apart. The pressure compensating emitters shall be molded from virgin polyethylene resin with a silicone rubber diaphragm. The pressure compensating emitters shall have nominal discharge rates of 0.53 gallons per hour. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of ten years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. WASTEFLOW PC pressure compensating dripline shall be Geoflow model number WFPC16-2-24 or WFPC16-2-12 or WFPC16-2-06.

2. Controllers

Controllers are used for time dosing and auto-flushing of the filter and dripleads. GEO controllers include a programmable logic control interface for field modifications. They can be used on systems ranging in size from one to four zones at the time this manual was printed. All controllers include a surge arrester, elapsed time meter and counter. For larger systems please inquire about our Wasteflow Manager controller that has monitoring and telemetry capabilities.

Controller Description

The following have been used in the standard GEO controller. Refer to paperwork supplied with controller for more detailed operating instructions.

Panel Components:

Programmable logic module for timing and controls.

Contact and circuit breaker for pump (see panel description for max hp ratings and other specifications).

Hand-Off-Auto (H-O-A) switches for pump and valve operation.

Connections/contacts for normally closed 24 VAC valves. (Contacts for normally open valves special order)

Elapsed time meter and cycle counter for pump monitoring built in to PLC.

Circuit breaker for control power.

Surge arrester for lightning protection.

12" x 10" NEMA 4 X fiberglass enclosure.

Float functions:

Redundant Off and Low level Alarm Float. It is a secondary off float that will prevent the operation of the pump if the timer on and off float fails. This float turns off the pump when lowered. Pumping will be disabled in both the automatic and manual modes. This float also activates the audible and visual alarm. Pressing the illuminated PUSH TO SILENCE button will silence the audible alarm. The alarm light will remain on until the float is raised. When raised, this float will enable operation of the pump. Timer On & Off float. Activates timer. Timer will control pump cycles, beginning with the off mode.

Over-ride timer On & Off float. Activates the over-ride timer. Over-ride timer will control pump cycles. The over-ride timer will finish at least one complete cycle even if the over-ride float drops. **High-level alarm float.** Activates the audible and visual alarm when raised. Audible alarm may be silenced by pressing the illuminated PUSH TO SILENCE button. The alarm light will remain on until the float is lowered.

NOTE: We recommend the use of normally open mercury control floats.

Pump and Valve Operation:

Pump dosing cycles are controlled by the timers when the H-O-A switch is in the auto position. Under normal conditions the "primary" timer will control the pump.

During high flow conditions, the over-ride timer will control the pump. The over-ride timer will cycle the pump more frequently than the primary timer. The pump will dose for the same amount of time but the time in between doses, or the over-ride timer "off time", will be one half that of the primary timer "off time". (For example, if your primary timer settings are one hour fifty-four minutes off and five minutes on then your over-ride timer settings would be approximately fifty-five minutes off and five minutes on.)

The Vortex Filter flush valve will open for 1 minute (field adjustable) at the end of the pump cycle to allow the filter to self-flush. When the Vortex Filter flush is complete, the pump will remain activated for 15 seconds (field adjustable) to accommodate the opening of the field flush valve.

The field flush valve will open during the 15 seconds the pump is still activated after filter flush cycle. After the pump is deactivated the flush valve will remain open for one minute (field adjustable) to allow for drainage of the return line.

For severe freezing conditions allow adequate time for the manifold to drain completely.

To periodically flush the driplead, after 10 dosing cycles (field adjustable) the pump will operate for 5 minutes (field adjustable) with the field flush valve opened and the field flush valve will stay open until all zones have been flushed. This operation will also occur after a power outage.

Wiring Control voltage input is 115 VAC for all GEO 1 and GEO 4 series panels. Output to valve(s) is 24 VAC

3. Pumps

Wasteflow dripleads depend on pumps to supply effluent and pressure to the field. These must be sized according to flow and pressure requirements. Look for effluent pumps from a dependable source. Geoflow does not endorse a single manufacturer, but does advocate you use a pump that is readily serviced in your area.

4. Filters

Geoflow systems use a self-cleaning Vortex Filter with a stainless screen 150 mesh / or 100 micron filter element. The self-cleaning action is efficient over a range of flow rates depending on the filter size. The clean-out port is at the base and can be opened and closed manually or automatically. If using a manual flush valve, please keep the valve cracked open slightly at all times for continuous flushing. The controller will fully open automatic flush valves.

