



MicroSepTec
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ONE TANK – FIVE CHAMBERS – TOTAL TREATMENT



REFERENCE MANUAL



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General Information

Thank you for selecting the EnviroServer® ES Series Wastewater Treatment System. Sometimes, the simplest solution is the best and that's the case with the EnviroServer. Simple, because the entire treatment system is in one tank. Simple, because the only moving part is the compressor. Simple, because there is minimal intrusion to the landscape. Simple, because the process is accomplished with aeration and agitation, the same technology as sewer treatment plants. Simply simple!

The system employs a naturally occurring biological process. Although it is robust, certain care must be taken. This manual will let you know what the EnviroServer ES Series is, how it works, and what is needed to keep it operational and healthy.

Glossary of Terms

Air Diffusers: Membrane device used to evenly distribute fine air bubbles in order to transfer and mix oxygen with dissolved substrates.

Alarm Control Panel: Controls the process and indicates failures of mechanical and electrical components.

Back-Flush System: Used with a drip dispersal system. A series of valves and a filter used downstream from the EnviroServer to flush the drip line filter and field.

Coliform Bacteria: Group of bacteria that constitute most of the intestinal flora of warm-blooded animals (including the genera *Klebsiella* sp., *Enterobacter* sp., *Citrobacter* sp., or *Escherichia* sp.) and are used as water pollution indicator organisms.

Coliform Bacteria, fecal: Indicator bacteria common to the digestive systems of warm-blooded animals that is cultured in standard tests to indicate either contamination from sewage or the level of disinfection; generally measured as number of colonies/100 mL or most probable number (MPN).

Coliform, total (TC): Measurement of water quality expressed as the number of colony-forming units (cfu) of coliform bacteria per unit volume.

BOD (Biochemical Oxygen Demand): The amount of dissolved oxygen needed (i.e. demanded) by aerobic biological organisms to break down organic material present in each water sample at a certain temperature over a specific time period. The BOD value is most expressed in milligrams of oxygen consumed per liter of sample during 5 days of incubation at 68°F and is often used as a surrogate of the degree of organic pollution in water.

CBOD (Carbonaceous BOD): A subset of BOD. BOD results are based on DO depletion from both carbonaceous and nitrogenous actors in a wastewater sample. CBOD measures DO depletion from only carbonaceous sources. Concentrations of oxygen utilized by microorganisms in the oxidation of organic matter during a 5-day period at 68°F. BOD is measured to indicate the strength of wastewater and/or the effectiveness of treatment. This is the unit measurement used in NSF/ANSI testing of treated wastewater systems.

Discharge Pump: A pump used to discharge processed water from the last chamber to the dispersal area.

Disinfection: Process used to destroy or inactivate pathogenic microorganisms in wastewater to render them noninfectious.

Disinfection, ultraviolet (UV): Process used to inactivate microorganisms by irradiating them with ultraviolet light to disrupt their metabolic activity, thus rendering them incapable of reproduction.

Dispersal: Spreading of effluent over and into the final receiving environment.

Distribution: The process of conveying wastewater or effluent to one or more components or devices.

Drip Dispersal: Application of effluent over an infiltrative surface via pressurized emitters and associated devices and parts (pump, filters, controls, and piping).

Effluent: Treated wastewater that flows out of the system.

EnviroServer ES System: An advanced wastewater treatment system that employs a hybrid fixed-film, suspended growth, extended aeration process (MBBR) that utilizes a two-stage biological process to optimize nitrification and denitrification.

ES (Extended Storage): The extended amount of storage volume of the EnviroServer ES Series.

Influent: Wastewater flowing into the system.

FOG (fats, oils, and grease): Constituent of sewage typically originating from foodstuffs (animal fats or vegetable oils) or consisting of compounds of alcohol or glycerol with fatty acids (soaps and lotions), typically measured in mg/L.

MBBR (Moving Bed Biological Reactor): A type of wastewater treatment process that consists of an aeration tank (like an activated sludge tank) with special plastic carriers that provide a surface where a bio-film can grow. To achieve higher concentration of biomass in the bioreactors, hybrid MBBR systems (like the EnviroServer) are used where suspended and attached biomass co-exist, contributing both to biological processes.

Normally Closed (NC): An alarm circuit that will not report an alarm when the circuit is closed; opening of the circuit (e.g. disconnecting wire, an open float or pressure switch) creates an alarm.

Normally Open (NO): An alarm circuit that will not report an alarm when the circuit is open; closure of the circuit (e.g.. a jumper, a closed float or pressure switch) creates an alarm.

Recirculation Pump: A pump used to return sludge and nitrified water from the final clarifier to the primary clarifier. The EnviroServer uses an air-actuated pump as its standard or an optional mechanical recirculation pump.

Telemetry System: A system that remotely monitors the process by delivering alarm signals to a remote Internet server.

Nitrogen (N): Essential chemical element and nutrient for all life forms; molecular formula (N_2), constitutes 78 percent of the atmosphere by volume; nitrogen is present in surface water and groundwater as ammonia (NH_3), nitrite (NO_2^-), nitrate (NO_3^-), and organic nitrogen; excess levels of nitrogen in marine areas may contribute to eutrophication.

Nitrogen, ammonia (NH_3): Non-ionized form of reduced nitrogen. Nitrogen, ammonium (NH_4^+): ionized form of reduced nitrogen usable by plants.

Nitrogen, Kjeldahl: Combination of ammonia nitrogen (NH_3) and organic nitrogen in a wastewater sample; total

Kjeldahl nitrogen is operationally defined by a method that involves digestion of a sample followed by distillation and

determination of ammonia (NH_3) in the distillate; see also nitrogen, ammonia; nitrogen, organic; and nitrogen, total Kjeldahl (TKN).

Nitrogen, nitrate (NO_3^-): Stable oxidized form of nitrogen; nitrifying bacteria can convert nitrite (NO_2^-) to nitrate (NO_3^-) in the nitrogen cycle.

Nitrogen, nitrite (NO_2^-): Unstable oxidized form of nitrogen.

Nitrogen, organic: Nitrogen bound in plant and animal matter, primarily amino acids and proteins; the amount of organic

Nitrogen can be obtained by separately measuring the ammonia nitrogen and subtracting that value from the total Kjeldahl nitrogen.

Nitrogen, total: Measure of the complete nitrogen content in wastewater including nitrate (NO_3^-), nitrite (NO_2^-), ammonia (NH_3), ammonium (NH_4^+), and organic nitrogen, expressed as mg/L of N; all these forms of nitrogen, (as well as nitrogen gas [N_2]), can be biochemically converted from one form to another and are constituents of the nitrogen cycle.

Nitrogen, total Kjeldahl (TKN): Measure of the total concentration of organic nitrogen, ammonia, and ammonium nitrogen.

TSS (Total Suspended Solids): The quantity of solids, which can be readily removed from a well-mixed sample with standard laboratory filtering procedures. TSS is measured to indicate the strength of wastewater and/or the effectiveness of treatment.

Toxic event: Sudden introduction of a substance or substances that impair or destroy biological activity within a wastewater treatment process.

Wastewater: The spent or used water of a structure containing dissolved and suspended matter.

Wastewater, commercial: Non-toxic, non-hazardous wastewater from commercial establishments, including but not limited to commercial food preparation operations, that is similar in composition to domestic wastewater, but which may have one or more of its constituents exceed typical domestic ranges.

Wastewater, domestic: Water or liquid carried waste from plumbing fixtures, appliances, and devices such as toilets, bath, laundry, and dishwashers.

Wastewater, high-strength: influent having BOD greater than 300 mg/L and/or TSS greater than 350 mg/L and/or fats, oils, and grease greater than 50 mg/L.

Wastewater, residential strength: Wastewater generated from a household that is not being used as a home business, in-home health care facility, beauty shop, taxidermy shop, or any other use that would be considered commercial use. Typical residential strength waste has a strength of 100-300 mg/L of BOD and a TSS of 100-350 mg/L and fats, oils, and grease less than or equal to 25 mg/L.

Wastewater Treatment System, on-site (OWTS): Wastewater treatment system relying on natural processes and/or mechanical components to collect and treat sewage from one or more dwellings, buildings, or structures and disperse the resulting effluent on property owned by the individual or entity.

What is the MicroSepTec EnviroServer ES System?

The EnviroServer ES is a pre-engineered, prefabricated MBBR on-site wastewater treatment system that is typically used in areas where sewer is not available and septic systems are not permissible due to environmental concerns. The system uses an accelerated natural biological process for wastewater treatment in a single tank design without employing any chemical or biological additives. The EnviroServer ES is engineered for dependability and proven reliability. It uses a heavy-duty fiberglass tank, which is the preferred method of storage for volatile fluids like gas and oil, and it employs industrial compressors and pumps (when needed) that function reliably for many years. The system is based on simple “plug and play” concepts to allow for quick installation and maintenance, with a minimum of moving parts.

The EnviroServer ES was the first small package residential MBBR product available in a self contained single tank. As a result, it requires minimal excavation which reduces installation costs and it can be installed in lots with space constraints. The tank leaves a very small footprint, which can be camouflaged with flagstone, fake rocks, etc. while maintaining easy access for future maintenance of the system. There are no large, unsightly boxes or lids visible in the landscape. The tank can also be installed in traffic-rated situations with minimal special requirements.

Because the compressor is the only moving part, minimal upkeep is required. Routine maintenance and inspections are mandatory to meet warranty requirements. Regulatory agencies may have additional requirements above the minimum required by MicroSepTec. Typically, maintenance is performed on the EnviroServer in about an hour, keeping operational costs low. MicroSepTec trained and authorized personnel must complete the installation, startup, inspections, service, and maintenance of the EnviroServer unit.

When properly designed, installed, and maintained, there are no sewer gas smells with the EnviroServer ES. This is because it uses high-efficiency, low-flow compressors that run continuously and with no noticeable noise.

Optional equipment includes mechanical recirculation pump, ultra-violet disinfection, and telemetry. The system can be configured to meet the needs of each specific site, including discharge pump(s), depending on the options required and the location of the components.

Major Components

Aeration Diffusers: The two membrane air diffusers are in the bottom of the second and third compartments and are supplied air from external air compressors. The diffusers transfer dissolved oxygen to the chamber and agitate the biomedica and suspended solids for rapid bacterial digestion of organic matter.

Alarm Control Panel: The EnviroServer is equipped with a series of alarms. These alarms are:

High-Level Alarm: Triggers when the water level in the effluent chamber is too high. The local indicator is the High-Level Alarm light and an audible alarm. If the system contains a telemetry monitoring system, the service provider will automatically be notified when the condition occurs.

Low Air Alarm: Triggers when there is a loss of air pressure. The local indicator is the Low Air Alarm light and an audible alarm. If the system contains a telemetry monitoring system, the service provider will automatically be notified when the condition occurs.

UV Alarm (optional): Triggers when there is a UV lamp failure and/or when the lamp is not transferring enough ultraviolet radiation to be effective and needs to be replaced. The local indicator is the UV Alarm light and an audible alarm. If the system contains a telemetry monitoring system, the service provider will automatically be notified when the condition occurs.

Power Failure: Is indicated when the green light on the front of the panel is not illuminated.

Spare Alarm: Is triggered when the spare alarm contact is open. The local indicator is both the high-level and low air lights, together, and audible alarm active. If the system contains a telemetry monitoring system, the service provider will automatically be notified when the condition occurs.

Remote Alarm Input: The system has a remote alarm input that allows alarms (120V input) from a remote panel to connect through the EnviroServer Panel. This Interface has no local alarms and only sends a signal to the optional telemetry unit.

Communication Failure (with telemetry option): No local notifications. Will have blinking lights on the telemetry board inside the panel and will notify the service provider of the failure once this condition occurs.

Biomedia: Plastic media used in the MBBR to help promote the attachment and growth of bio-films and high biologically active organisms that are used to treat wastewater.

High-Level Float: Activates an audible alarm and the red light on the front of the panel. If equipped with telemetry remote notification, an alert will be sent to the service provider.

Peak Float (included with discharge pump control panels): Activates the discharge pump(s) regardless of timer settings. If duplex discharge pumps are required, this float operates the second pump rather than overriding the timer on the first pump. If the system contains a telemetry monitoring system, the service provider will automatically be notified when the condition occurs.

On/Off (timer enable) (included with discharge pump control panels): Activates the pump in a demand-dose application or enables the timer in a time-dose application.

Redundant Off (optional with discharge pump control panels): Deactivates discharge pumps when the water level is too low to prevent the pump from running dry and activates an audible alarm. If equipped with telemetry remote notification, an alert will be sent to the service provider.

Compressors: Air compressors provide air to the diffusers and the airlift recirculation pump. The ES6 uses one compressor and both the ES12 and ES25 use two compressors. Since airflow is the key to the proper function of the system, the compressors run continuously.

Discharge Pump (optional): A discharge pump is used when gravity flow from the system is not adequate. These pumps are powered through a PLC controlled by the Alarm Control Panel and floats.

Recirculation:

Airlift Pump (standard): This pump resides in the fourth compartment; it recirculates water and biomass back to the first compartment. The pump has no moving parts and uses air to lift the water and siphon it through piping back to the first chamber. The rate of recirculation is controlled by a needle valve that controls the volume of air provided to the pump. The pump should recirculate 8-10% of the system capacity per hour. The needle valve should be adjusted at service intervals depending on actual system loading. Not recommended for denitrification systems.

Solenoid Controlled Airlift Pump (optional): This pump resides in the fourth compartment; it recirculates water and biomass back to the first compartment. The pump has no moving parts and uses air to lift the water and siphon it through piping back to the first chamber. The rate of recirculation is controlled by a solenoid valve that controls the volume of air provided to the pump and is controlled by a timer in the control panel to recirculate 8-10% of the system capacity per hour. The solenoid timer should be adjusted at service intervals depending on actual system loading.

Mechanical Recirculation Pump (MRP) (optional): The Mechanical recirculation pump can be used instead of the airlift pump. It is installed in the fourth compartment and recirculates water and biomass back to the first compartment. This pump is controlled by a timer that is included in the control panel to recirculate 8-10% of the system capacity per hour. The MRP timer should be adjusted at service intervals depending on actual system loading.

