4.7 Drip Distribution

Description

Drip distribution systems may or may not be continuously flushed, and are comprised of a shallow network of, thin walled small-diameter flexible tubing with self-cleaning emitters to discharge filtered effluent into the root zone of the receiving soils.

Typical system components include, but are not limited to:

1. Septic tank
2. Pretreatment system:
    - Intermittent sand filter
    - Recirculating gravel filter
    - Extended Treatment Package System
3. Filtering system:
    - Cartridge or disk filters (flushable filter cartridge)
4. Effluent dosing system:
    - Pump tank and dose pump
5. Process controller:
    - Programmable logic controller (PLC)
6. Flow meter
7. Drip tubing network and associated valving

Conditions of Approval

Drip distribution systems shall only be installed at locations that meet the criteria in the site suitability subsection of the IDAPA 58.01.03.008.02 and 58.01.03.013 (see section 8.1). The effective soil depths that are established for alternative pretreatment systems may be applied to drip distribution systems.

Design

1. Application areas up to 2 ft^2/ft of drip irrigation line may be used.
2. Drip lines may be placed on a minimum of two-foot centers.
3. Drip lines are placed directly in native soil at a depth of 6 to 18 inches with a minimum final cover of 12 inches. The design application rate is based on the most restrictive soil type encountered within two feet of the drip lines.
4. Effluent is required to be filtered with a 100-micron or smaller disc or flushable filter cartridge prior to discharge into the drip tubing network.
5. In non-continuous flush systems: drip laterals are flushed at least once every two weeks to prevent biofilm and solids buildup in the drip tubing network. Minimum flushing velocity is based on the tubing manufacturer recommendations for the return ends of the distribution lines and in the drip irrigation tubing during field flush cycles and minimum duration is long enough to fill all lines and achieve several pipe volume changes in each lateral.
6. A minimum of two vacuum relief valves are required per zone. The valves are located at the highest points on both the distribution and return manifolds. Vacuum relief valves are located in a valve box that is adequately drained and insulated to prevent freezing.

7. Pressure regulators/pressure compensating emitters are to be used on sloped installations. Pressure is to be between 25 and 40 pounds per square inch (psi) unless pressure compensating emitters are used.
8. In non-continuous flush systems: the return manifold is required to drain back to the septic tank.
9. Timed dosing is required in all drip distribution systems. In non-continuous flush systems: timed or event-counted back flushing of the filter is required.
10. In non-continuous flush systems: filters, flush valves, and pressure gauge may be placed in a head works (between the dose pump and the drip field). Each component is required to be insulated to prevent freezing.
11. The system must be designed by an Idaho licensed professional engineer.

Construction

1. No wet weather installation. Excavation and grading are to be completed before installation of the subsurface drip system. Drip systems may not be installed in unsettled fill material.
2. No construction activity or heavy equipment may be operated on the drain field area other than minimum to install the drip system. Do not park or store materials on the drain field area.
3. For freezing conditions the bottom drip line must be higher than the supply and return line elevation at the dosing tank.
4. All PVC pipe and fittings shall be PVC schedule 40 type 1 or higher rated for pressure applications**.** All glued joints shall be cleaned and primed with purple (dyed) PVC primer prior to being glued.
5. All cutting of PVC pipe, flexible PVC and/or drip tubing should be accomplished with pipe cutters, unless the following requirements for sawing are complied with. Sawing of PVC, flexible PVC and/or drip tubing may be allowed only if followed by cleaning off any residual burs and removing all of the shavings retained in the tubing or pipe.
6. All open PVC pipes, flexible PVC and/or drip tubing in the work area shall have the ends covered during storage and construction to prevent construction debris and insects from entering the pipe. Prior to gluing, all glue joints shall be inspected for and cleared of construction debris.
7. Dig the return header ditch along a line marked on the ground and back to the septic tank. Start the return header at the farthest end from the dosing tank. The return line must slope back to the treatment tank or septic tank.
8. Prior to startup of the drip distribution system the air release valves shall be removed and each zone in the system shall be flushed as follows:
    a) The flushing of the system is accomplished by manual override of the control panel by the manufacturer or engineer.
    b) Using an appropriate length of flexible PVC pipe with a male fitting attached to the air release connection to direct the flushing away from the construction area,

c) Flush the zone with a volume of water (clean water to be provided by contractor) equal to 1.5 times the volume of the pipes from the central unit to the air release valve or the equivalent of five minutes of flushing, and

d) Repeat this procedure for each zone.

