General Installation Instructions

April 1, 2019

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NOTE: Always <u>disconnect the power supply before working on SoilAir™ equipment or the leach field that it serves</u>. *The blower can start automatically, without warning, based on inputs from the programmable timer, float switch settings and other parameters. Additionally, the leach field is under pressure; stay clear of any inspection ports and other similar pressurized ancillary devices.*

1. SoilAir Overview

SoilAir is a patented technology that intermittently aerates leaching systems and the surrounding soil. This process allows for rapid rejuvenation of failed leaching systems, extends the life of new leaching systems and enhances treatment.

The SoilAir System generates supra and sub atmospheric air pressure in the OWTS. This results in oxygen flowing through the OWTS and through the surrounding soils. Through this process, the biomat is transformed from anaerobic to aerobic. The aerobic and facultative microorganisms that flourish in a well aerated environment can then reduce the thickness of the biomat through metabolic activity and enhance treatment efficiencies.

2. Equipment

In general, system components include controls, a blower, airline, air backflow prevention device to pneumatically isolate the OWTS and a float switch to monitor septic tank levels and control blower operation. The float switch (normally closed) and check valve assembly should be preferably installed inside the septic tank at the outlet. This assembly replaces the outlet baffle. Alternatively, the check valve can be installed just outside the septic tank, <u>directly</u> adjacent to the tank wall and brought to grade with a riser for ease of maintenance. This may be desirable in situations where access is restricted.

The aboveground SoilAir components typically include a blower and controls, both are installed outside in weatherproof enclosures and installed in unobtrusive locations; typically within 200 feet of the septic system. An air supply line runs from the blower to the OWTS components and to supply air. Power and optional phone or communication lines are run to the equipment enclosure location or control panel. Telemetry is required on all commercial systems incorporating SoilAir.

<u>Equipment Provide By Geomatrix</u>

- <u>Blower</u>
- <u>Control Panel</u>
- <u>Weatherproof Enclosure</u>

<u>Equipment Provide by Installer</u>

- <u>Float Switch</u>
- <u>Check Valve</u>
- <u>Air Supply Line</u>
- <u>Fittings and Connectors</u>

3. Septic Tank

If this is a retrofit or repair situation, locate the septic tank, pump it out and clean it. Confirm tank size, integrity and repair or replace as necessary.

4. Leach Field

If this is a retrofit or repair situation, locate and dewater the leach field. Excessive probing and hole digging will result in you having to seal more holes. Dewatering of the leach field prior to addition of SoilAir™ will provide the best results. In any case sufficient head space must exist to allow the air to enter the structure and flow through the biomat and into the surrounding soil. Dewatering can be done with a pump truck or by breaching the biomat and allowing the effluent to drain into soil adjacent to the leach field. In certain instances pneumatic soil fracturing can be effective. Seal any holes you have made or that previously existed with Benseal bentonite or equal. If D-boxes are new or if they have been opened, silicone, foam sealant or chemical grout should be utilized to seal them. A layer(s) of bentonite may also need to be placed in the soil backfill over the d-box.

5. Equipment Enclosure

Determine where to locate the SoilAir equipment enclosure. Although the equipment is typically quieter than an air conditioner, it is advisable to not install the equipment enclosure near windows, decks, etc. Care should also be exercised to not locate the equipment enclosure in excessively wet locations, such as low spots, near downspouts, etc.

The pedestal base of the SoilAir enclosure should be buried up to the point where the base tapers to a noticeably smaller dimension. In no case should the pedestal base be buried above the intersection of the lid and pedestal base.

It is recommended that plastic sheeting (Garbage bag) be installed under the bottom of the pedestal base to minimize condensation buildup in the box when the blower is not running. The plastic sheeting should then be covered with gravel to protect it and hold it in place. It is advisable to put a few small draw holes in the plastic sheeting to facilitate drainage.

6. Gravity Systems

The float switch (normally closed) and check valve assembly should be preferably installed inside the septic tank at the outlet. This assembly replaces the outlet baffle. Alternatively, the check valve can be installed just outside the septic tank, directly adjacent to the tank wall and brought to grade with a riser for ease of maintenance. The check valve and float switch must be at the same elevation, plumb and level to operate properly. The float switch wires should preferably be run in a conduit to the equipment enclosure; direct burial wire is less desirable. **Warning:** All wiring should be performed by licensed professionals and in accordance with all applicable codes and regulations.

When installing line voltage floats, care should be taken to size wires such that line loss is considered. With a 14 gauge wire, runs should not exceed approximately 50 feet from the equipment enclosure (50 feet to and from the float switch, or in other words a total of 100 linear feet of wire in the circuit).