Pressure Switches: The EnviroServer is equipped with one or two pressure switches that monitor the air pressure from the compressors to the air diffusers and airlift pump. The pressure switches are mounted in a junction box in or near the third riser of the tank.

Silent/Test Selector: This switch is mounted on the exterior of the controller door and is used to test all alarms and silence an audible alarm. Moving the switch to the 'Test' position will turn on the audible alarm and alarm lights. Moving the switch to the 'Silent' position will turn off the audible alarm when buzzing.

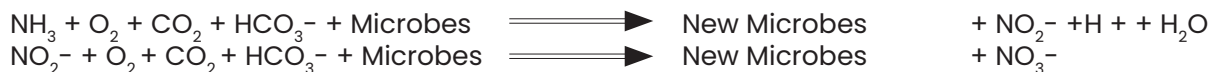
Telemetry (optional): The telemetry system monitors all alarm conditions in addition to system power outages. If any alarm condition continues for a period, the telemetry system will contact the remote monitoring computer. The remote computer will log the alarms and alert the service provider with text and email messages.

UV disinfection (optional): UV disinfection is a physical process that instantaneously neutralizes microorganisms as they pass by ultraviolet lamps submerged in the effluent.

Scientific and Engineering Principles

The design of the EnviroServer ES Model is based on well-known engineering principles in the wastewater field applied in a new way. The system can be described as a hybrid fixed-film, suspended growth, extended aeration wastewater treatment system with a two-stage biological process to optimize denitrification. This system is also referred to as a Moving Bed Biological Reactor (MBBR). The treatment portion of the ES Model is the same as the patented¹ and certified² EnviroServer SM Model. The ES Model is equipped with a larger Primary Clarifier Compartment for Extended Storage (ES) of sludge in lieu of the Thermal Processor for Solids Management (SM), which is part of the SM Model.

The EnviroServer ES removes nitrogen using biological processes; specifically, ammonification followed by nitrification and denitrification. In ammonification, organic nitrogen (proteins and peptides) is decomposed to ammonia or ammonium ions. About 80% of the ammonification takes place in the sewer lines before the wastewater enters the EnviroServer and the balance is ammonified in the first compartment. The ammonification is followed by nitrification. In nitrification, ammonia is removed biologically by a two-step process in which the ammonia is oxidized to nitrite and then the nitrite is oxidized to nitrate according to the following formulas (3, 8, 13).



Nitrification is affected by temperature, pH, dissolved oxygen (DO), alkalinity, contact time, and mean cell residence time (4, 6, 13). Influent pH ranges between 7.5-8.0 are required for denitrification. The temperature and pH are not specifically controlled in the EnviroServer. The temperature is normally kept between 70 and 90°F by the microbial activity and some added heat from the air compressor(s). The pH is typically between 7.0 and 8.5 in the EnviroServer, since no chemicals are added to any of the compartments. In the EnviroServer, under normal operations, both the temperature and the pH fall well within the optimum range for nitrification.

Air is continuously supplied to the two aerobic compartments in the tank to keep the dissolved oxygen above 3 mg/l. The conversion of ammonia to nitrates requires 4.57 kg of oxygen per kg of ammonia converted (12, 15, 16). Furthermore, it requires about 7 mg of carbonate alkalinity per mg of ammonia nitrogen (8). The alkalinity concentration in the tap water is typically enough to convert all the ammonia to nitrates, but in some cases, an alkalinity source must be added.

Nitrate formed during nitrification is removed by heterotrophic organisms under anaerobic conditions by converting it to gaseous nitrogen species through denitrification (13, 15, and 16). In this process, nitrate is first reduced to nitrite and then to nitric oxide (NO), followed by nitrous oxide (N₂O), and nitrogen gas (N₂). This process requires a carbon source. In the EnviroServer, the wastewater exiting the two-stage aerobic section is high in nitrates and low in carbon. It is recirculated back to the first anaerobic compartment where it mixes with the raw wastewater, which is high in carbon. Denitrification requires 5-6 mg of BOD per mg of Nitrate-Nitrogen removed, and it produces about 3 mg of carbonate alkalinity per mg of Nitrate-Nitrogen removed.

The biodegradable organic carbon that causes CBOD is converted to carbon dioxide and settleable biomass by heterotrophic organisms¹³. These microorganisms require oxygen. The process is referred to as aerobic digestion and can be expressed by the following equation (7, 12).

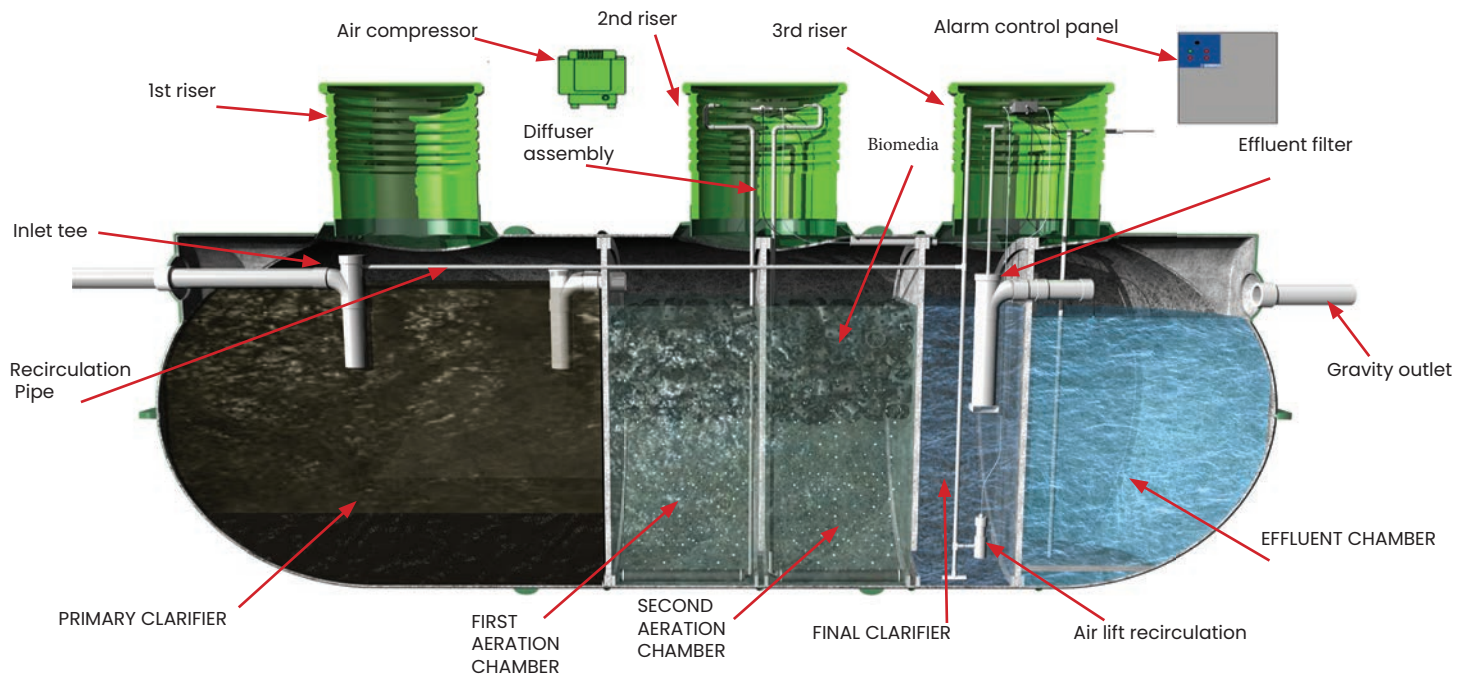


The aerobic digestion takes place in the second compartment of the EnviroServer. The EnviroServer utilizes a combination of an attached and suspended growth process. The attached film is growing on a biomedium and the suspended growth is created by mixing and recirculation of sludge. This combination results in a treatment efficiency that exceeds the individual performance of either an attached or suspended growth process. The aerobic digestion of organic matter is mainly affected by dissolved oxygen, pH, temperature, mixing, and solids retention time. The design of the EnviroServer optimizes these parameters for maximum CBOD₅ and nitrogen removal (5, 6, 7, 10).

The fourth compartment is the clarifier where final settling of suspended solids and clarification of the effluent takes place. The settled solids are then recirculated back to the first compartment. The fourth compartment is followed by an effluent storage compartment which can be equipped with an optional gravity flow UV disinfection unit and/or an effluent pump. UV disinfection is recommended for shallow dispersal fields, such as drip dispersal.

The tank design is optimized with respect to the following parameters: wastewater flow rate, sludge settling rate, sludge removal, surface area, tank depth, overflow rate, inlet device, and tank configuration ⁽⁹⁾.

EnviroServer Process



Stage 1 – Primary Clarification

The figure above shows a process flow diagram of the EnviroServer ES Model. Wastewater influent from the house is gravity fed into the first compartment (Primary Clarifier) of the system. In the first compartment, settling of the sludge and solids occurs. The primary clarified wastewater flows into the second compartment of the system (First Aeration Chamber) through sanitary tees.

Stage 2 – Biological Organic Removal

In the second compartment, the wastewater is aerated using a high-efficiency, low-pressure air compressor and a fine-bubble membrane air diffuser assembly. The diffuser assembly is custom designed to ensure maximum oxygen transfer and optimum mixing of dissolved substrates and oxygen. Furthermore, the mixing ensures the solids remain suspended within the reactor and the biomedia does not clog. The aeration promotes the growth of aerobic microorganisms, which convert and remove biodegradable organic matter. (The organics removed by the aerobic process are the constituents that are measured in the CBOD₅ test.)

To optimize the contact time and the mean cell residence time, the EnviroServer utilizes a biomedia in the aerobic sections. This plastic media is used to supply a support structure for the establishment of a resident biofilm and is specifically developed for optimized biological growth without clogging. The design allows the biomass to attach to the biomedia and not flush out during high flow rates. The biomedia also enhances the nitrification process, which requires a larger population of organisms due to the lower metabolic rate of the nitrifying bacteria.

Stage 3 – Biological Ammonia Conversion (Nitrification)

The partially treated wastewater, now low in carbon but high in ammonia, flows into the third compartment (Second Aeration Chamber) of the system and is aerated in the same manner as the second compartment. The combination of low carbon content, high ammonia, and high oxygen levels in this chamber promotes the growth of nitrifying microorganisms (Nitrosomonas and Nitrobacter). The nitrifying microorganisms convert ammonia to nitrates utilizing the oxygen in the wastewater.

Stage 4 – Clarification

The two-stage aerobically treated wastewater, which is now high in nitrates but low in carbon (BOD), flows into the fourth compartment (Final Clarifier) of the system where clarification and settling of suspended solids occurs.

Stage 5 – Nitrate Removal

To promote denitrification, the wastewater is recirculated from the final clarifier back to the primary clarifier, which contains enough carbon to promote denitrification. Denitrification occurs because the bacteria in the primary (anoxic) clarifier use the oxygen from the nitrate molecules in their metabolic process; the nitrogen left over from this reaction is then released as a gas.

Stage 6 – Solids Removal

The recirculation also helps prevent accumulation of biomass in the final clarifier, decreasing the need for periodic removal. Removing the accumulated biomass helps ensure optimum clarifier performance, resulting in an effluent with low suspended solids. The transfer of the biomass to the primary clarifier ensures a large vital population of microorganisms for the organic and nitrogen removal processes in the aeration compartments. When the water is recirculated, it carries nutrients from the primary clarifier into the aeration compartments. Thus, the available nutrients are utilized to sustain the population if possible, particularly in times of low loading such as vacation periods. In normal operation, this keeps sludge build-up to a minimum by helping break up and dissolve the solids, thereby making the nutrients available for the microorganisms.

Because of the recirculation, the sludge is accumulated and stored in the primary clarifier. The primary clarifier is sized to hold sludge for one to three years, depending on the usage of the system, and pumping is required as needed.

Stage 7 – Effluent Filtration and Disinfection (optional)

The clarified water leaves the treatment compartments through an effluent filter into the final storage compartment (Effluent Chamber). The effluent filter protects the effluent chamber and subsequent dispersal field from solids carry-over during upset conditions. It is designed to remove all particles larger than 1/16". A UV-disinfection unit can be added to sterilize remaining pathogens, including fecal coliform. When selected, the clarified water passes through a disinfection unit after it leaves the effluent filter. The effluent is now ready for discharge.

Treated Effluent Quality

Parameter	NSF/ANSI Std. 40 certified Class I 30-day average effluent requirements	EnviroServer Average effluent ²
BOD ₅ (mg/L)	25	6
TSS (mg/L)	30	8
PH	6-9	6.2-7.9
TN (mg/L) ³	50% reduction	<25

The EnviroServer has been tested and certified to NSF/ANSI STD 40 Class 1

Note: Only certain models are tested and certified to NSF/ANSI Std. 40 ²Effluent wastewater is a measurement of CBOD₅ ³Results from independent third party testing.

When treating domestic strength sewage as defined by NSF/ANSI with an influent BOD range between 100-300 mg/L and a suspended solids range between 100-350 mg/L TN between less than 70 mg/L, and Fats, Oil and Grease (FOG) under 50mg/L. The EnviroServer system will typically perform better than the 30-day average requirements of NSF/ANSI Standard 40 Class 1 (25 mg/L CBOD₅ and 30 mg/L TSS). Reductions in the BOD₅ and suspended solids (TSS) effluent concentrations will be attained within weeks of commissioning and should be consistently achieved over the lifetime of the EnviroServer with proper maintenance and service.



SAFEGUARDS

To reduce the risk of fire, electrical shock, or injury:

- ◇ Do not use any flammable liquids near any portion of the EnviroServer
- ◇ Keep flammable materials and vapors, such as gasoline, away from the EnviroServer
- ◇ Never operate the system with any of the covers opened or removed
- ◇ Do not attempt to open manhole covers

***There are no owner-serviceable parts on the EnviroServer System.
ALL SERVICE MUST BE PERFORMED BY A MICROSEPTEC AUTHORIZED PROVIDER.***

Range of Operating Conditions

For the system to perform as intended, the EnviroServer must be properly installed and maintained by a MicroSepTec Authorized service provider. The design flow is based on an average throughout the day; as such, high peak flows can adversely affect the treatment process. Peak flows of greater than 40% of daily design flow in three hour period, 60 % of design flow in a seven hour period, or 100% of design flow in a fourteen hour period without a ten hour period of no load will increase the likelihood of poor performance of the system and should, therefore, be avoided.

