

3.8 Purging The Closed Loop

3.8.1 Purge Pump Requirements

The purge pump must be able to provide a minimum velocity of 2ft/sec in every flow path. This velocity is required to move and dislodge any trapped air in the loop system. As can be seen from the polyethylene pressure drop tables the flow required, to meet the 2ft/sec criteria, for 3/4" IPS SDR 11 is 4 GPM. To meet the same criteria for 1 1/4"IPS SDR 11 the flow must be 9 GPM

For example, if a loop system has, three flow paths of 1 1/4" pipe the purging system must supply a total of 27 GPM (see Figure 3.16). Since the loop configuration is a parallel reverse return, each parallel branch (sometimes refer to a flow path or parallel circuit) will have the same pressure drop. If the pressure drops are the same then the flow rate in each branch will be the same. If 1 1/4" P.E. pipe requires 9 GPM, to maintain a velocity of 2 feet per second for purging, then each branch must have a minimum of 9 GPM. If one studies the flow through the header with a flow rate of 27 GPM the first "T" of the header will see this flow rate. Since each branch will have an equal flow rate, the first branch will have 9 GPM flowing in it. As the flow continues through the header the second "T" will see the remaining 18 GPM. The second branch will have another 9 GPM flowing in it and the last 9 gallons is delivered, through the header, to the last parallel branch. Note that since the header was also 1 1/4" pipe its requirement of 2 feet per second at 9 GPM was also satisfied. It is very important to maintain the minimum velocity of 2 feet per second in any portion of the loop to achieve successful purging of the ground loop system.

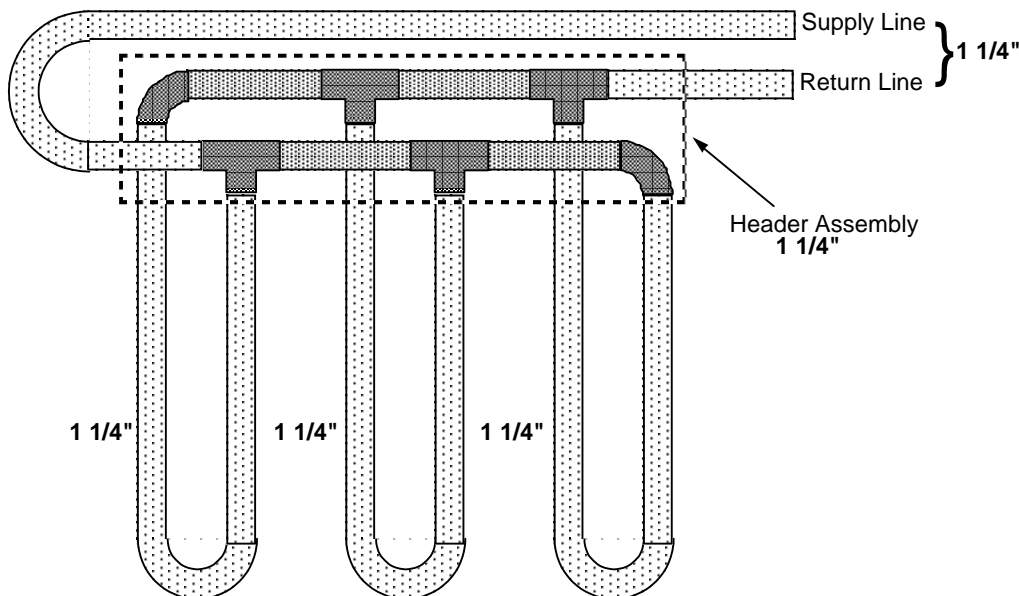


Figure 3.16 Purge Requirement Example

When choosing the correct pump for purging applications one must anticipated the worst cases pumping conditions. Consideration must be given to velocity of pumping, which translates to the pumps flow rate capabilities and the system pressure, which the pump

can overcome. **Important:** When selecting a pump for purging, it is imperative that the pump chosen delivers the G.P.M. needed at the proper ft. of head.