Filter specification

3/4" Filter. The Y filter body shall be molded from glass reinforced engineering grade black plastic with a 3/4 inch male pipe thread (MIPT) inlet and outlet. The two-piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. An additional 3/4 inch MIPT outlet shall be capable of periodic flushing. The 150-mesh filter screen is all stainless steel, providing a 23.4 square inch filtration area. The screen collar shall be molded from vinyl. The filter shall flush flows from 4-11 gpm. The 3/4" filter shall be Geoflow Vortex Filter model number AP4E-75.1" Filter. The Y filter body shall be molded from glass reinforced engineering grade black plastic with a 1 inch male pipe thread (MIPT) inlet and outlet. The two-piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. An additional 3/4 inch MIPT outlet shall be capable of periodic flushing. The 150-mesh filter screen is all stainless steel, providing a 28.4 square inch filtration area. The screen collar shall be molded from vinyl. The filter shall flush flows from 7-28 gpm. The 1" filter shall be Geoflow Vortex Filter model number AP4E-100.1.5" Filter. The Y filter body shall be molded from glass reinforced engineering grade black plastic with a 1.5 inch male pipe thread (MIPT) inlet and outlet. The two-piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. An additional 3/4" MIPT outlet shall be capable of periodic flushing. The 150-mesh filter screen is all stainless steel, providing a 60.8 square inch filtration area. The outer support shell shall be woven stainless steel wire, and the inner screen shall be made of stainless steel cloth. The inner and outer screens shall be soldered together. The screen collar shall be molded from vinyl. The 3-hole filter shall flush flows of 34-42 gpm and the 4-hole filter shall flush flows of 45-55 gpm. The 1 1/2" filter shall be Geoflow model number AP4E-150-3 or AP4E-150-42" Filter. The Y filter body shall be molded from glass reinforced engineering grade black plastic with a 2 inch male pipe thread (MIPT) inlet and outlet. The two-piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. An additional 3/4" MIPT outlet shall be capable of periodic flushing. The 150-mesh filter screen is all stainless steel, providing a 60.8 square inch filtration area. The outer support shell shall be woven stainless steel wire, and the inner screen shall be made of stainless steel cloth. The inner and outer screens shall be soldered together. The screen collar shall be molded from vinyl. The 3-hole filter shall flush flows from 68-84 gpm and the 4-hole filter shall flush flows of 90-110 gpm. The 2" filter shall be Geoflow model number AP4E-200-3 or AP4E-200-4.

5. Supply Manifold

This carries the water from the dosing tank to the dispersal area. Rigid PVC is usually used and must be designed to slope back to the pump tank in freezing conditions. The velocity in the manifold should be between 2 feet per second and 5 feet per second (fps). Refer to PVC pipe sizing chart in the appendix to determine the best diameter for your application.

6. Return Manifold

In order to help clean the system, the ends of the drip lines are connected together into a common return line, most often made of rigid PVC. This line will help equalize pressures in the system. Flushing should be done frequently during the installation period. Periodic flushing under full system pressure will guarantee a long system life. The return manifold should be installed to drain the line back to the pretreatment tank in freezing climates.

7. Pressure Regulator

Pressure regulators fix the inlet pressure at a given rate and are recommended with Wasteflow Classic. Under normal operating conditions, pressure in the drip lines should be:
10 psi to 45 psi for Wasteflow Classic and
7 psi to 60 psi for Wasteflow PC

8. Air Vacuum Breaker

Air vacuum breakers are installed at the high points to keep soil from being sucked into the emitters due to back siphoning or backpressure. This is an absolute necessity with underground drip systems. They are also used for proper draining of the supply and return manifolds in freezing conditions. Use one on the high end of the supply manifold and one on the high point of the return manifold. Additional air vents may be required depending on terrain. Maximum flow per vacuum breaker is 50 gpm. Freezing conditions require the air vacuum breaker be protected with insulation.

Air Vacuum Specification

The air vacuum relief valve provides instant and continuous vacuum relief and non-continuous air relief. Both the body and the removable dirt cover shall be constructed of molded plastic. The body and the dirt cover shall be connected with a 3/4 inch hose thread. The ball shall be constructed of low density plastic and the internal seat shall be constructed of vinyl. The air vacuum relief valve shall seal at 5 psi. Inlet size shall be a 1-inch male pipe thread. The air vent shall be Geoflow item number APVBK-1

9. Filter Flush Valves

Used to flush debris from the filter cleanout port back to the pretreatment tank, this can be an electronically activated solenoid valve or a manual ball valve. If manual, it should be opened for a full flushing at least every six months and left cracked open slightly to flush continuously. Cracking open a manual valve may be used to increase flow through the system to be within the efficient flow rate of the filter and/or pump, if necessary. Certain States may require automated electronic flushing. Please refer to your State codes.