Note: The system is designed to treat typical residential influent strength wastewater, 100-300 mg/L BOD, 100-350 mg/L TSS, 30-70 mg/L total Nitrogen (NSF/ANSI standard influent parameters), and FOG under 50 mg/L. Influent strengths greater than the properties stated above will decrease the treatment capacity.

Note: Certain activities in the facility will change the characteristics of the influent and will change the classification from residential to other use. In-home businesses, beauty salons, taxidermy, home breweries, home commercial bakery, and home health care are some examples of in-home activities that would cause the system to function improperly and void the warranty.

Extended Periods of Non-Use

The EnviroServer went through testing protocols under several stress conditions and was effective at continuously meeting effluent standards under these stress conditions. However, like most biological treatment units if there is an extended period of non-use the biological activity in the EnviroServer could diminish in effectiveness.

If the EnviroServer System is used intermittently no special actions are required if the power is on and the system continues to operate.

In a system that will have an extended period (longer than 30 days) of non-use the EnviroServer may experience a lag in effluent quality that will correct itself within days of being returned to use and reintroduction of biological activity to the system. During these extended periods of non-use, it is recommended to consult with the Authorized Service Provider. They may decide to deactivate certain components (discharge pumps, optional UV Light, and compressors) and to reactivate immediately upon returning the system to use.

NOTE: During extended periods of non-use DO NOT turn off the Alarm Control Panel power as this will deactivate any alarm conditions that could be sent through the optional Telemetry unit to the Authorized Service Provider.

Water Conservation

Conserving water will reduce hydraulic loading of the system and disposal field, however, the EnviroServer system is a biological process that needs wastewater to perform as designed. Although water conservation helps the efficiency of the EnviroServer system, extreme water conservation may adversely affect the performance of the system. The EnviroServer should not be used with Grey-water systems or systems that separate the wastewater from the facility.

- ◇ Turn off the water when it is not needed (e.g. when washing food, dishes, hands; brushing teeth, etc.).
- ◇ Wipe dishes in the trash prior to washing.
- ◇ Take shorter showers. When bathing, do not fill the tub all the way.
- ◇ Use water-saving devices including faucets, shower heads, washing machines, dishwashers, and toilets.
- ◇ Only run washing machines and dishwashers with full loads.
- ◇ Spread out laundry chores throughout the week, rather than multiple loads in a day.
- ◇ Repair any leaking fixtures. A leaky toilet can waste as much as 2,000 gallons per day!!

Do Not Flush

The EnviroServer employs a natural biological process. As such, it is critical that certain items not be introduced to the system. Cleaning supplies should be used in a proper dilution as to not adversely affect the operation of the biological process. The items below constitute a representative example of items that should never be poured down a drain or flushed down a toilet. These items can overtax or destroy the natural biological digestion taking place within the system or clog pumps and pipes.

NOTE: These items are broad categories that are intended to serve as examples and are, by no means, all-inclusive.

- ◇ Toxic chemicals such as paints, varnishes, thinners, waste oils, photographic solutions, pesticides, herbicides, fertilizers, acids, and bleaches
- ◇ Gasoline in any form
- ◇ Fat, greases, and oils, including cooking refuse and large amounts of bath salts/oils
- ◇ Food by-products including coffee grounds, tea bags, fruit seeds, gum, eggshells, etc.
- ◇ Cigarette butts
- ◇ Kitty litter
- ◇ Paper products including non-septic-safe toilet paper, paper towels, facial tissues, disposable diapers, feminine hygiene products, flushable wipes, gauze bandages, etc.
- ◇ Condoms
- ◇ Dental floss, hair, pet hair, or lint (including from dryer and/or washing machine)
- ◇ Construction debris
- ◇ Cleaning supplies including disinfectants, detergents, rug cleaners, polishing wax, bleaches, etc.
- ◇ Septic additive products
- ◇ Prescription medicines including, but not limited to, antibiotics and chemotherapy
- ◇ Water softener backflush

NOTE: Garbage disposals are not recommended with the EnviroServer system and should not be used with any septic system because they increase the organic loading to the system.

References

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3. "Design of Municipal Wastewater Treatment Plants Volume I", WEF Manual of Practice No. 8/ASCE Manual and Report on Engineering Practice No. 76 (1992).
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9. "Clarifier Design", Manual of Practice FD-8, Water Pollution Control Federation, Washington, D.C. (1985).
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11. "Water Reuse", Manual of Practice SM-3, Second Ed., Water Pollution Control Federation, Alexandria, Virginia (1989).
12. "Aeration", WEF Manual of Practice FD-13/ASCE Manuals and Reports on Engineering Practice No. 63 (1996).
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14. "Treatment Process Digest", Water Environment Federation Digest Series, WEF, Alexandria, Virginia (1993).
15. "Wastewater Engineering: Treatment, Disposal, Reuse", Third Edition, Metcalf and Eddy, Inc. (1991).
16. Crites, R. and Tchobanoglous, G., "Small and Decentralized Wastewater Management Systems", McGraw-Hill (1998).

MATERIALS SUPPLIED BY MICROSEPTEC

The following items are supplied by MicroSepTec as part of the EnviroServer ES System:

BASE ASSEMBLY

- ◇ Fiberglass tank assembly (not supplied with riser adapters or risers)
- ◇ Three Access man-ways with lids
- ◇ Air Diffuser Assembly
- ◇ Recirculation Pump Assembly
- ◇ Effluent Filter
- ◇ Tank Plumbing
- ◇ Biomedia

AIR SUPPLY ASSEMBLY

- ◇ Air Compressor(s)
- ◇ Air Supply fittings
- ◇ Air Lines
- ◇ Compressor pressures switches

CONTROL CONFIGURATION

- ◇ Alarm Control Panel
 - ◇ Audible and visual alarm for high water level
 - ◇ Audible and visual alarm for low air pressure
 - ◇ Audible and visual alarm for optional UV light failure
 - ◇ Timer controls for optional discharge pump & recirculation control
 - ◇ Remote notification from separate control panel
- ◇ Floats (number depends on system configuration)
- ◇ Junction Box for recirculation control and wiring
- ◇ Electrical Fittings

FRAGILE COMPONENTS

These assemblies must be handled carefully to ensure that breakage does not occur.

- ◇ Air Compressor Assembly
- ◇ Controller
- ◇ Optional UV Assembly

OPTIONS

- ◇ Timed recirculation
- ◇ UV Disinfection
- ◇ Discharge pump controls
- ◇ Telemetry

ORDERING REPLACEMENT PARTS

Replacement parts are available from your local MicroSepTec distributor.

EnviroServer ES Series Quick Reference

ES Model	Treatment Capacity ¹ (Gallons Per Day)	Liquid Capacity (Gallons)	Dimensions (D X L)	Bottom of Inlet	Bottom of Outlet	Weight (Unloaded) (Pounds)
ES4.5	450	1,500	5' X 13' 6"	52"	46"	1,500
ES6	600	2,000	5' X 16' 4"	52"	46"	1,575
ES7.5	750	2,500	6' X 15'	64"	56"	1,650
ES12	1,200	3,650	6' X 21' 5"	64"	56"	2,000
ES25	2,500	7,550	8' X 24' 10"	88"	80"	3,000

¹Treatment capacity based on typical residential strength see glossary of terms

Designing the system

The EnviroServer is a pre-engineered pre-packaged MBBR aerobic treatment system designed to treat domestic strength wastewater. There are several models available in the ES series. Before choosing the EnviroServer model needed for the site, the designer should verify the following information:

Standard design

- ◇ Type of facility generating wastewater
 - ◇ If the system is generating non residential wastewater consult with MicroSepTec on design parameters
- ◇ Effluent quality required as per local code
- ◇ Gallons Per Day
 - ◇ Using the chart at the beginning of this section, select the EnviroServer that is closest to the estimated hydraulic loading
 - ◇ Do not select a system if you expect the actual flows will be greater than design flow
- ◇ Availability of electrical for the EnviroServer

Influent characteristics (NSF/ANSI standard 40 CLASS I)

Note: The following typical residential influent wastewater characteristics must be met to meet treatment standard for NSF/ANSI 40 CLASS I Treatment standards.

- ◇ BOD5: 100-300 mg/L
- ◇ TSS: 100-350 mg/L
- ◇ FOG: <50 mg/L
- ◇ Temperature: 50F-86F

Denitrification Design

Note: The key to superior denitrification is controlled recirculation of treated wastewater through a treatment system that contains biomedica for attached growth of beneficial organisms. These organisms aid and support the denitrification process.

The EnviroServer was specifically developed for denitrification of wastewater. In the standard operation of the system with typical residential strength wastewater the EnviroServer will reduce total Nitrogen by 50%. If greater than 50% reduction of Nitrogen is required, timed recirculation should be used, using either a Solenoid Valve or Mechanical Recirculation Pump (MRP). If greater than 65% reduction in Nitrogen is required, MicroSepTec must be consulted for system design. With designs of greater than 65% reduction in Nitrogen, MicroSepTec may require additional chemical feeds needed to control PH, Alkalinity, Phosphorous and other chemicals that affect the stoichiometry of the system to ensure the desired effluent quality is met. It is highly recommended that flow monitoring be used to control proper recirculation ratio.

- ◇ Choose a model that is as close to designed Gallons Per Day required without under-sizing
- ◇ Metered effluent flow of the system is needed for proper adjustment of recirculation
 - ◇ If targeted effluent Total Nitrogen is less than 25mg/L it is highly recommended that pump discharge with a flow meter (both supplied by others) be installed to help determine actual flows for setting proper recirculation, future service, and trouble shooting
- ◇ Known or estimated influent Influent organic load
- ◇ Desired effluent quality for local jurisdiction
- ◇ Future potential high and low flow situations

Influent characteristics (NSF/ANSI Standard 245)

Note: The following typical residential influent wastewater characteristics must be met in order to meet minimal treatment of 50% denitrification.

- ◇ BOD5: 100-300 mg/L
- ◇ TSS: 100-350 mg/L
- ◇ TKN: 35-70 mg/L
- ◇ FOG: <50 mg/L
- ◇ Alkalinity: > 7:1 ratio no less than 175 mg/L (alkalinity may need adjusting in certain situations)
- ◇ Temperature: 50F-86F
- ◇ PH: 7.5-8.0 SU

Site Considerations

The EnviroServer ES Series can be used on a variety of sites and conditions including steep sloping landscapes, small lots, ocean front, lake shore, high elevation, cold weather, and hard-to-reach locations. In some instances, additional geotechnical engineering may be needed.

EnviroServer Tank sighting

- ◇ The EnviroServer system cannot be installed more than 6' below grade and minimum of 2' of cover is required
- ◇ The components shipped with the EnviroServer ES series are manufactured to a standard bury depth of 2'
 - ◇ Bury depths greater than 2' will need to have all electrical and plumbing components extended/modified in the field
 - ◇ Bury depths of greater than 4' may make future service of the EnviroServer more difficult than normal and should be avoided if possible

- ◇ Riser adapters and risers are not supplied by MicroSepTec. The man-way areas of the EnviroServer will support most riser adapters and risers
 - ◇ The first and second riser will support a 24 and 30" diameter opening
 - ◇ The third riser will support a 24" and 30" diameter riser
- ◇ Riser adapters should be installed according to manufacture's recommendations
 - ◇ Riser adapters should form a water tight seal to the tank
 - ◇ If riser adapters requires a flange or bolt down kit, this kit must not have more than eight #12 1/4 inch stainless steel screws
- ◇ Risers should be installed as per manufactures recommendations
 - ◇ Riser should form a watertight seal to the riser adapter.
 - ◇ Risers should bring the lids to 2-3" above grade for service and accessibility
- ◇ Monolithic risers are preferred
 - ◇ If riser extensions are used follow manufactures instructions to form a watertight seal
 - ◇ Risers should extend up so that the lids to the EnviroServer are 2-3" above finished grade.
- ◇ Landscaping around tanks is acceptable, however the lids should not be covered with any landscaping material as debris may enter the tank while being serviced.
 - ◇ Landscaping or other debris could have an adverse effect on the system or system components if allowed to enter the tank and not removed from the system

Minimum Excavation Requirements

ES Model	Treatment Capacity ¹ (Gallons Per Day)	Liquid Capacity (Gallons)	Minimum Excavation Length	Minimum Excavation Width	Minimum Excavation Depth	Primary Backfill Material (Approx)
ES4.5	450	1,500	15' 6"	7'	8'	17 YDS
ES6	600	2,000	18' 6"	7'	8'	20 YDS
ES7.5	750	2,500	17"	8'	9'	25 YDS
ES12	1,200	3,650	23' 5"	8'	9'	35 YDS
ES25	2,500	7,550	26' 10"	10'	11'	50 YDS

Minimum excavation requirements are for non-traffic rated burials in a typical installation. See complete installation drawings for dimensions in traffic-rated installations.

Cold Weather

The EnviroServer ES introduces warm air through the compressors, this warm air not only supplies process air to the EnviroServer ES series, but also helps raise the temperature in the EnviroServer ES Series to help in the biological process and denitrification.

Note: State and local code will determine if cold weather applications will be needed

Note: State and local code should be followed if tank insulation is required

If the temperature of the wastewater in the EnviroServer drops below the temperatures listed in the influent characteristics appropriate steps should be taken to increase the temperature of the wastewater in the EnviroServer ES Series. Consult with MicroSepTec on possible solutions to raise wastewater temperature which may include the addition of warm air or insulation of the EnviroServer.