Once piping is completed between the unit and pump and the earth loop, the earth loop must be purged of all air and debris. A typical closed loop installation is shown in Fig. 4.1.

A purging system with at least a 2.5 hp high capacity pump is required, to adequately purge residential loops. The purging system should include a means of changing the purging direction to allow purging of the loop in both directions. The purging system must also have a tank to allow for the addition of water and anti-freeze as well as having a place for air to perk out of the loop system.



3.8.2 Purging Method / Anti-freeze charging

****Warning:** It is very important when handling methanol that it NOT be poured in open air. Methanol fumes can be very **DANGEROUS TO YOUR HEALTH**. Methanol is highly flammable. Do not have any open flames or lit cigarettes when working near an open methanol container. Add methanol under water. Attach a tube or spout to the container of methanol, insert the tube under the water level and then pour. Another way of adding methanol to the loop is to use a suction pump. Again make sure that the methanol is added below the water level.

Methanol should never be transported unless diluted 50% with water. This will increase safety.

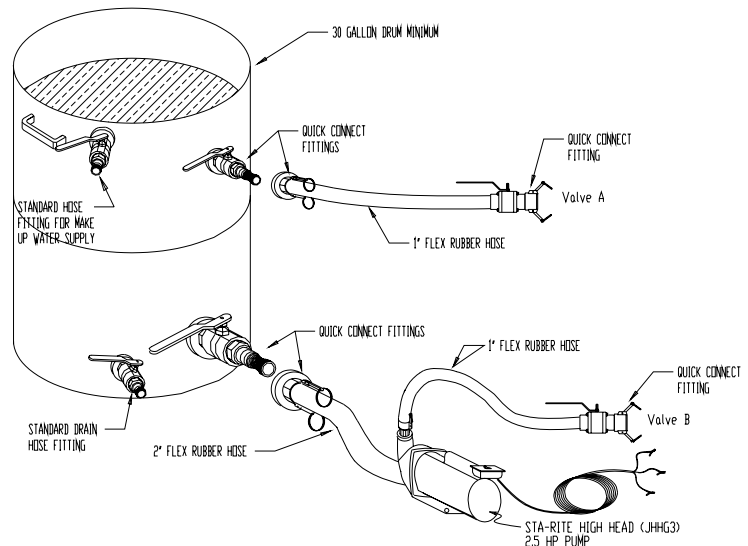
Purging of the loop and system should only be done after it has passed the air pressure check and all leaks have been repaired.

- 1) Connect purging unit to purge ports.
- 2) Close the isolation valves to the unit and open the isolation valves to the loop and the purging ports.
- 3) Fill the purging unit water reservoir so that the water level is above the return line. (Your anti-freeze should be added here as required. When purging in methanol it should be diluted to 50% methanol and 50% water for safety until the required amount has been added) It is helpful to keep the return line below the water level in the reservoir to prevent splashing of the water in the reservoir. The splashing will introduce air into the supply water.
- 4) Start the purge pump. Make sure that the water is always above the supply water line. This will prevent any extra air from entering the loop. Turn the purge pump off and on as needed while refilling the reservoir.
- 5) Purge the loop for about 20 minutes. Close valve A of the purging unit for about 5 seconds. This will "dead head" the system. In other words the internal pressure of the loop will be increased. **Important:** Watch for any significant drop in the water level of

the reservoir if the water level in the purger drops more than one or two inches, this will indicate the presence of air still in the loop. If this occurs continue purging in the same direction. "Dead heading" the system will provide bursts of high pressure through the system. This will help dislodge any difficult air pockets. "Dead heading" can be done at any time and can speed up the whole purging procedure.

Note on purging time. When becoming familiar with new purging equipment a good rule of thumb for purging time is between 20 - 30 minutes per ton of loop. When one is familiar with the equipment this time can be reduced.