Care should be exercised to properly seal the conduit interior to prevent unpleasant odors and potentially hazardous and corrosive gases from entering the equipment enclosure or control panel. Appropriate seals/fittings designed for this purpose should be utilized; epoxy or other sealant alone may not be effective.

The air line can be connected anywhere between the leach field and the check valve, including directly into the D-box. See air line requirements. A riser assembly should be installed over the septic tank outlet access hole for float switch and check valve for ease of maintenance.

Note: Location of components varies with site specifics and complications. Consult Geomatrix or its authorized representative for proper utilization of components.

7. Pump Dosed Systems

A check valve must be installed between the air supply line and the pump, to prevent air flowing backwards through the pump. If necessary, the check valve can be installed at the highest elevation in the force main pump line to facilitate drain back of the force main line to the pump station. This is often accomplished by installing the check valve on the force main inside or adjacent to a D-box and by piping the air supply line to the D-box. When tying the air line into a d-box, it is often best to tee into the inlet line directly adjacent to the d-box, the tee should be oriented up. This ensures that the air enters higher than the discharge lines. The air line can also be tied into the force main between the leach field and the check valve, if the force main is sufficiently sized and facilitates drain back. The airline is then run to the equipment enclosure.

Ensure that air is not lost out a weep hole. If the weep hole can not be plugged, a ¼" barb fitting can be tapped in the weep hole. The ¼" tubing is then installed on to the

barb and a J-trap can be constructed out of the 1/4" tubing to allow the weep hole to function and to prevent air from escaping. The tubing is often weighted with a brick to hold it on the bottom of the pump tank.

When the blower is lower than the leach field, in addition to a check valve on the air line, a stand pipe should also be utilized to protect against water reaching the blower. This stand pipe should be sufficiently higher than the top elevation of the leach field to take into account the additional resistance associated with the soil cover.

A line voltage float switch (normally closed) is typically installed in the pump station to turn off the blower prior to a dose. The float switch should be set to activate approximately 1 – 2 inches below the pump on level, this will serve to turn off the SoilAir blower prior to the pump being energized. The float switches must be set to ensure that the pump turns off before the blower turns on.

When installing line voltage floats, care should be taken to size wires such that line loss is considered. With a 14 gauge wire, runs should not exceed approximately 50 feet from the equipment enclosure (50 feet to and from the float switch, or in other words a total of 100 linear feet of wire in the circuit).

These wires are then run to the equipment enclosure, preferably in a suitable conduit. Care should be exercised to properly seal the conduit interior to prevent unpleasant odors and potentially hazardous and corrosive gases from entering the equipment enclosure or control panel. Appropriate seals/fittings designed for this purpose should be utilized; epoxy or other sealant alone may not be effective.

In certain instances the SoilAir float switch in the pump station can be eliminated or substituted with other sensing devices such as pressure switches, dry contacts, etc.

Note: Location of components varies with site specifics and complications. Consult Geomatrix or its authorized representative for proper utilization of components.

8. Air Line

The air line should pitch down towards the leach field or drain to the pump tank to prevent condensation buildup. For typical residential installations with runs of 50 feet or less, the air line should be a minimum of 2-inch schd. 40 PVC. Runs from 50 – 200 feet should be a minimum of 3-inch schd. 40 PVC; 4-inch piping is even better. Contact SoilAir for runs longer than 200 feet.

In certain instances the air line can be connected to a dedicated air diffuser piping network or to other components such as plastic chambers.

A Fernco fitting or equal rubber coupling should be installed on the airline piping directly adjacent to the equipment enclosure to help minimize the effects of vibration, settling or frost.

The air line should enter the top of the effluent pipe with a tee or saddle tee; this minimizes effluent entering the air line. The air line can also be connected directly to the d-box or wastewater infiltration device such as plastic chambers. In all cases the air line should be connected to the top of the structure or be plumbed so as to minimize the risk of effluent entering the air line and to avoid bubbling the air into the effluent; this will produce biosolids.

Note: Location of components varies with site specifics and complications. Consult Geomatrix for proper utilization of components.

9. Sealing and Backfilling System

D-boxes and holes in leach field must be sealed properly to avoid air from short circuiting. When sealing a d-box, make certain that the surfaces are clean and dry, place a generous bead of silicone or foam sealant on the box and place the lid firmly on top. It is recommended that new system configurations have a liner membrane over top and along the sides of the system to ensure the leachfield is "Keyed in". Final grade must facilitate storm water sheet flow away from the leaching system. Any areas or holes that can puddle water will be problematic.

10. Leach Field Cover & Grading

Soil cover depth and permeability over the leach field directly impacts performance of any leach field; especially one with a SoilAir System. Cover should be a minimum of one and one half feet above distribution line inverts in accordance with RI DEM OWTS Rule 6.33.N. Uniformity in cover depth and permeability over the leaching system is imperative. Cover depth should not vary by more than 20%. This will ensure that the entire leaching system will receive adequate oxygen.