Compressor location

- ◇ For cold weather installations insulation of the airlines from the compressor to the tank is recommended

Tank Insulation

Note: Local and state code will determine if tank insulation is required

Note: Tank insulation should conform to state, local code, and be rated for direct burial

Spray Foam

Note: Ensure no spray foam insulation enters the EnviroServer in the process of insulating the tank

- ◊ Insulate the bottom $\frac{2}{3}$ (to the bottom of the outlet) of the EnviroServer ES Series tank with appropriate direct burial spray foam prior setting the tank in the excavation
- ◊ Install tank and backfill in accordance with tank installation procedures in the INSTALLATION MANUAL
- ◊ Insulate the top of the tank once riser adapters and risers have been installed, watertight testing has been performed (if applicable by state and local code), and all connections have been made through the risers

Sheet Foam

- ◊ Use 2" thick sheet insulation
- ◊ Install tank, riser adapters, risers, connections, conduct watertight testing (if applicable by state and local code), and backfilled according to directions in the "INSTALLATION MANUAL" to within 8-12" from finished grade and smooth backfill
- ◊ Place sheet foam insulation over the excavation to extend 18"-24" inches beyond the tank
- ◊ Ensure insulation is sealed (taped)together
- ◊ Complete backfilling over the sheet foam, in accordance with the "INSTALLATION MANUAL", being careful not to damage sheet foam insulation

Elevation

Airflow and oxygen content of 10% less than design, has no significant impact on treatment levels from waste water treatment plants that have introduced aeration and fixed film media for biological treatment ⁽¹⁵⁾. However, as atmospheric pressure changes, oxygen content becomes lower at certain elevations it may become necessary to change the compressor sizes on the EnviroServer System.

- ◊ <7000 FT above Mean Sea Level (MSL) no changes required to the EnviroServer System
- ◊ <11,000 FT and >7000 FT above Mean Sea Level (MSL) increase one compressor size
- ◊ >11,000 FT above Mean Sea Level (MSL) contact MicroSepTec for compressor sizing

Electrical

- ◊ Local Electrical Code must be followed
- ◊ **Wire Size should be based on best electrical practices and conform to local and national electrical codes**
- ◊ The system requires 120V power to operate the compressors and the Alarm Control Panel.

System	Breakers	Volts, HZ, AMPS
Gravity Discharge	Single from main panel	120VAC, 60HZ, 15 AMP
Simplex Pump Discharge	Two from main panel	2-120VAC, 60HZ, 15 AMP
Duplex Pump Discharge	Two from Main Panel	1-120VAC, 60HZ, 15 AMP 1-120V, 60 HZ, 30AMP

- ◊ The EnviroServer Alarm Control Panel should be sited 48" above ground surface, in a shaded area if possible, in line-of-sight from the system, and be accessible for service.
- ◊ Optional telemetry should have a network cable supplied to the Alarm Control Panel
- ◊ If no network cable is available and using WI-FI, the Alarm Control Panel shall be located within 100 feet of the wireless router with minimal interference (e.g. walls) between the wireless router and the Alarm Control Panel

- ◇ Electrical Connections are made at a minimum of two places
 - ◇ The junction box at the third riser
 - ◇ The Alarm Control Panel
- ◇ All electrical connections should be sealed to prevent sewer gases and moisture from entering the Alarm Control Panel and junction boxes.

Air Compressor(s)

- ◇ Compressors should be located in a well-ventilated, shady, and accessible place. An indoor location like a shed or garage is ideal. Access should be made available for service if located in a shed or garage.
- ◇ Elevated off the ground so surface water cannot enter the electrical terminals of the compressor.
- ◇ Located as close to the tank as possible; do not exceed 50' distance from tank.
- ◇ Plumbing from compressor enters the middle riser
- ◇ Pipe from the compressor to the Air Supply Inlet pipe must fall toward the tank with no low points.
- ◇ 1" Schedule 80 PVC pipe is required for plumbing the compressor(s) to the middle riser, one pipe per compressor

Recirculation

Needle Valve

- ◇ Standard systems include a needle valve to control the Airlift pump for recirculation
- ◇ For systems that require advanced treatment standard of $<30 \text{ mg/l CBOD}_{5r}$, $<30 \text{ TSS}$, and nitrogen reduction up to 50%

Solenoid Valve

- ◇ Optional timed control of the Airlift pump for recirculation
- ◇ For system that require advanced treatment standards of $<30 \text{ mg/l CBOD}_{5r}$, $<30 \text{ mg/l TSS}$, and Nitrogen reduction of greater than 50%

MRP

- ◇ Optional recirculation method that replaced the standard Airlift pump (standard for commercial applications)

DISPERSAL OPTIONS

Gravity

- ◇ Standard design of the EnviroServer ES Series
- ◇ Sites that have elevation fall to the final dispersal area
- ◇ Sites that require advanced treatment but no flow monitoring

Pumped Discharge (supplied by others)

- ◇ Optional discharge from the EnviroServer ES Series
- ◇ Sites that need to lift effluent to dispersal area
- ◇ Sites with pressure dispersal
- ◇ Sites that require flow monitoring, including sites with strict nitrogen reduction requirements

Pre-treatment and flow equalization

- ◇ Pre-treatment (septic tank)
 - ◇ All effluent quality data was achieved without the assistance of a pretreatment (septic tank). Therefore, pretreatment is not required.
 - ◇ A pretreatment tank may reduce the biological activity that is needed for the optimal operation of the EnviroServer
 - ◇ If local jurisdictions require a pretreatment tank please consult with MicroSepTec for design consideration

- ◇ Flow equalization
 - ◇ DO NOT exceed peak flows in the 'RANGE OF OPERATING CONDITIONS' section of this manual.
 - ◇ Consult MicroSepTec to assist with flow equalization design

Note: If the project requirements include pressure dosing to the EnviroServer, or a cluster of EnviroServer(s), always install solids-handling pumps, not grinder pumps. In addition, set the pump station to dose the EnviroServer(s) in small increments. The system will also require additional venting.

SPECIAL OTHER CONSIDERATIONS

- ◇ Water Softeners
 - ◇ Check with the builder or homeowner to ensure any water softening devices DO NOT back flush into the wastewater treatment system. The brine from the discharge will have a significant negative impact on the chemical/biological process.
- ◇ Garbage Disposals
 - ◇ Garbage disposals are never recommended for use with treatment systems, as they often result in higher-than-expected organic loading

Installation

General

The EnviroServer System must be installed and serviced only by MicroSepTec authorized personnel with oversight from trained representatives. Proper tools must be used in the installation process to ensure assembly conforms to manufacturer's specifications and to prevent damage or injuries.

- ◇ COMPLETE INSTALLATION INSTRUCTIONS CAN BE FOUND IN THE INSTALLATION MANUAL
- ◇ Installer responsibilities include interconnections between the tank, compressor(s) and controller, electrical power supply, network cable (for Telemetry Option only), influent waste, and effluent discharge.

It is important to follow the procedures and instructions in the Installation Manual to safely and properly install the MicroSepTec underground tank and accessories. Failure to follow these instructions will void the MicroSepTec warranty, may cause tank failure, and possibly serious personal injury or property damage. MicroSepTec's limited warranty applies only to a tank installed according to the complete instructions and procedures found in the installation manual. Since MicroSepTec does not control any installation, MicroSepTec's sole responsibility is that presented in the limited warranty.

Tank Installation

Note: complete instructions for the installation of the EnviroServer Tanks can be found in the Installation Manual and Installation Drawings.

- ◇ All tanks must be visually inspected over the entire vessel, paying particular attention to location of shipping cradles and strapping.
- ◇ Do not move tank by dragging or rolling.
- ◇ The tank must be installed with specified primary backfill material in the region immediately around the tank.
- ◇ In non-traffic rated installations only, the primary backfill must extend a minimum of 12 inches with 18 inches preferred beyond sides and ends of the tank. Primary backfill under the tank is to be a minimum of 12 inches
- ◇ Backfill material specifications are the same in traffic and non-traffic rated installations, the hole dimensions and amount of material used will differ. Refer to the Installation manual and instructions for more details.
- ◇ Filter fabric is strongly recommended around the primary backfill area
- ◇ All tanks must have a cover depth of at least 24 inches of backfill. Follow engineered installation drawings in the Installation Manual for installations requiring a traffic load.

- ◇ The maximum burial depth is 6 feet of cover over the top of the tank. However, at this depth the system will be very difficult to maintain and should therefore be avoided if possible.
- ◇ If more than one tank is to be installed in the same hole, allow for at least 30 inches between the tanks. This spacing must be increased as needed to accommodate dead men or anchor slabs or traffic load installations.
- ◇ The minimum spacing between the sidewall or endcap of the tank and the side of the excavation must be 18 inches.
- ◇ MicroSepTec recommends that every site be thoroughly evaluated for the potential of a rise in the local water table or of trapped water. Failure to anchor a tank when required may cause tank failure or damage the tank and/or surrounding property. The design engineer is responsible for determining an appropriate anchoring system

System Assembly

- ◇ The system consists of several internal components and steps for assembling and routing the plumbing components, air diffusers, float switches, compressor(s), airlines, electrical wire routing, electrical junctions and the Alarm Control Panel.
- ◇ The various assemblies (Air Supply Kit, diffuser plumbing, recirculation pump plumbing and effluent pump plumbing) will each be bundled and bubble-wrapped separately, to prevent confusion during assembly.
- ◇ Step by step detailed assembly instructions are outlined in the Installation Manual.
- ◇ Always remember the system will need to be maintained far into the future and consider this when installing all of the components. Make sure everything is easily accessible near the lids and that removable components (i.e. pumps, diffusers, UV, effluent filter, floats, etc.) are laid out for ease of maintenance

Maintenance Policy

NOTE: There are no user-serviceable parts on the EnviroServer System. All service must be performed by MicroSepTec Authorized Personnel.

All MicroSepTec systems must be covered by an on-site parts and labor maintenance agreement with a local MicroSepTec Authorized Service Provider.

This maintenance agreement should provide:

- ◇ Response with-in 24 hours of alarm conditions and emergency system problems.
- ◇ Periodic on-site service inspections by MicroSepTec Authorized Service Technicians.
- ◇ Any required reporting to local regulatory agencies, in accordance to the permit

Monitoring Agreement (optional)

MicroSepTec strongly recommends all system employ the Telemetry Option, but only some jurisdictions require it. MicroSepTec offers remote monitoring of the EnviroServer for an annual fee. This system will automatically alert the Authorized Service Provider of any equipment malfunctions. Telemetry requires a network cable be installed from the network to the Alarm Control Panel.

Recommended Maintenance

The following is a list of recommended maintenance items during the initial two years of operation to ensure high quality treatment. After the initial two years of maintenance, the Authorized Service Provider should recommend maintenance frequency based on usage. Ongoing maintenance is recommended and helps maintain proper operation after the initial two year warranty period, and in some areas may be required by local regulations.

Item	Frequency	Maintenance
Air Compressor Filter	6-Month or as required	Inspect and clean filter. Rebuild as needed
Air Compressor	12- Month or as required	Replace filter
Sludge/Scum Level 1st Compartment	6-Month or as required	Inspect and pump as needed
Sludge/Scum Level 4th Compartment	6-Month or as required	Inspect and pump as needed
Airlift Recirculation Pump	6-Month or as required	Inspect and clean as needed
Effluent Filter	6-Month or as required	Inspect and clean as needed
Controller & Sensors	6-Month or as required	Inspect and test
Discharge Pump (option)	6-Month or as required	Inspect and clean
UV Disinfection (option)	6-Month or as required	Inspect and Clean. Replace bulb every 2 years, even if still working, or as needed.
Diffusers	6-Month or as required	Inspect and clean

Routine pumping of the Enviroserver ES Series

For complete instructions about routine pumping of the EnviroServer ES Series see the Service Manual or the Technical Bulletin for Routine Pumping of the EnviroServer ES series.

Periodic pumping is an important element of the proper maintenance of a wastewater treatment system, and the EnviroServer is no exception. Many jurisdictions mandate pumping frequency but, absent a local requirement, the health of the system should determine frequency. Pumping should be only conducted by a company that is familiar with the EnviroServer System. Following manufacturer’s recommendations on the proper procedures for pumping the system is important to ensure continued efficient operation of the system.

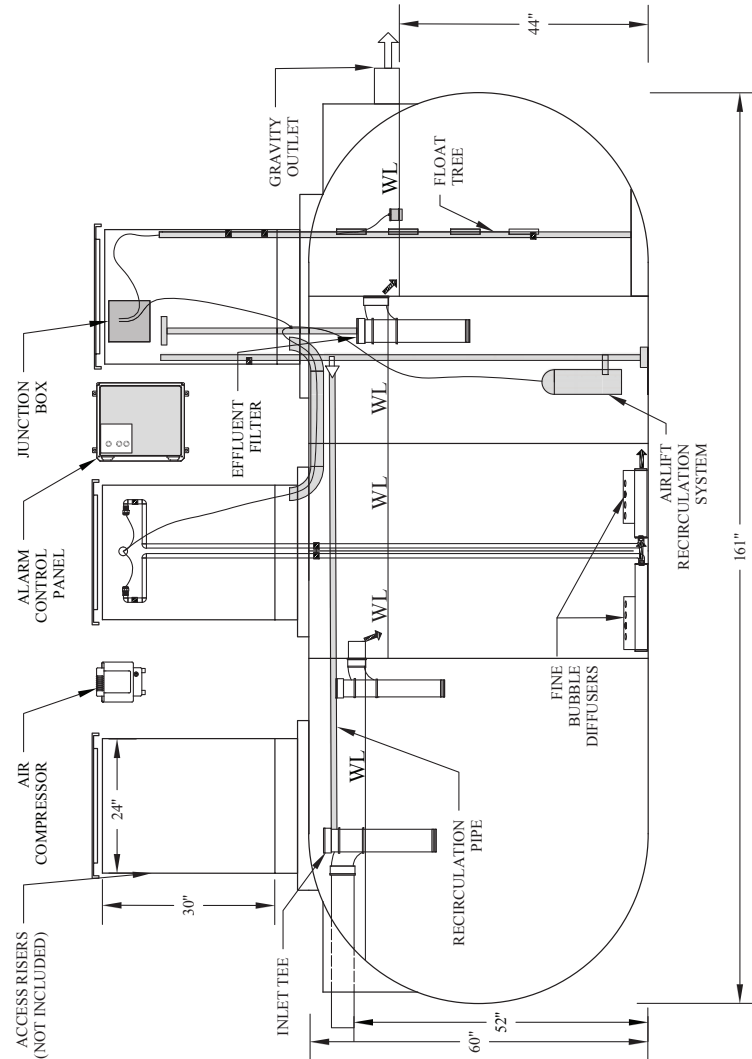
The system should not be completely emptied, as the EnviroServer tank could float out of the ground under certain conditions and complete removal of the bacteria will inhibit performance in the short term.