- 6) Keep purging until no more air is seen coming out of the loop into the Purging unit reservoir. "Dead head" the system again and watch for any significant drop in the purgers water level. At this point, it may be a good idea to bring the loop up to maximum pressure using the pump and valve off both valves A & B of the purging unit. This is a good check, over a longer period of time, to check for pressure drop in the loop pressure. This pressure drop is an indication of a leak in the loop.



3.8.3 Purging the Unit

- 1) Now that the loop has been purged slowly crack open the isolation valves on the unit while the purge pump is running. This will allow water to continue to flow through the loop and slowly allow the air to be purged from the units piping.
- 2) You will start to see air come up in the purge reservoir as the air is purged from the lines to and from the unit. When the air stops open the isolation valves wide open and close the isolation valves to the loop if available. This will purge just the unit. Allow this to run for 20 – 30 minutes to insure system purge.
- 3) After all the air is purged from the unit open all the isolation valves on the loop and unit and allow flow through everything. Let purge for 5 – 10 minutes then turn off purge pump and shut off purge ports.
- 4) If no auto purge is being used then the purge pump can be used to pressurize the loop. Do this by turning off valve A of the purging unit while the pump is running. This will build up the loop pressure equal to the head of the pump. After a few seconds turn off valve B of the purging unit then turn off the pump.
- 5) If an auto purge is being used no loop pressurizing is needed.
 - a. Disconnect the purge hoses.
 - b. Mount the Auto purge tank to the wall above the purge fitting.
 - c. Connect the hose from the auto purge tank to the purge fitting located on the suction side of the circulating pump.
 - d. Fill the auto purge tank $\frac{3}{4}$ of the way full.
 - e. Open the fitting below the autopurge.

3.8.4 Reversing the Flow when purging

Most residential systems can be purged without reversing the flow of the purger. On larger systems or unique applications, reversing the flow of the purger may be needed to dislodge all the air in the loop. This is done with the manifold system shown in Figure 3.18. Purging should be done for 20 – 30 minutes each way. Consideration of any check valves should be made.

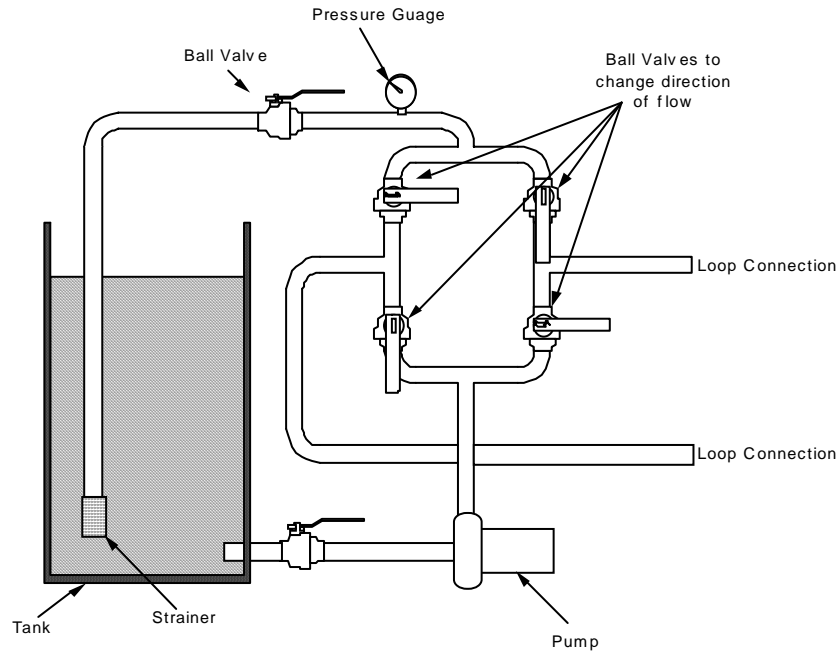


Figure 3.18 Purging System Schematic