9. If existing septic tanks are to be used, they shall be pumped out by a commercial septic tank pumper, checked for leakage or other problems, and replaced if necessary. After the tank is emptied, the tank shall be rinsed, pumped, and refilled with clean water. Debris in the septic tank shall be kept to a minimum since it could clog the filter during startup. NOTE: filters are not back flushed during startup as any clogging could cause incorrect rate of flow readings for the controller.
10. Once completed, drain field areas for shallow installations (less than 12 inches) are to be capped with 6-8 inches of clean soil and suitably vegetated.

Inspection

1. The system must be inspected and approved by an Idaho licensed professional engineer.
2. Turn on the pump and check pressure at the air vacuum breaker.
3. Check the system for leaks; record flow measurements and pressure readings at start up.

Example: Suggested Design

1. Determine square feet needed for the drip distribution system, as follows.

   Wastewater flow in GPD is divided by the soil application rate (based on the soil classification from an on-site evaluation).

   The result is the ft^2 needed for the system.

   Example conditions: three-bedroom home in C-2 soils
   250 GPD/0.2 gal/ft^2 = 1250 ft^2

2. The system design is to use an application area of 2 ft^2 per foot of drip line. Divide the required ft^2 by the drip line application area (2 ft^2. /ft.). This will determine the length of drip line needed for the system.

   1250 ft^2 / 2ft^2/ft. = 625 ft. of drip line

3. Determine the size of pump based on GPM (step 3) and total head (step 4) necessary to deliver dose to system. Determine pumping rate by finding the total number of emitters and multiplying by the flow rate per emitter (1.32 gal/hr./emitter at 20 psi). For continuous flush systems: the number of emitters will vary depending on the product selected. Adjust output to GPM and add 1.5 GPM per connection for flushing to achieve for example a 2 ft. /s flushing velocity.

   625 ft. / 2 emitters/ft. = 312.5 use 315 emitters
   315 emitters x 1.32 g/hr./emitter = 415.8 gal/hr.
   415.8 gal/hr. / 60min/hr. = 6.93 GPM or 7 GPM
   10 connections at 1.5 GPM/connection = 15 GPM

4. Determine feet of head. Multiply the system design pressure (20 psi is standard, but values can be between 10 and 60 psi dependent upon drip line used) by 2.31 ft. /psi to get head required to pump against.

   20 psi x 2.31ft/psi = 46.2 ft. of head
   Add in the frictional head loss from tubing.

5. Select a pump. Pump selected must achieve a minimum of 22 GPM plus the flush volume at 46.2 ft. of head.

Figure **4**-4-2 shows an overhead view of a typical drip distribution system. Figure **4-3** 4-3 shows a potential layout of a filter, valve, and meter assembly, and Figure **4**-4-4 illustrates a cross-sectional view.