Drawings ES4.5 Drawing

ENVIOSERVER - ES SERIES ES4.5-GRAV/NV

DESCRIPTION:

PRIMARY AND SECONDARY WASTEWATER TREATMENT DEVICE USING BOTH FIXED FILM AND SUSPENDED GROWTH WITH MULTI-STAGE AEROBIC PROCESS. TANK CAPACITIES LISTED ARE FOR STANDARD UNITS



DESIGN TREATMENT CAPACITY (gpd)	450
TOTAL TANK CAPACITY (gal)	1500
OVERALL LENGTH	13' - 5"
DIAMETER (in)	60
INLET HEIGHT (in)	52
OUTLET HEIGHT (in)	44
BIOMEDIA VOLUME (cu.ft.)	15
AIR DIFFUSER	2-EDI FINE BUBBLE
AIR COMPRESSOR	HIBLOW 100LL
RECIRCULATION CONTROL	NEEDLE VALVE
ALARM CONTROL PANEL	PROPRIETARY
REMOTE TELEMETRY	OPTIONAL

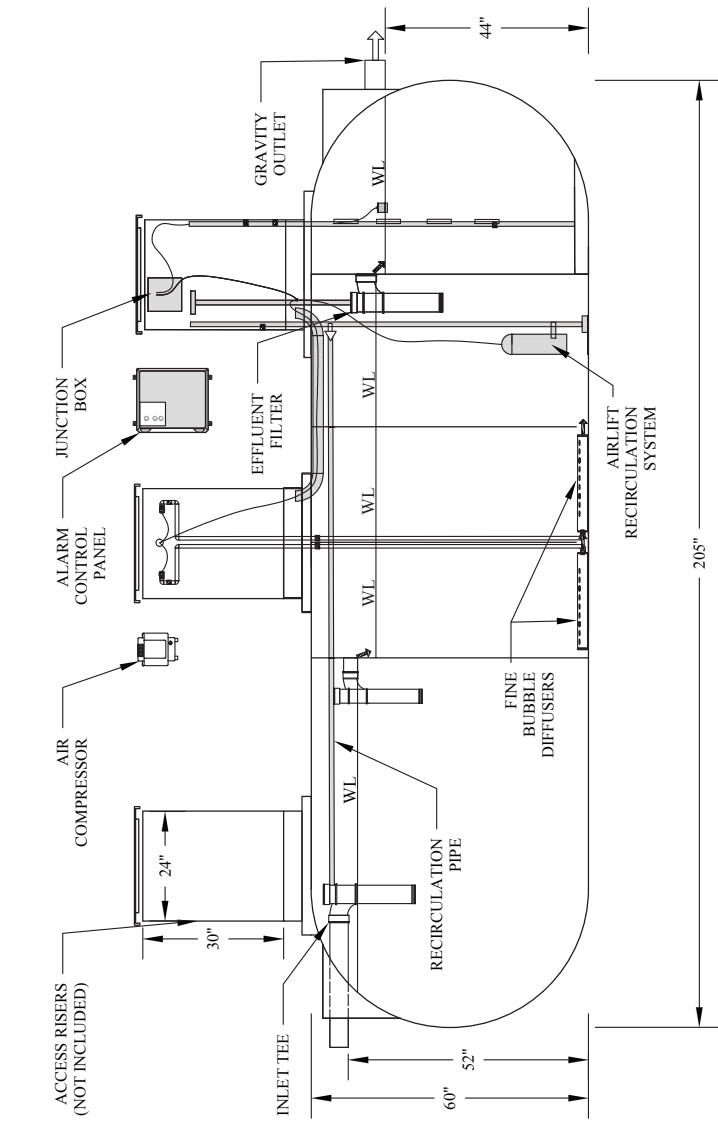
MicroSepTec 233 MADERO ST MISSION VIEJO, CA 92691 (877)4SEPTIC 877-473-7842 www.microseptic.com	
PROJECT:	INSTALLATION DRAWING
MODEL:	ES4.5 ENVIOSERVER ADVANCED WASTEWATER TREATMENT SYSTEM
SCALE:	NONE
DRAWN BY:	XXX
ORG. DWG DATE:	12/30/2019
REV. DWG DATE:	XXXXXX
SHEET SIZE:	11" x 17"
SHEET NUMBER:	ES4.5
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ES6 Drawing

ENVIROSERVER - ES SERIES ES6-GRAV/NV

DESCRIPTION:

PRIMARY AND SECONDARY WASTEWATER TREATMENT DEVICE USING BOTH FIXED FILM AND SUSPENDED GROWTH WITH MULTI-STAGE AEROBIC PROCESS. TANK CAPACITIES LISTED ARE FOR STANDARD UNITS



DESIGN TREATMENT CAPACITY (gpd)	600
TOTAL TANK CAPACITY (gal)	1918
OVERALL LENGTH	17' - 1"
DIAMETER (in.)	60
INLET HEIGHT (in.)	52
OUTLET HEIGHT (in.)	44
BIOMEDIA VOLUME (cu.ft.)	20
AIR DIFFUSER	2-EDI FINE BUBBLE
AIR COMPRESSOR	HIBLOW 120LL
RECIRCULATION CONTROL	NEEDLE VALVE
ALARM CONTROL PANEL	PROPRIETARY
REMOTE TELEMETRY	OPTIONAL
DISCHARGE PUMP	OPTIONAL

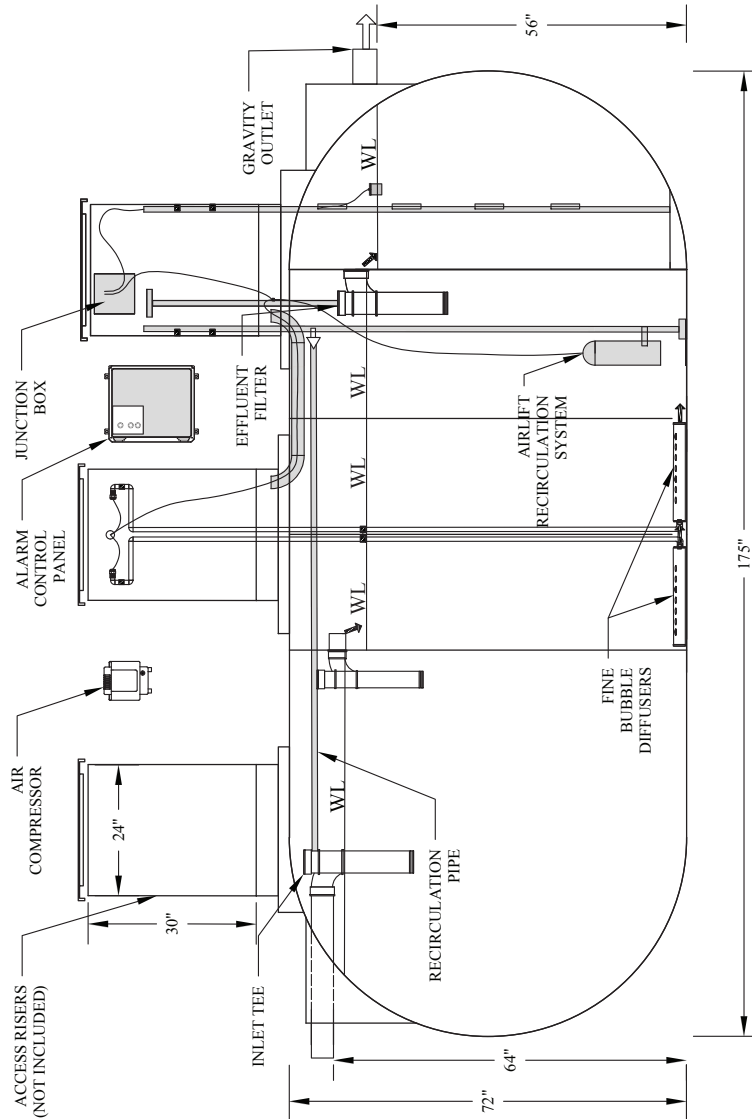
		233 MADRO ST MISSION VIEJO, CA 92691 (877)4SEPTIC [1-877-473-7842] www.microseptec.com	
MODEL: ES6 ENVIROSERVER ADVANCED WASTEWATER TREATMENT SYSTEM	PROJECT: INSTALLATION DRAWING	SCALE: NONE	DRAWN BY: XXX
SCALE: NONE	ORG DWG DATE: 12/30/2019	REV DWG DATE: XXXXXXXX	SHEET NUMBER: 11' x 17' ES6
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ES7.5 Drawing

ENVIROSERVER - ES SERIES ES7.5-GRAV/NV

DESCRIPTION:

PRIMARY AND SECONDARY WASTEWATER TREATMENT DEVICE USING BOTH FIXED FILM AND SUSPENDED GROWTH WITH MULTI-STAGE AEROBIC PROCESS. TANK CAPACITIES LISTED ARE FOR STANDARD UNITS



DESIGN TREATMENT CAPACITY (gpd)	750
TOTAL TANK CAPACITY (gal)	2400
OVERALL LENGTH	14' - 7"
DIAMETER (in.)	72
INLET HEIGHT (in.)	64
OUTLET HEIGHT (in.)	56
BIOMEDIA VOLUME (cu.ft.)	30
AIR DIFFUSER	2-EDI FINE BUBBLE
AIR COMPRESSOR	HIBLOW HP150
RECIRCULATION CONTROL	NEEDLE VALVE
ALARM CONTROL PANEL	PROPRIETARY
REMOTE TELEMETRY	OPTIONAL
DISCHARGE PUMP	OPTIONAL

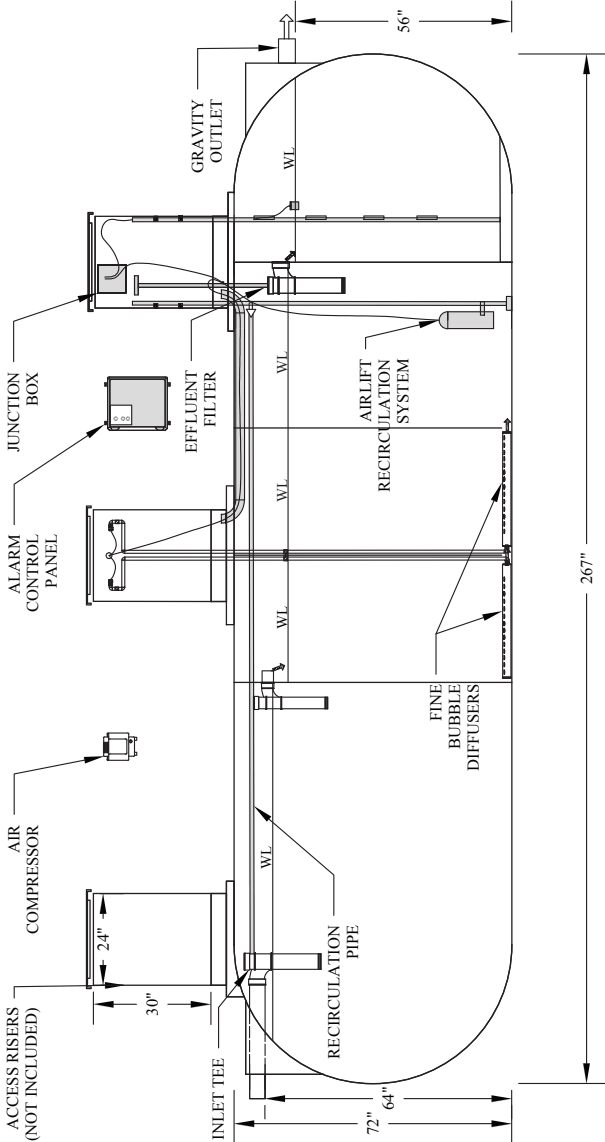
		PROJECT: INSTALLATION DRAWING	
MODEL: ES7.5 ENVIROSERVER ADVANCED WASTEWATER TREATMENT SYSTEM	ORG. DWG DATE: 12/30/09 REV. DWG DATE: XX/XX/XXXX	SHEET SIZE: 11" x 17"	SHEET NUMBER: ES7.5
SCALE: NONE DRAWN BY: XXX			
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ES12 Drawing

ENVIROSERVER - ES SERIES ES12-GRAV/NV

DESCRIPTION:
 PRIMARY AND SECONDARY WASTEWATER TREATMENT DEVICE USING BOTH FIXED FILM AND SUSPENDED GROWTH WITH MULTI-STAGE AEROBIC PROCESS. TANK CAPACITIES LISTED ARE FOR STANDARD UNITS

DESIGN TREATMENT CAPACITY (gpd)	1200
TOTAL TANK CAPACITY (gal)	3822
OVERALL LENGTH	22'-3"
DIAMETER (in.)	72
INLET HEIGHT (in.)	64
OUTLET HEIGHT (in.)	56
BIOMEDIA VOLUME (cu.ft.)	40
AIR DIFFUSER	2-EDI FINE BUBBLE
AIR COMPRESSOR	2-HIBLOW 120LL
RECIRCULATION CONTROL	NEEDLE VALVE
ALARM CONTROL PANEL	PROPRIETARY
REMOTE TELEMETRY	OPTIONAL
DISCHARGE PUMP	OPTIONAL