Flush valve specification and description

The Solenoid Valve is electrically operated and used to flush the dripfield and Vortex filter. It is normally closed, and in the event of a power failure the valve closes. Unique Dual Ported Diaphragm greatly minimizes clogging. In operation, the diaphragm ports constantly flex, inhibiting sand, silt and debris from blocking the valve action. The porting design also permits equal pressure on both sides of the diaphragm wall, regardless of line pressure when valve is not operating, and nearly equal pressure across the wall when operating. The DW Valve diaphragm is made of nylon fabric reinforced Buna-N rubber; a grooved rib interlocks with cover and body to prevent leakage. Nylon exhaust orifice is non-corrosive and has an opening sized larger than the diaphragm ports so that any pieces of sand or silt passing through the diaphragm will not be trapped beneath the solenoid actuator. The solenoid is constructed of molded epoxy resin having no carbon steel components exposed thereby eliminating possible external corrosion and deterioration. Solenoid is completely waterproof, with an O-ring seal, and complies with NEC Class II circuit requirements for 24V a.c. operation (also operates on 12 volts d.c. up to 75 psi). The actuator is teflon coated stainless steel and brass with a molded-in place rubber exhaust port seal; a stainless steel spring assures positive seating. High strength plastic glass-filled body and cover designed to operate in heavy duty commercial applications. Stainless steel 1/4 inch cover bolts and mating brass body inserts make re-assembly easy. Shock cone on diaphragm seat eliminates water hammer in all except extreme cases.

Flow control. A brass, non-rising type flow control stem for throttling the valve from full open to close positions.

Manual bleed lever. An easy-to-use, hand operated control bleeds valve to downstream; has stops for open and closed positions.

Cold water working pressure: 150 psi

10. Field Flush valves.

Used to flush out fine particles which have passed through the filter and accumulate on the bottom of the tube at the end of each lateral. The field flush valve can be manual or electronic. If manual, it should be opened for full flushing at least every six months and left cracked open slightly to flush continuously and provide for drainage of the flush line in freezing conditions. Cracking open a manual valve can also be used to increase the flow through the system to be within the efficient flow rate of the filter and/or pump if necessary. Certain States do require automated electronic flushing. Please refer to your State codes.

Flush valve specification and description

See specifications and description for filter flush valves above.

FREEZING OPERATIONS

Buried drip systems are not prone to frost damage because, in their design, vacuum release and drain valves are provided. Please adhere to the following precautions:

- a) Manifolds, supply lines and return lines must be sloped back to their respective dosing or treatment tanks. Under extreme conditions return and supply manifold should be insulated or buried below frost line. Be sure drain valve on flush line remains open long enough for entire field to drain.
- b) Remove the check valve at the pump or provide alternate method for draining supply manifolds. Check with pump manufacturer before removing check valve from pump to be sure that it does not affect warranty.
- c) Insulate equipment boxes, including Headworks box or filter and field flush valve boxes as well as zone dosing valves, pressure regulator and air vacuum relief valves. Use closed-cell insulation such as perlite in a plastic bag.
- d) The top of air vacuum relief valves must be no higher than soil surface.
- e) If using an index valve to split field zones, be sure it is capable of self-draining.
- f) WASTEFLOW lines will self-drain through the emitters into the soil. If the cover crop over the dripfield is not yet adequately established, add hay or straw over the field for insulation.
- g) Mark the valve box with a metal pin so you can find it in the winter when covered in snow.
- h) If using manual filter flush valves or manual field flush valves, they should be left cracked open slightly to provide for quick and complete drainage of the flush line in freezing conditions.

SYSTEM MAINTENANCE:

The best way to assure years of trouble free life from your system is to consistently monitor the system and perform regular maintenance functions. For large systems or systems with a BOD > 20 mg/l automation of maintenance is essential.

For smaller systems with a BOD < 20 mg/l semi-annual inspection and maintenance is adequate.

- 1) Remove the spin filter and install a clean cartridge. Clean the used filter cartridge back at the shop with a pressure hose. The filter cartridge should be cleaned from the outside inwards. If bacteria buildup is a problem we advise first trying lye, and if the problem persists, soak it in a chlorine bath. Soak the filter cartridge in a mixture of 50% bleach and 50% water.
- 2) Open the field flush valve.
- 3) Manually turn on the pump.
- 4) Flush the system for approximately five minutes.
- 5) Close the field flush valve.
- 6) Check for proper pressures in the field and if a ball valve is used reset the field flush valve for 1-psi loss.
- 7) Remove the lids on the vacuum breaker and check for proper operation.
- 8) Visually inspect the field for any irregularities.
- 9) Turn off the pump and reset the controller for auto mode.
- 10) Periodically remove and clean the field flush and filter flush valves.

ROOTGUARD® is a registered trademark of A.I.Innovations.