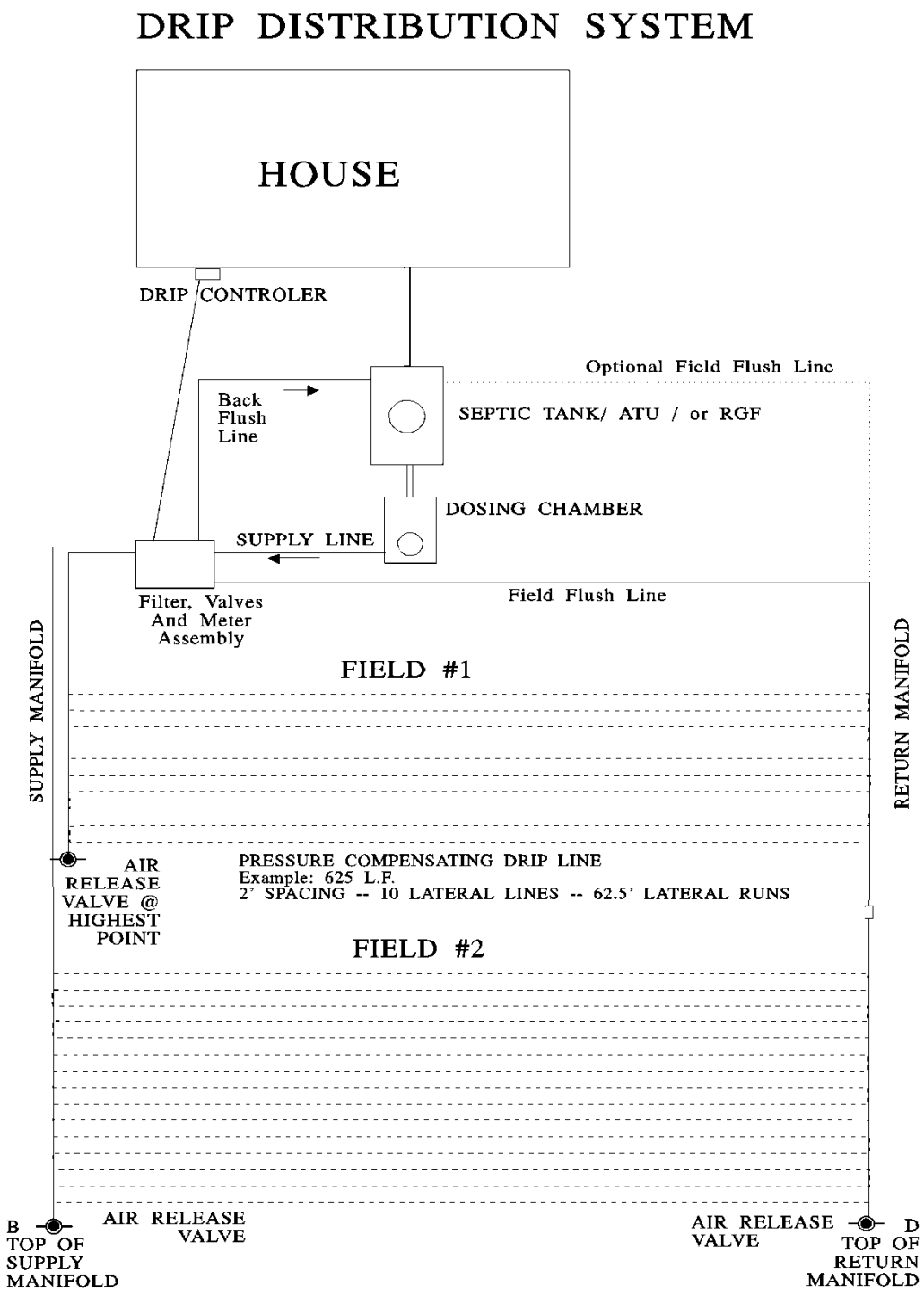

Figure 4-2. Overhead View of Typical Drip Distribution System

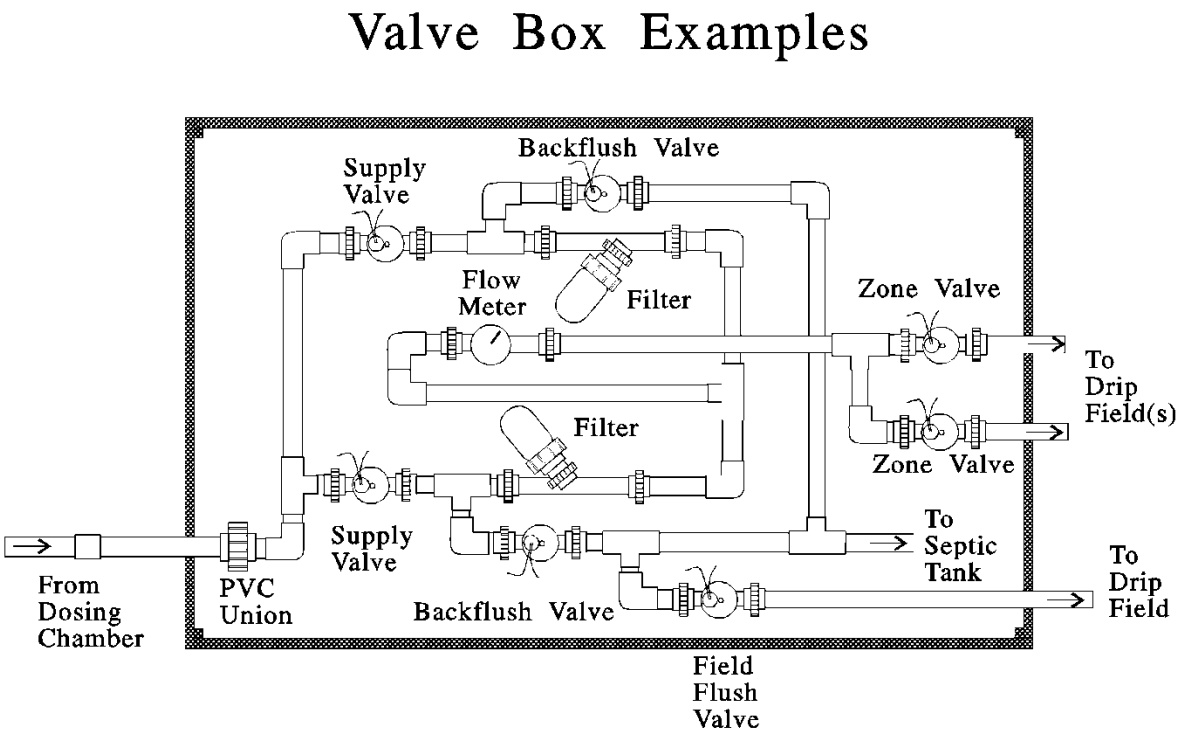

Figure 4-3. Overhead View of Filter, Valve, and Meter Assembly

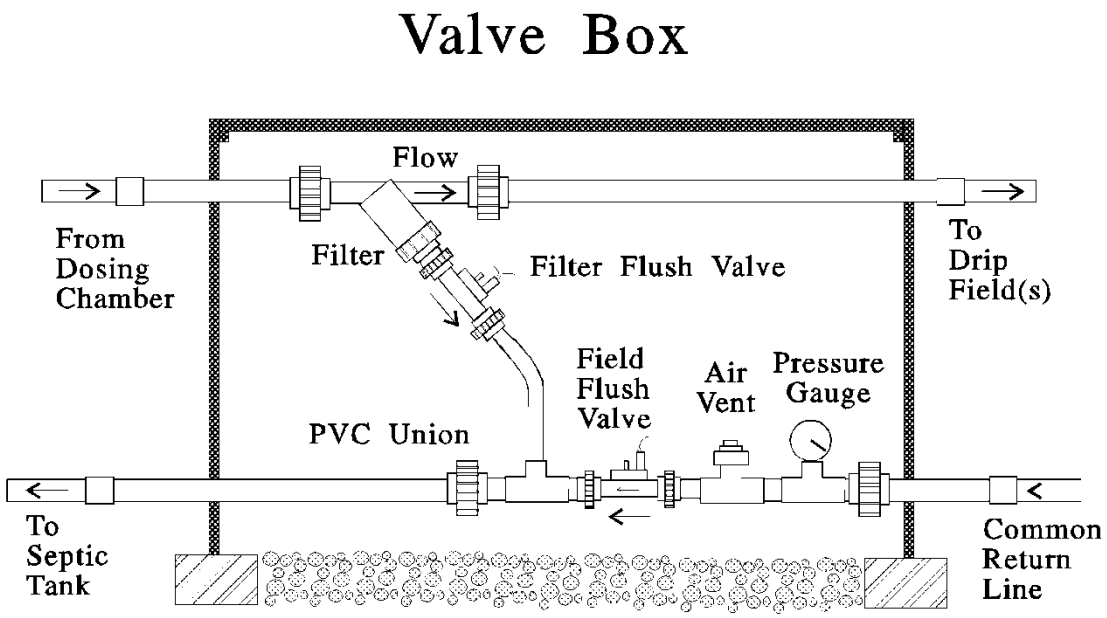

Figure 4-4. Cross-Sectional View of Typical Filter, Valve, and Meter Assembly

Continuous Flush Systems

The following requirements are different for continuous flush systems than for the rest of the drip distribution systems. All other requirements described in this section apply to continuous flush systems along with the following. Figure 4-4a provides an overhead view of a continuous flush system filter and meter assembly.