MODEL:		PROJECT:	
ES12 ENVIROSERVER ADVANCED WASTEWATER TREATMENT SYSTEM		INSTALLATION DRAWING	
SCALE:	DRAWN BY:	ORG. DWG DATE:	REV. DWG DATE:
NONE	XXX	12/30/2019	XXXXXXXXXX
		SHEET SIZE:	SHEET NUMBER:
		11" x 17"	ES12
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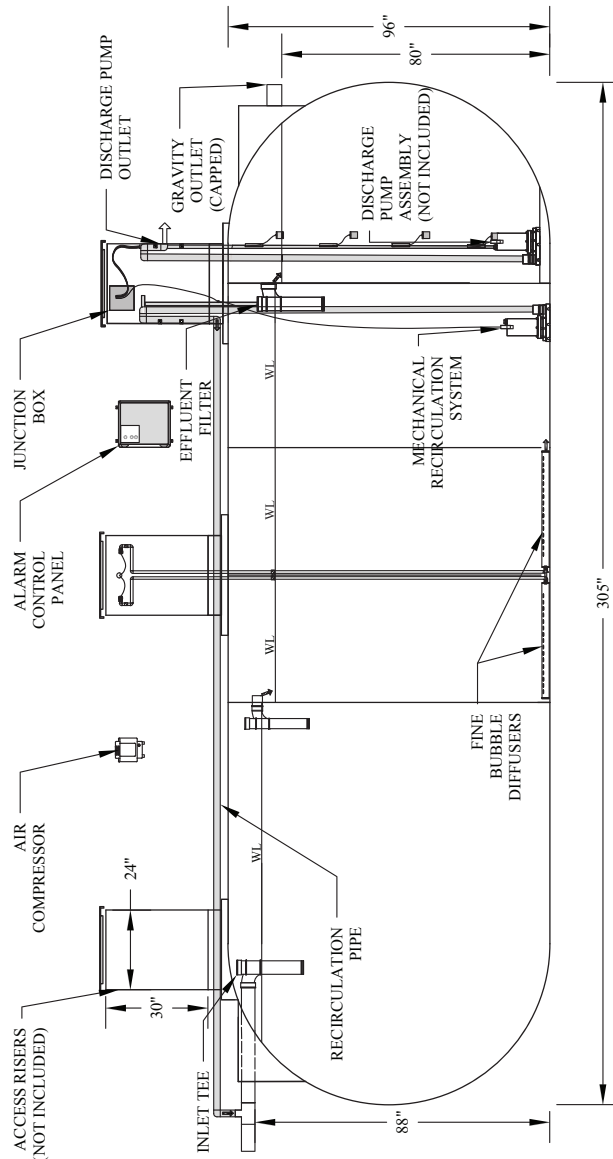
ES25 Drawing

ENVIROSERVER - ES SERIES ES25-PUMP/MRP

DESCRIPTION:

PRIMARY AND SECONDARY WASTEWATER TREATMENT DEVICE USING BOTH FIXED FILM AND SUSPENDED GROWTH WITH MULTI-STAGE AEROBIC PROCESS. TANK CAPACITIES LISTED ARE FOR STANDARD UNITS

DESIGN TREATMENT CAPACITY (gpd)	2500
TOTAL TANK CAPACITY (gsl)	7974
OVERALL LENGTH	25' - 5"
DIAMETER (in.)	96
INLET HEIGHT (in.)	88
OUTLET HEIGHT (in.)	80
BIOMEDIA VOLUME (cu. ft.)	80
AIR DIFFUSER	2-EDI FINE BUBBLE
AIR COMPRESSOR	2-HIBLOW HP200
RECIRCULATION CONTROL	MECHANICAL
ALARM CONTROL PANEL	PROPRIETARY
REMOTE TELEMETRY	OPTIONAL
DISCHARGE PUMP	OPTIONAL



MODEL: ES25 ENVIROSERVER ADVANCED WASTEWATER TREATMENT SYSTEM	PROJECT: INSTALLATION DRAWING		233 MADERO ST MISSION VIEJO, CA 92691 1(877)ASEPTIC [1-877-473-7842] www.microseptic.com
	DRAWN BY: NONE	REV. DWG DATE: 12/30/2019	
SCALE: XXX XXXX XXXX Copyright Information © 2020 MST Manufacturing Inc. All Rights Reserved.			

Effluent Filter (After July 2020) ES4.5, ES6, ES7.5, ES12, and ES25



PL-122 Effluent Filter

PL-122 Filter

The PL-122 was the original Polylok filter. It was the first filter on the market with an automatic shut-off ball installed with every filter. When the filter is removed for regular servicing, the ball will float up and prevent any solids from leaving the tank. Our patented design cannot be duplicated.

Features:

- Offers 122 linear feet of 1/16" filter slots, which significantly extends time between cleaning.
- Has a flow control ball that shuts off the flow of effluent when the filter is removed for cleaning.
- Has its own gas deflector ball which deflects solids away.
- Installs easily in new tanks, or retrofits in existing systems.
- Comes complete with its own housing. No gluing of tees or pipe, no extra parts to buy.
- Has a modular design, allowing for increased filtration.

PL-122 Installation:

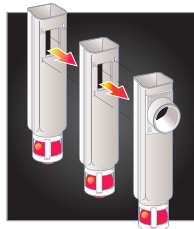
Ideal for residential waste flows up to 3,000 gallons per day (GPD). Easily installs in any new or existing 4" outlet tee.

1. Locate the outlet of the septic tank.
2. Remove the tank cover and pump tank if necessary.
3. Glue the filter housing to the outlet pipe, or use a Polylok Extend & Lok if not enough pipe exists.
4. Insert the PL-122 filter into tee.
5. Replace and secure the septic tank cover.

PL-122 Maintenance:

The PL-122 Effluent Filter will operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped, or at least every three years.

1. Do not use plumbing when filter is removed.
2. Pull PL-122 cartridge out of the tee.
3. Hose off filter over the septic tank. Make sure all solids fall back into septic tank.
4. Insert filter back into tee/housing.



Polylok offers the only filter on the market where you can get more GPD by simply snapping our filters together!

Patent Numbers
6,015,488 & 5,871,640



Outdoor SmartFilter® Alarm
Polylok, Zabel & Best filters accept the SmartFilter® switch and alarm.

Effluent Filter (Prior to July 2020) ES4.5, ES6, ES12, ES25



Effluent Filters

EF-6



ANSI/NSF
Standard 46



244 ft. of
1/16"
filtration
area.

4" Sch. 40 &
SDR-35

TB-6
T-Baffle™



ANSI/NSF
Standard 46
COMPONENT

Molded-in
Gas/Solids
Deflector

Installation:

Tuf-Tite Effluent Filters are designed to extend the life of your drainfield by preventing solids from leaving the septic tank. The filter fits into either a 4" or 6" Tee Baffle which in many cases is already attached to the outlet pipe. If a Tee Baffle is not installed, install as shown in Figure 2, allowing enough clearance from the end of the tank to permit easy filter access.

1. Insert the filter into the Tee Baffle with arrow on the top of the filter pointing toward the outlet pipe (as shown in Figure 1 and Figure 2).
2. Push down firmly until top of the filter seats into hub of the Baffle Tee.

Maintenance:

Tuf-Tite Effluent Filters will, under normal conditions, operate efficiently for several years or more before requiring removal and cleaning. It is suggested that the unit be cleaned every time the tank is pumped or at least every three years.

1. Do not use plumbing during filter cleaning.
2. Pull the filter straight out of the Tee.
3. Hose filter off, making sure that all solids fall back into the septic tank, not back into the Tee Baffle.
4. Replace filter as in installation instructions above.

For replacement parts and warranty information, contact Tuf-Tite, Inc. 800-382-7009

EF-4
EF-6



ANSI/NSF
Standard 46

TB-4
TB-6



ANSI/NSF
Standard 46
COMPONENT



Figure 1:

Arrow on top of filter unit must point in the direction of the outlet pipe. Top rim of filter will seat in hub of Tee.

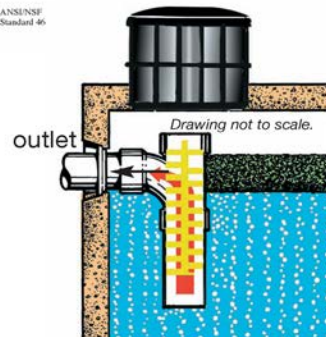


Figure 2:

Diagram of installed filter and Tee Baffle. Note: drawing is not to scale.

ES25 Effluent Filter (After July 2020)



PL-525 Effluent Filter

PL-525 Filter

The PL-525 Filter is rated for 10,000 GPD (gallons per day) making it one of the largest filters in its class. It has 525 linear feet of 1/16" filtration slots. Like the Polylok PL-122, the Polylok PL-525 has an automatic shut-off ball installed with every filter. When the filter is removed for cleaning, the ball will float up and temporarily shut off the system so the effluent won't leave the tank.

Features:

- Rated for 10,000 GPD (gallons per day).
- 525 linear feet of 1/16" filtration.
- Accepts 4" and 6" SCHD 40 pipe.
- Built in gas deflector.
- Automatic shut-off ball when filter is removed.
- Alarm accessibility.
- Accepts PVC extension handle.

PL-525 Installation:

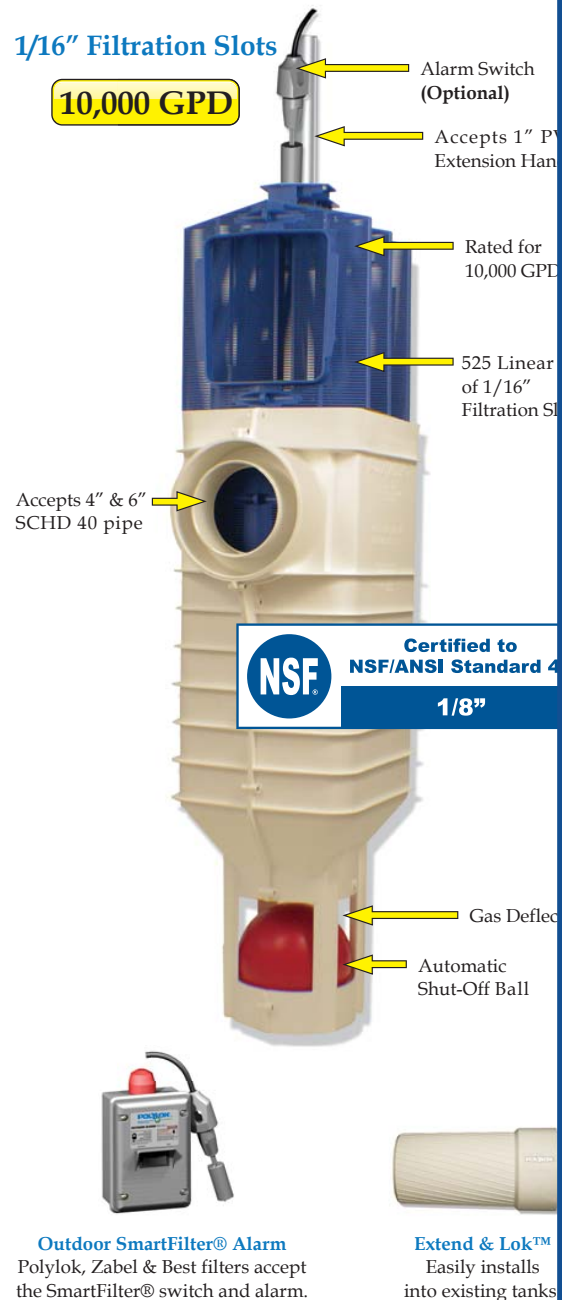
Ideal for residential and commercial waste flows up to 10,000 gallons per day (GPD).

1. Locate the outlet of the septic tank.
2. Remove the tank cover and pump tank if necessary.
3. Glue the filter housing to the 4" or 6" outlet pipe. If the filter is not centered under the access opening use a Polylok Extend & Lok or piece of pipe to center filter.
4. Insert the PL-525 filter into its housing.
5. Replace and secure the septic tank cover.

PL-525 Maintenance:

The PL-525 Effluent Filters will operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped, or at least every three years. If the installed filter contains an optional alarm, the owner will be notified by an alarm when the filter needs servicing. Servicing should be done by a certified septic tank pumper or installer.

1. Locate the outlet of the septic tank.
2. Remove tank cover and pump tank if necessary.
3. Do not use plumbing when filter is removed.
4. Pull PL-525 cartridge out of the housing.
5. Hose off filter over the septic tank. Make sure all solids fall back into septic tank.
6. Insert the filter cartridge back into the housing making sure the filter is properly aligned and completely inserted.
7. Replace and secure septic tank cover.



Compressors ES4.5, ES6, and ES12

LINEAR AIR PUMPS **HIBLOW®**

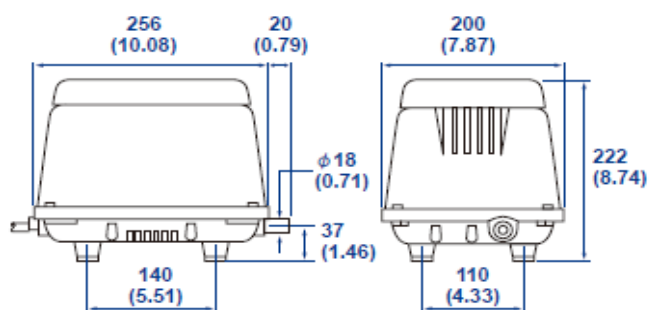


HP-100LL, 120LL

PRESSURE TYPE

Dimensions

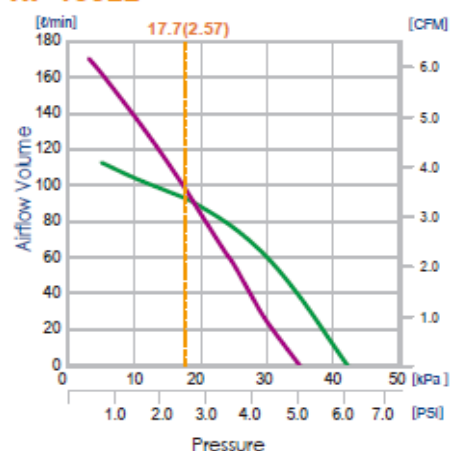
[Unit: mm(inch)]



Performance Curves

--- Rated Loading Pressure [kPa(Psi)]
— 50Hz — 60Hz

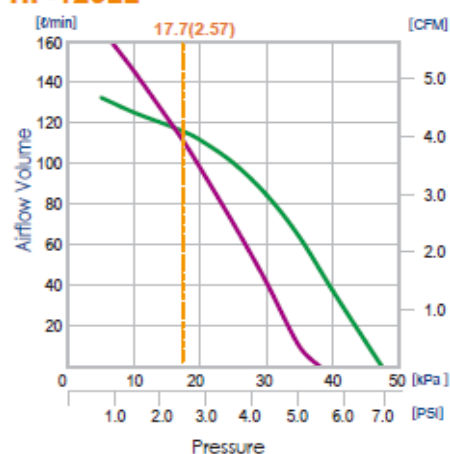
HP-100LL



Specifications

		HP-100LL	HP-120LL
Rated Voltage	V	AC100 / 110-120 / 220-240	
Power Supply Frequency	Hz	60	50 / 60
Rated Loading Pressure	kPa	17.7	
Airflow Volume	l/min	100	120
Power Consumption	W	75	90 / 100
Noise Level	dBA	42	
Weight	kg	9.0	

HP-120LL



- Flow measured in Normal(NL/min)
- Performance data is representative of typical values.
- Specifications and performance data are subject to change without notice.
- Purchaser is responsible for determining suitability for product applications
- "HIBLOW" is a registered mark of Techno Takatsuki co., Ltd.

