

Guidelines for Domestic Pressure Pipe Network Designs and Installation

We provide site specific design proposals for pressurised pipe networks for pumped polishing filters with calculated design details including pump and pump tank dose requirements. This is required by the footnote to tables 8.1 and 8.2 of the EPA Code of Practice 2009... *“Due to variations in the discharge rating of pumps available on the market, it is important to correctly match the orifice diameter and the lateral diameter in the distribution system to the pump, thus ensuring even and effective distribution of the hydraulic load across the filter area.”*

We provide system installation and certification for domestic and for large commercial systems. The advantage of a pressure distribution system is that the water can be pumped throughout the pipe network and **spread over the infiltration area more effectively than by a gravity system**. This means that pressure must exist to the furthestmost part of the network; otherwise the percolation area is only being partially dosed which can quickly result in leakage and overloading.

The system design is based on calculating the flow in litres per minute from each hole (orifice) and by extension the flow from the total network of holes. To maintain the design pressure in the pipe network, the number and diameter of the holes must be matched by the capacity of the pump and the volume of water pumped each time the pump runs.

The choice of pump and the volume of the pump tank or pump compartment are critical design elements. The design for the pressure pipe network SHOULD contain two calculated design values that are essential for the effective distribution of the water throughout the pipe network.

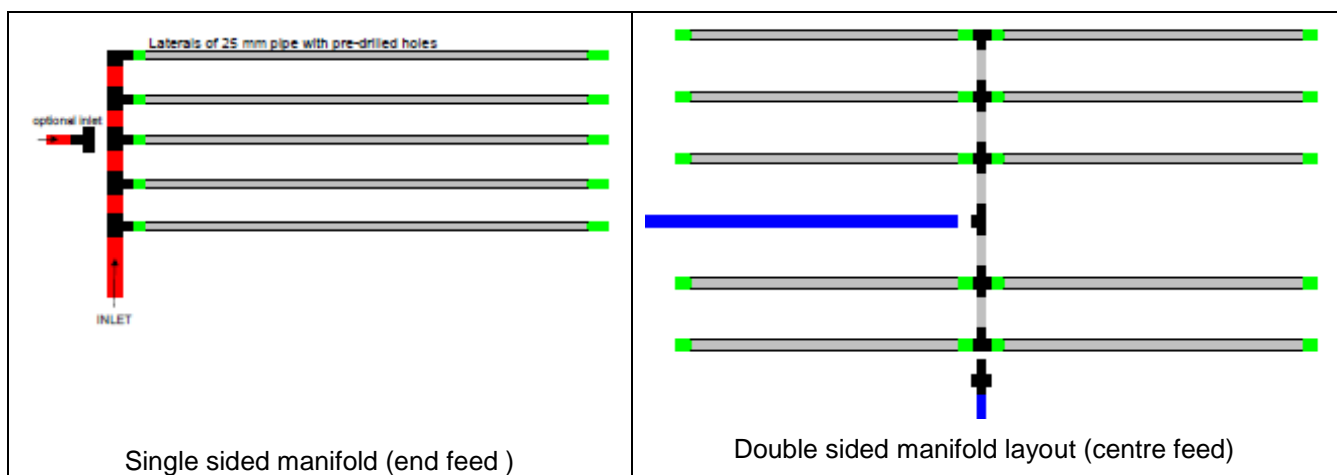
1. The minimum operating pump capacity for the specific pipe network at the site TDH head in litres/minute.
2. The minimum recommended network dose volume in litres per dose i.e. per pumping event.

These are important design elements and are specific to the number and spacing of orifices in each design. More pipes, bigger holes or additional holes will change this calculation.

Pipe Configuration.

We supply two main types of domestic pressure systems single sided manifold (end feed) and double sided manifold (centre feed). Valves housed in valve boxes are recommended to be used at the head and also at the ends of each lateral (perforated pipe length).

Sometimes the design can include a pressure indexing valve which allows the pressure pipe system to be divided into multiple zones and fed sequentially by a single pump.



Site Considerations

Once the configuration of the pipe network has been decided, the site considerations involved in completing the system design are:

- System head. Total dynamic head (TDH) to include elevation, design pressure and friction losses.
- Pump capacity. The pump must have sufficient flow rate capacity at TDH. Examine the pump curve.
- Dose volume. The volume of water each pump run should exceed the calculated network minimum.
- Slope and contours of the site. Generally the lateral lines should be placed along the site contours at right angles to the slope or fall on the site.
- Long and narrow percolation area is preferred to square shape to increase oxygen flow into the area.
- Pumping distance and the diameter of the pump line (rising main) to avoid excessive pressure loss.

