GUIDELINE FOR USE WITH 'GRAVITY 2017' PERFORMANCE PROGRAM

Applies for Pressure Fields located below the Septic Tank or Treatment System.

DESIGN

The drain field, including the distribution manifold can be designed as it would be for a pumped system. In some instances where the driving static head available is low, the field could be split into two separate circuits from a double outlet dosing tank to achieve a desired squirt height.

TRANSPORT PIPE

For typical residential size systems incorporating a 3" dia. floating outlet device, the transport pipe should be sized at 2" dia. There are two reasons for this:

1. The rate of flow from the 3" dia. tank outlet will overwhelm the 2" dia. pipe opening and quickly fully flood the 2" dia. pipe thus generating the full driving head required for the design squirt height.
2. Smaller diameter transport pipe will require less volume and less time to fully flood. It will take less of the total dose volume to fully purge air and reach full pressure at the manifold (usually a matter of seconds). Dose volumes should be larger where transport pipes are longer or of a larger diameter to give more time for full pressure to develop. As a rough yardstick, dose volume should be a minimum of 2-4 times the total pipe volume in the transport pipe and field.

VENTING OF TRANSPORT PIPE

The behavior / interaction of transient air and water in a sloped pipe is virtually impossible to predict. Interaction and time taken to reach a steady state will vary subject to the:

a) Flow rate entering the pipe.
b) Diameter and slope of the pipe.
c) Size of the opening at the end (i.e. resistance to flow of the orifice size and number)
d) Rate air can be purged from the system.

Premier Plastics Inc. has conducted a series of tests, using a 3"dia. outlet from the dosing tank, and clear acrylic tubing for the transport pipe.

The following observations were noted for each of three transport pipe sizes:

2" Dia.

Air is purged quickly and fully flooded flow (full head) develops in a few seconds. This is true with all field sizes ranging from 20 to 120 3/16" dia. orifices. No additional venting is required unless the initial run out from the dosing tank is long and shallow.

3" Dia.

The force of the flow entering the downward sloped pipe tends to equal the buoyancy force of the rising air trying to escape resulting in extreme turbulence with rapidly changing slugs of partially flooded and fully flooded flow moving erratically up and down the pipe. The trapped air prevents the full head pressure developing over duration of the dosing cycle (usually 1-3 minutes). The addition of a 2" dia. air vent placed a couple of feet along the top of the pipe as it slopes away from the tank will allow trapped air to quickly vent out.

4" Dia.

Flow will run with stable separation of air and effluent. Air trapped above the flow will prevent any head generation. The addition of an air vent on the slope as described for 3" dia. piping will allow the air to escape and the pipe to progressively flood back up towards the location of the air vent.

Note: For effective venting, the vent pipe must be located on a sloped section of the transport pipe. Vent pipes located on a horizontal section of the pipe will be ineffective in venting air.

A larger field and/or larger transport pipe will take longer to vent than a smaller field and/or shorter transport pipe. The full squirt height must be reached well before the dose completes.

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With effective venting and fully flooded flow there will be little difference in squirt height performance between 2" and 3"dia. transport pipes up to 30' long. Additional friction loss in longer transport pipes is calculated separately in the program.

VENTING OF DOSING TANK

To ensure unimpeded flow from the dosing tank, sufficient air must enter the tank to take the place of exiting effluent. This air is usually drawn from the open air flow across the inside of the septic tank and back through the sewer line vents through the building roof. The inclusion of a filter (recommended) on the exit pipe from the septic tank will restrict the free flow of air, thus an air bypass vent around the filter must be installed. The bypass vent would typically be 2" dia. and connect from the top of the 4" dia. outlet leaving the septic tank back through a rubber grommet in the side of the access riser on the septic tank. This will allow free air flow from the septic tank through the 4" dia. sewer pipe connecting to the dosing tank when in drain cycle.

DOSE VOLUME

Volume per dose is an independent value determined by the system designer. The dose volume must be sufficient to fully purge air from the system and generate the full static head and full squirt height from the orifices. Dose volume should be no less than a multiple of two times the volume of the entire drain field and transport piping. For larger diameters of extended transport pipe, the multiplier should be higher.

Approx. volume per 50' of pipe:

1¼" dia. – 3 US gal, 2"dia. – 8 US gal, 2½"dia. - 13 US gal, 3"dia. – 18 US gal, 4"dia. - 33 US gal.

SQUIRT TEST

This test, prior to covering the orifices, is to check actual squirt height against the expected squirt height.

1. Close all balancing/throttling valves on each lateral at the distribution manifold.
2. Use hose to fill dosing tank and check the rise of the Flout dosing head in the tank. Make sure it is clear of any dose monitoring devices in the tank.
3. Observe the dosing head flood and sink as it loses buoyancy. Remove hose. Wait a few minutes for the transport pipe to fully flood from the balancing valves back to the dosing tank. Replace access lid on dosing tank.
4. Open all balancing valves together and observe rate of generation of the squirt for the duration of the cycle and measure height. This will be the best performance of the system. If inadequate, check vent bypass around septic filter or re-test with lid off the dosing tank.
   If the squirt height needs to be reduced, throttle each valve until all laterals have close to the same desired squirt height.
5. Allow the tank to refill and discharge normally. Observe time taken to reach steady state squirt height and measure height achieved.
6. Compare final squirt height with the pre-flooded squirt height. Any difference would indicate not all trapped air has purged out. This should be acceptable if the resultant squirt height is adequate. If not, check venting points on slope near dosing tank outlet. Record squirt height and dose time for future testing and trouble-shooting (if any). Re-check squirt height with dosing tank lid secured to confirm adequate air flow into the dosing tank during discharge.

Please call us at the factory if you are using this technique for the first time, or if you have any questions relating to a particular site. We are here to help you help your customers save money and get a simple, well performing and maintenance free septic system.

John Richardson.
PREMIER PLASTICS INC.

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