HIBLOW USA
www.hiblow-usa.com
1300 Tefft Court, Suite 8 Saline, Michigan 48176
P: 734-429-5618 F: 734-944-5163

ES 7.5 and ES25

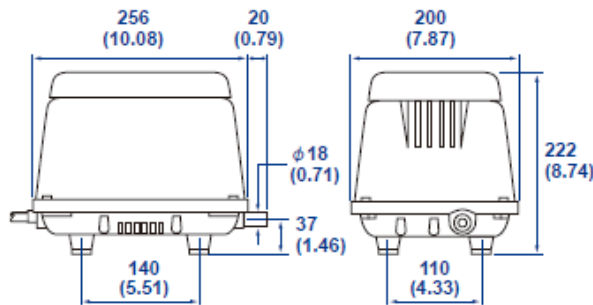
LINEAR AIR PUMPS
HIBLOW®



HP-150, 200
PRESSURE TYPE

Dimensions

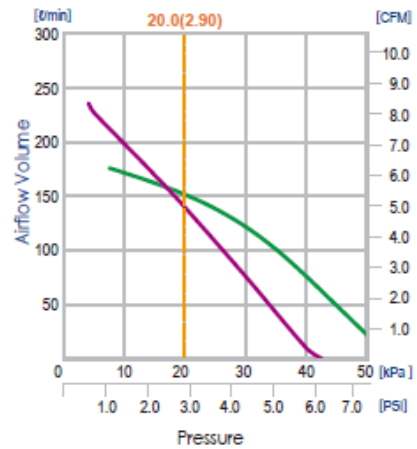
[Unit: mm(inch)]



Performance Curves

--- Rated Loading Pressure [kPa(Psi)]
— 50Hz — 60Hz

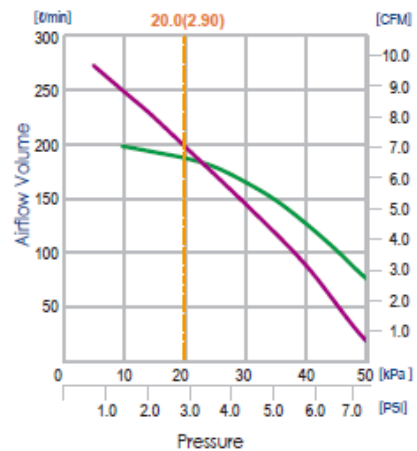
HP-150



Specifications

		HP-150		HP-200	
Rated Voltage	V	AC100 / 110-120 / 220-240			
Power Supply Frequency	Hz	50	60	50	60
Rated Loading Pressure	kPa	20.0			
Airflow Volume	l/min	150		200	
Power Consumption	W	125	155	210	250
Noise Level	dBA	45	47	46	48
Weight	kg	9.0			

HP-200



- Flow measured in Normal(NL/min)
- Performance data is representative of typical values.
- Specifications and performance data are subject to change without notice.
- Purchaser is responsible for determining suitability for product applications
- "HIBLOW" is a registered mark of Techno Takatsuki co., Ltd.

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Floats

SJE SIGNALMASTER® Control Switch

Mechanically-activated, narrow-angle float switch designed to activate pump control panels and alarms.

This narrow-angle sensing device is used to accurately monitor liquid levels in:

- water
- sewage applications

The SJE SignalMaster® control switch is not sensitive to rotation.

Normally Open Model (high level)

The control switch turns on (closes) when the switch tips slightly **above** horizontal signaling a high level, and turns off (opens) when the switch drops slightly below horizontal.

Normally Closed Model (low level)

The control switch turns on (closes) when the switch drops slightly **below** horizontal signaling a low level, and turns off (opens) when the switch tips slightly above horizontal.



FEATURES

- Mechanically-activated, snap action contacts.
- High impact, corrosion resistant, polypropylene float housing.
- Not sensitive to rotation.
- Control differential of 1.5 inches (4 cm) above or below horizontal.
- Yellow colored cap for easy identification of normally open control switch.
- White colored cap for easy identification of normally closed control switch.
- UL Listed for use in water and sewage.
- CSA Certified.
- Five-year limited warranty.



SPECIFICATIONS

CABLE: flexible 18 gauge, 2 conductor (UL, CSA) SJOW, water-resistant (CPE)

FLOAT: 2.74 inch diameter x 4.83 inch long (7.0 x 12.3 cm) high impact, corrosion resistant, polypropylene housing for use in sewage and water up to 140° F (60° C)

MAXIMUM WATER DEPTH: 30 feet (9 meters), 13 PSI (90 kPa)

ELECTRICAL: 5 amp, 125/250 VAC, 50/60 Hz

NOTE: This switch is not recommended for controlling:

- electric loads less than 100 milliamps, 12 VAC
- non-arcing electric loads

OPTIONS

This switch is available:

- CE certified unit available upon request.
- for normally open (high level) applications or normally closed (low level) applications.
- in standard cable lengths of 10, 15, 20, or 30 feet and 3, 5, 6, or 10 meters (longer lengths available)
- with two mounting options that allow for flexibility in installation:

Mounting Clamp: for applications where the switch can be attached to a discharge pipe or similar mounting device.

Externally Weighted: for applications where the switch can be suspended from above.

California Prop 65 requires the following: WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

**SEE REVERSE SIDE FOR ORDERING INFORMATION.
SEE PRICE BOOK FOR LIST PRICE.**



SJE RHOMBUS.

1-888-DIAL-SJE • 1-218-847-1317
1-218-847-4617 Fax

email: customer.service@sjeinc.com

www.sjrhombus.com

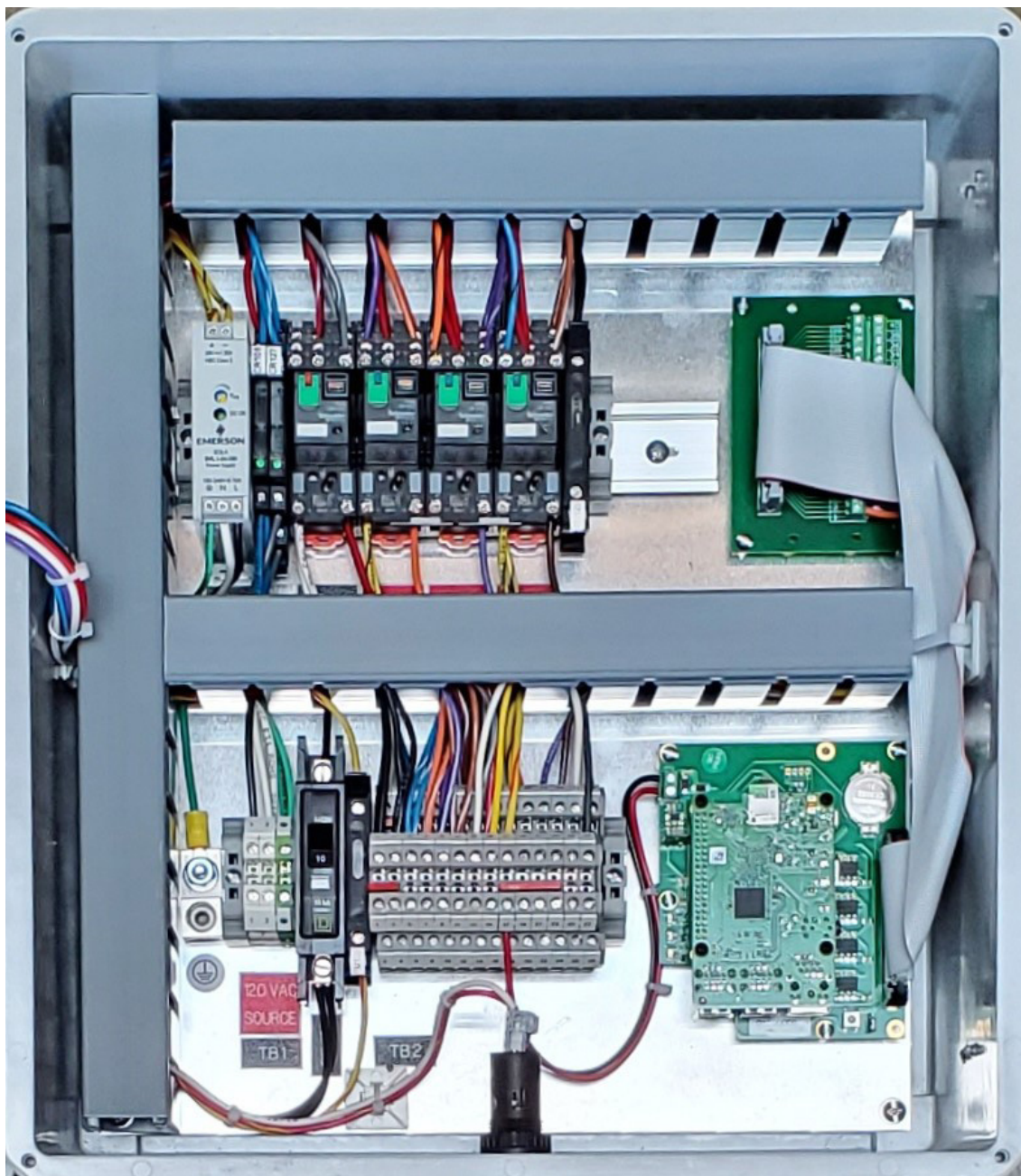
G.7

Alarm Control Panel



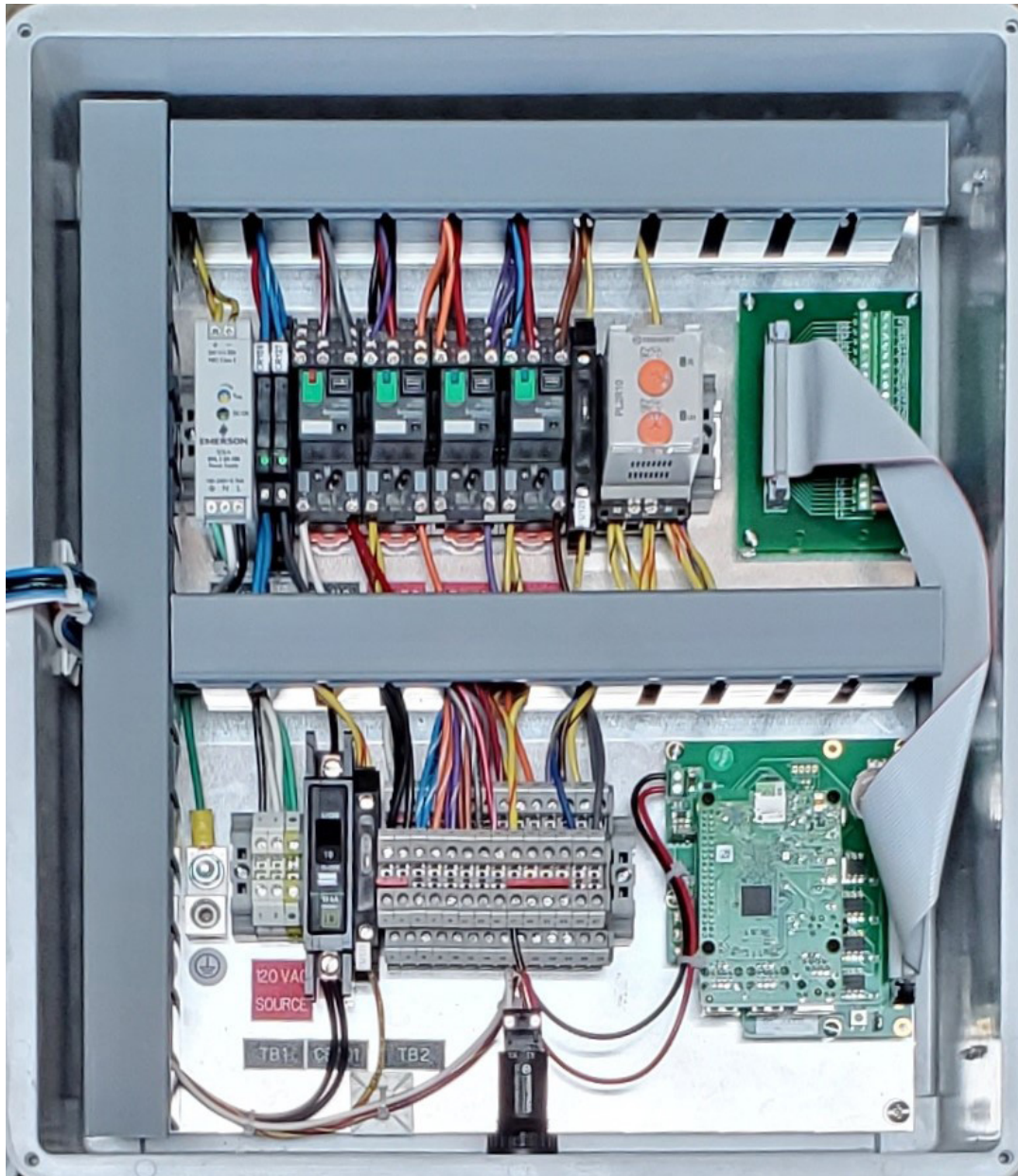
Panel	Controls	Length	Width	Depth
Gravity (MRP/Sol)	Relays	17"	16"	6"
Pump	PLC/Relays	22"	18"	9"