It is also critical that storm water can sheet flow off the surface above the leach field and that low spots are not present. If puddles can develop during storm events, it will become a problem for airflow short circuiting. Standing water with air flow under it equals bubbles, bubbles equals agitation, agitation equals holes in soil and holes in soil results in air flow short circuits. In the end, the air is not getting where it needs to go. When soil cover cannot be adjusted accordingly, or when treating a stone bed wider than 6 feet, buried plastic sheeting, 6mm or greater, can be utilized to address these issues and assure that air flows through the soil where it is needed. Contact Geomatrix or its authorized representative for proper use and application.

11. Wiring

Warning: All wiring should be performed by licensed professionals and in accordance with all applicable codes and regulations. An appropriate power supply and service disconnect should be provided. Follow the specific wiring instructions provided with the specific SoilAir unit you are installing.

12. Setting the Float Switch

The float switch utilized to control the SoilAir System is typically normally closed; this turns off the blower when the water level reaches a certain elevation in a tank. Certain SoilAir controllers can effectively reverse the polarity of a float, allowing a normally open float to be utilized. This is covered in the specific controller instructions provided with the specific SoilAir unit where applicable.

The float switch installed in a septic tank should be set at the factory to maintain the tank level between 1 and 3 inches above the discharge pipe invert elevation when the blower is running. When the blower is off, the tank level should be at the invert elevation of the outlet pipe. The float operating level is typically adjusted by moving the float retaining collars (stops) up and down. Make certain that the float turns the blower on and off at the above specified elevations. If the float is set too low, the blower will not run. If the float is set too high the blower will not turn off and could backup wastewater into the house or cause scum to flow over the baffle.

When the SoilAir float is installed in a pump station, the float must be adjusted to turn off the blower prior to the pump turning on. If this elevation is too low the blower will be off for extended periods of time. If this elevation is too high, the blower may not shut off before the pump is energized. The float must be adjusted to turn on the SoilAir blower AFTER the pump has turned off. Floats for use in a pump station are typically normally closed and can be vertical with adjustable stops, or horizontal cord floats that are adjusted by the tether length.

13. Setting the Delay Interval

When the float is activated by water rising in the septic or pump tank, the blower should turn off. It is desirable that the blower remains off for a period of time sufficient to allow water to fully enter the leach field. This period of time is referred to as the delay interval.

With a vertical stick float, collar stops can be moved up and down on the stick (shaft) to prevent further upward or downward movement. The collar stops should come set from the factory to turn the blower off when approximately 2-3” of water has accumulated above the invert elevation of the outlet pipe. This setting should also turn the blower back on when the tank level is just above the invert of the outlet pipe. Since the collar stops allow the float to slide on the shaft, a delay is effectively built in.

In the case of a system with a SoilAir microprocessor controller, a delay can be set to take effect after the float returns to the low position. This delay is generally set for 10-60 minutes, typically 20 minutes, and serves to ensure that all the water has drained from the piping before the blower starts up.

14. Testing for Air Short Circuits

It is critical that the air supplied by the SoilAir System flows through the biomat and soil around the leach field and does not just short circuit to atmosphere. Some SoilAir units have dedicated smoke testing ports and others are optional; these devices allow the air flow pathways to be evaluated.

After the blower has run for approximately five minutes, turn it off. Light a smoke bomb and quickly put it in the smoke bomb canister, put the cap back on and tighten it. **Immediately** start the blower up again preventing smoke from entering the blower and damaging it. Smoke will come out of any significant holes/short circuits. Fix any significant leaks in piping components, if the D-box is leaking, replace it or seal it with silicone, expandable foam, chemical grout, bentonite or a combination of these. Short circuits through soil over or adjacent to the leach field can be sealed with bentonite and/or by tamping/compacting any holes in the soil and by adding additional soil. Compacting the soil with a tamp bar can be effective.

Smoke diffusing uniformly through the soil over the leaching system is not necessarily problematic, but can be indicative of shallow cover depth over the leaching system. The more resistance the air has above the leach field the better.

Do not forget to remove the smoke bomb from canister when finished

15. Air Intake Louvers

All SoilAir models are equipped with air intake louvers. SoilAir Systems are typically significantly quieter than an air conditioner. Sound is directional, when possible locate the SoilAir System enclosure and/or the air intake louvers so as to direct sound in a desirable direction, or preferably into an absorptive medium such as an evergreen bush, etc. Try to not have the louvers facing a direction where grass clippings from mowing, dust, etc. will routinely be directed towards them.