Filter Type

Filter must be a flushing type.

Filter Backwashing

The filter is required to be backwashed according to the manufacturer's recommendations and the process must be automated unless the automated backwashing requirement has been waived. The automated backwashing requirement may be waived if the filter is configured with an alarm to indicate when velocity is reduced below the manufactures minimum recommended flow velocity.

Flushing

Drip laterals are flushed during the dosing cycle. The continuous flush system must be designed to the manufactures minimum recommended flow velocity with a dose duration long enough to achieve several pipe volume changes in each lateral to adequately accomplish flushing of the drip lines.

Location of Filters and Gauges

Filters and pressure gauges may be placed in a head works (between the dose tank and the drip field), and supply and return pressure gauges are necessary to insure that the field pressurization is within the required range specified by the drip tube manufacturer.

Manifold Drain Routing

In continuous flush systems: both supply and return manifolds are required to drain back to the dose tank.

Examination and Cleaning of Filter during Startup

Due to the nature of the continuous flush process, the filter shall be examined after initial startup and cleaned if necessary to prevent incorrect rate of flow readings for the controller.

Determining Required Pump Size and Total Head

The drip system will operate to the manufactures minimum recommended flow velocity for the duration of each cycle, and the total flow minus the emitter uptake flow would be the return/flushing flow.

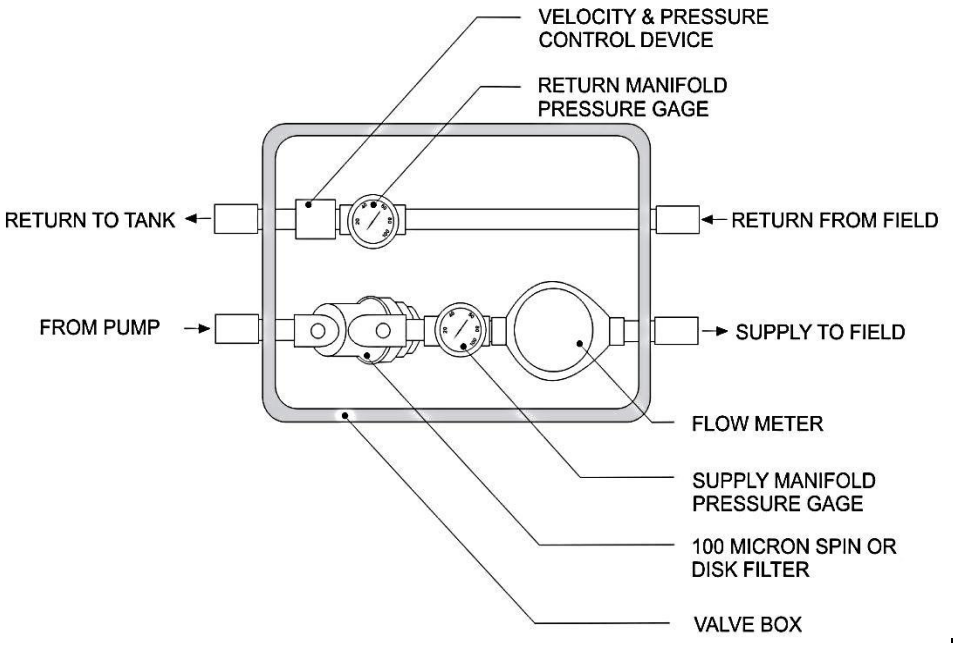

Figure 4-4a. Overhead View of Continuous Flush System Filter and Meter Assembly.