Installing the System

1. A typical system consists of larger diameter pipe lengths (the manifold) which will be connected by tees feeding into smaller diameter pipes (the laterals) placed at right angles to the manifold.
2. The manifold pipe lengths have been cut to suit the separation distance between the lateral lines. This gives the centre to centre trench distance for the lateral pipe trenches that must be excavated.
3. By laying out the complete pipe system on the area to be excavated the length of manifold trench and the location, length and number of lateral trenches can be marked on the site prior to excavation.
4. The larger diameter pipes are the inlet manifold which connects to the pump rising main. The manifold sections are joined by Tees with reducers into which the lateral pipes are glued. The last manifold section has an elbow instead of a Tee.
5. The lateral pipes have pre-drilled holes which should be placed facing in the position recommended by the system designer - i.e. facing up and covered with pipe sleeve or orifice shields or down onto the gravel trench bottom or in some cases at 3 o'clock if preferred. Holes facing up allows visible pressure testing prior to backfilling.
6. Make sure all holes are clean without burrs and remove any shavings from the pipes that might block holes.
7. The ends of each 25 mm pipe are flared for easy joining of the lateral pipes.
8. The shortest lengths of 25 mm pipes (i.e. cut sections without flared ends) should be placed at the ends of each lateral line so that the holes will not be too close to the valve boxes.
9. Usually ball valves are placed at both the head and end of each lateral for maintenance, system balancing and annual flushing of any solids that will build up in the pipes. Valve connectors (short 120mm lengths of 25 mm pipe) can be fitted to the valves to assist flushing.
10. Valve boxes house the ball valves and provide access to the valves after backfilling.
11. Valve boxes can be raised by adding sections of 6" diameter pipe cut to suit as risers below them.
12. The lateral pipes can be fed through the valve boxes before gluing of components or a section of suitable diameter pipe can be placed below the box as riser.
13. Check that the correct pipes are connected so that holes are not located at the very edges of the filter.
14. All components should be glued together after the correct layout has been confirmed on site.
15. It is possible to test the network distribution by pumping water through the pipe prior to gravelling and backfilling. If holes are facing up, a metre of squirt height at the end of the lateral is ideal. During future inspection a perspex pipe and elbow can be attached to the valve to measure pressure.
16. The valves at the head of the laterals are set open and the valves at the end of each lateral are closed so that water is forced through the pipe perforations.
17. Flows to each lateral can be reduced if necessary by partially closing the lateral header valves.
18. Future maintenance of the pressure system should involve opening the end of lateral valves and flushing out the accumulated sludge and slimes due to the pipe scouring of biofilm as designed. This may require using a bottle brush attached to a length of wire if excessive solids are blocking flow through the open valves. Other lateral pipe lines can be closed using the header valves to provide extra pressure if necessary.



A female 40 mm to 1 1/4" threaded fitting is supplied for connecting to (at least 1 1/2") rising main. (Black Philmac fitting not supplied)



Orifice shields are available to prevent holes being blocked with soil –or cuts of 110 mm pipe can be placed directly over pipes.



As featured on ECO-EYE. Testing system pressurisation with water



Our Indexing valves can pump water to 2- 6 independent cells in sequence using a single pump. Useful for large systems or to use small parcels of a small site.

Picture 1 opposite shows start of lateral valve accessible through valve box to balance flows by partially opening or closing valves and to allow laterals to be shut off if necessary.

Picture 2 shows end of lateral valve assembly beside its access valve box. It is brought to final surface level using a riser pipe before landscaping. By opening this end valve the accumulated solids can be flushed out during maintenance.



These are summary guidelines to assist with the system installation and are not intended to replace the advice of your engineer or system designer.

New Drip distribution systems mole ploughed into the ground level soil are a cost effective and more attractive alternative to raised mounds. A recent EPA research report recommended the use of drip in low permeability soils.

We specialise in pressurised wastewater soil infiltration systems for schools, housing and industrial projects. We work with engineers, architects, site assessors and contractors providing sub-contracting services on rural projects incl. design, supply, installation, project oversight and certification.