16. Programming Blower Operation

Program the SoilAir unit per the specific instructions provided with it. When rejuvenating failed systems, it is best not to run the blower 24/7, but to program the blower to run with some off time, such as for 5 hours on and 1 hour off or 1 hour on and 20 minutes off, etc. The rest interval is beneficial and allows water and oxygen to redistribute in the soil adjacent to the leach field.

In most instances, less than one hour of blower operation far exceeds the daily B.O.D. Once the leach field has been rejuvenated, or when utilizing the SoilAir System for preventative maintenance or for enhanced wastewater treatment, less frequent blower operation is typically advantageous. Examples include: 1 hour on and 5 hours off, 2 hours on every night, etc.

Programming the SoilAir System should take into consideration the associated wastewater oxygen demands and general treatment objectives. When the goal is increasing the Long Term Acceptance Rate and/or treatment of high strength wastewater, the more air the better; however, optimizing the run time should be balanced against power consumption. When the objective is enhanced nitrogen removal, sequencing the blower operation and subsequent dosing of the anoxic carbon containing wastewater will increase the removal efficiency.

17. Enclosure Location

Care should be exercised to locate the equipment enclosure where it will not be subject to damage from vehicles, snow plowing, lawn maintenance, dust, vandalism, etc. Consideration for protecting and securing the SoilAir enclosure and equipment should be provided. Provisions are provided for use of a padlock on the equipment enclosure.

18. Installation Assistance

Geomatrix will provide installation assistance as necessary. A Geomatrix representative must inspect all installations of SoilAir prior to initial operation.

19. Troubleshooting

History has proven that if the desired effect is not being achieved, go back to the basics and confirm the septic system design basis, hydraulic load, wastewater strength; if all of this is inline, then look at the other variables that impact the SoilAir performance directly. Certain SoilAir Systems can track the volume of wastewater that the septic system is treating; certain SoilAir systems can track and data log all system operating parameters.

The number one issue is to ensure that the air is flowing through the biomat; if it does not, you are not getting the benefit of the SoilAir technology. If wastewater flows prevent air from contacting the biomat due to constant flows, or if water is ponded over the surface of the leaching system biomat, there is no way to oxidize the biomat. The SoilAir technology effectively makes the natural rest period between doses more efficient; if this rest period is nonexistent, it will provide little benefit.

The first step in troubleshooting is to make certain that the individual SoilAir System components, such as the float switch and blower, are operable. Confirm that power is present at the SoilAir disconnect with appropriate test meters. Also confirm that the float is operable and not stuck in the up position.

The second step in troubleshooting is to confirm airflow pathways by adding indicator smoke to the air stream; the smoke should highlight any short circuiting issues that are present. Address any problems identified by the smoke testing as previously described.

If smoke is diffusing uniformly over the system, this suggests that cover depth and/or permeability is a potential problem. In this case, additional top soil cover or plastic sheeting over the system will be beneficial in increasing oxygen levels at depth. If low spots are present over the leach field, they can hold water; this will negatively effect airflow and ultimately result in airflow short circuiting.

If smoke testing does not identify any obvious problems, you should confirm that air flow is present in all sections of the leach field. This is best determined by measuring the operating pressure in each individual leach field lateral or zone. Pressures can be measured with a differential pressure gauge and a suitable probe and/or test plug. Simply opening up an inspection port does not confirm that air is flowing when it is under pressure.

SoilAir technical staff is available to assist you over the phone or in the field. Contact us at the number listed below.

20. Inspection

In general, SoilAir Systems should be inspected and maintained twice annually; however, this frequency should be increased to quarterly inspections for commercial establishments, systems with design flows of 2000 gpd per day or more and more challenging sites, including when operated in dusty conditions.

NOTE: Always disconnect the power supply before working on SoilAir equipment or the leach field that it serves. *The blower can start automatically, without warning, based on inputs from the programmable timer, float switch settings and other parameters. Additionally, the leach field is under pressure; stay clear of any inspection ports and other similar pressurized ancillary devices.*

21. Maintenance

To Remove the Cover

Some covers simply lift off and on others a 9/16 bolt retains the cover. A lock can be utilized for security purposes.

Air Filter

Clean the air filter as required. This frequency will vary depending on specific site conditions. Call 888 SOILAIR for replacement elements.
If removal is necessary loosen wing nut or hose clamp. After filter replacement tighten wing nut or hose clamp.

Air Intake Louvers
Air intake louver should be cleared of all debris with a stiff bristle brush.

General Condition
Check condition of rubber couplings, pipe etc.
Cooling fan on end of the blower should be kept clear of all debris.
Listen for any abnormal noises.
Check for loose parts, fittings or air leaks.

22. Contact Us

Contact us or your local distributor for any questions you may have Monday – Friday 8am – 4pm Eastern Standard Time.

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