Gravity



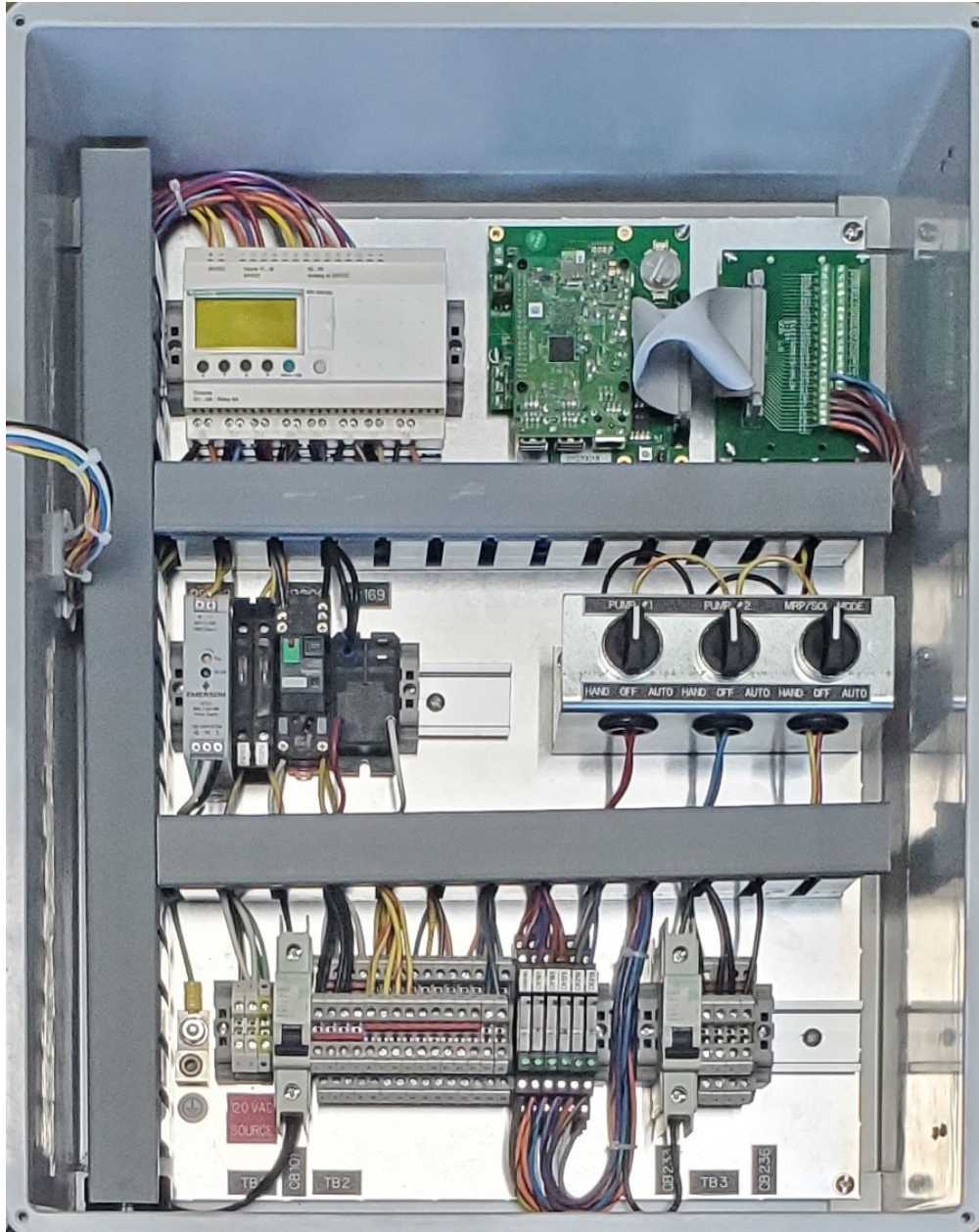
- ◇ 120V incoming power
- ◇ Relay controls for recirculation pumps and alarms
- ◇ Compressor power control
- ◇ UV power control
- ◇ High level alarm
- ◇ Low air pressure alarm
- ◇ UV alarm
- ◇ One spare normally open dry contact for alarm
- ◇ Accepts 120V Remote Alarm input from secondary panel for telemetry notifications
- ◇ Pictured with optional T100i telemetry

Gravity with recirculation control



- ◇ 120V incoming power
- ◇ MRP/Solenoid Timer control
- ◇ Relay controls for recirculation pumps and alarms
- ◇ Compressor power control
- ◇ UV power control
- ◇ High level alarm
- ◇ Low air pressure alarm
- ◇ UV alarm
- ◇ One spare normally open dry contact for alarm
- ◇ Accepts 120V Remote Alarm input from secondary panel for telemetry notifications
- ◇ Pictured with optional T100i telemetry

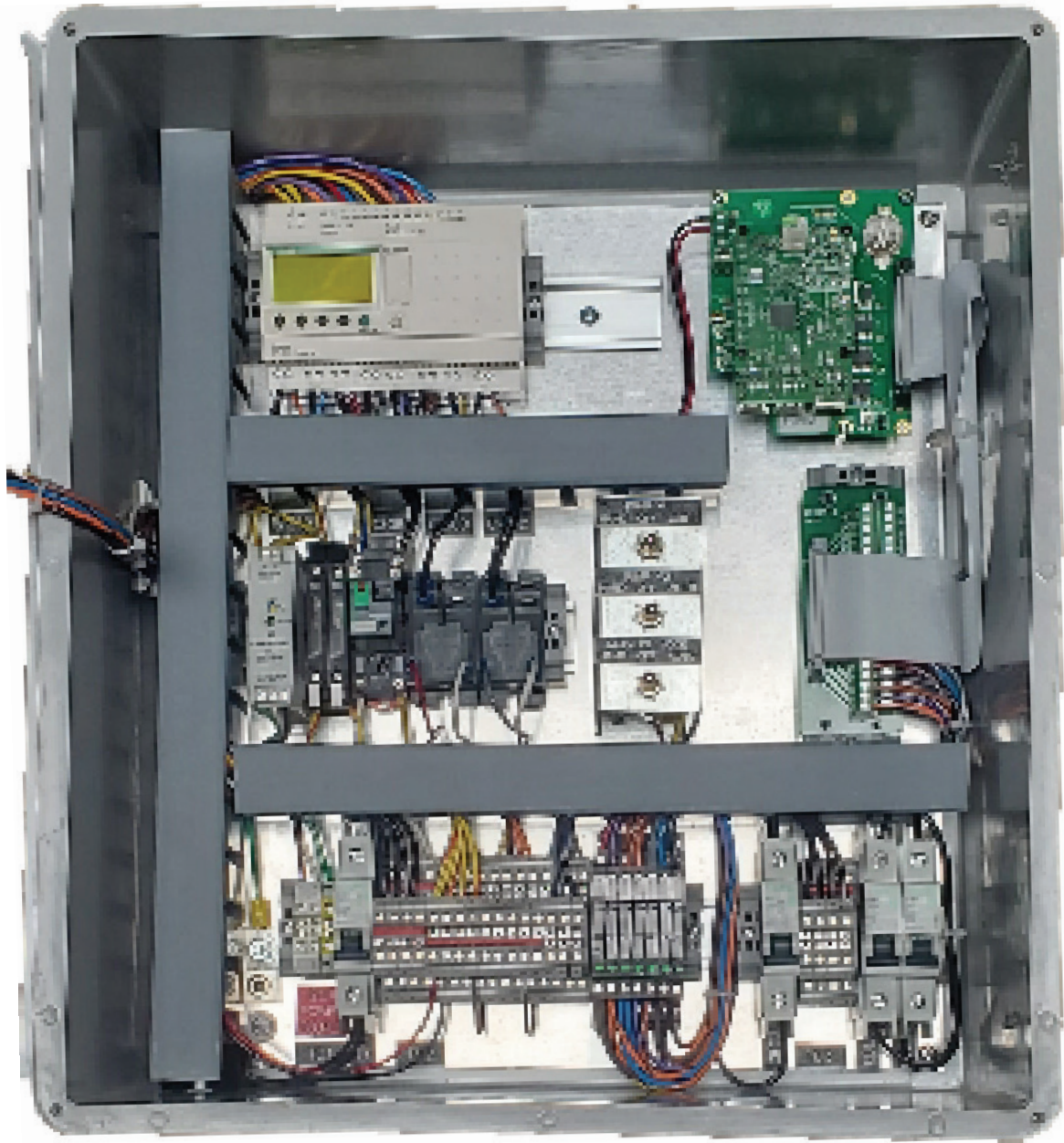
Simplex discharge with recirculation control



- ◇ PLC based
- ◇ 120V incoming power
- ◇ 120V output power for discharge pumps up to 1/2HP
- ◇ Relay controls for discharge pumps and alarms
- ◇ Demand-dose or timed-dose control for discharge pumps
- ◇ Separate circuit breaker(s) for PLC and pumps
- ◇ Hand/off/auto switches for pumps
- ◇ Controls for timed recirculation (24V Solenoid and

- 120V for MRP)
- ◇ Compressor power control
- ◇ UV power control
- ◇ High level alarm
- ◇ Low air pressure alarm
- ◇ UV alarm
- ◇ One spare normally open dry contact for alarm
- ◇ Accepts 120V Auxiliary Alarm input from secondary panel for telemetry notifications

Duplex discharge with recirculation control



- ◇ PLC based
- ◇ 120V incoming power
- ◇ 120V output power for discharge pumps up to 1/2HP
- ◇ Relay controls for discharge pumps and alarms
- ◇ Demand-dose or timed-dose control for discharge pumps
- ◇ Separate circuit breaker(s) for PLC and pumps
- ◇ Hand/off/auto switches for pumps
- ◇ Controls for timed recirculation (24V Solenoid and 120V for MRP)
- ◇ Compressor power control
- ◇ UV power control
- ◇ High level alarm
- ◇ Low air pressure alarm
- ◇ UV alarm
- ◇ One spare normally open dry contact for alarm
- ◇ Accepts 120V Auxiliary Alarm input from secondary panel for telemetry notifications

UV Disinfection (optional Supplied by others)

Salcor 3G Disinfection Unit

NOTE: Not all dimensions to scale

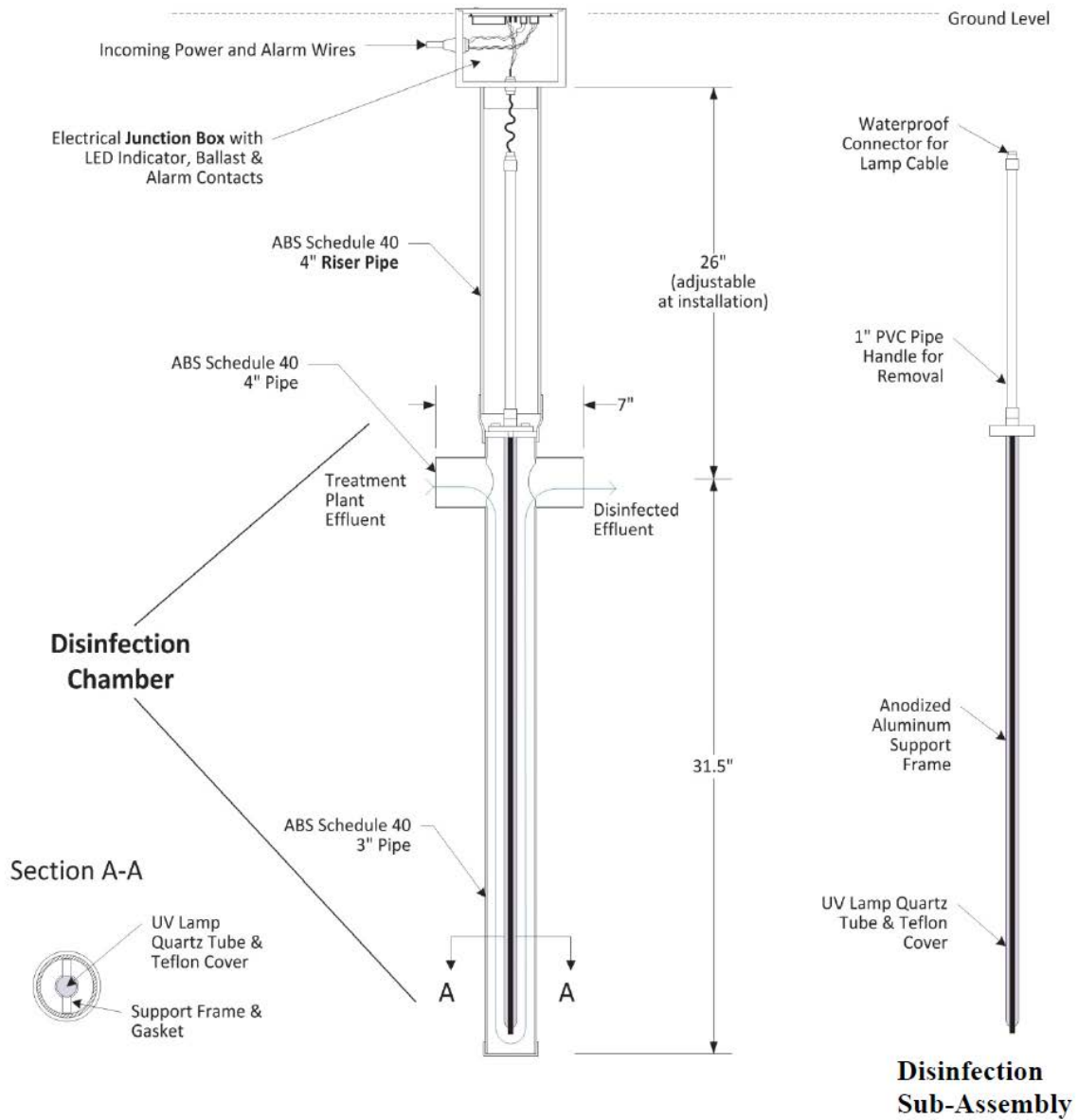
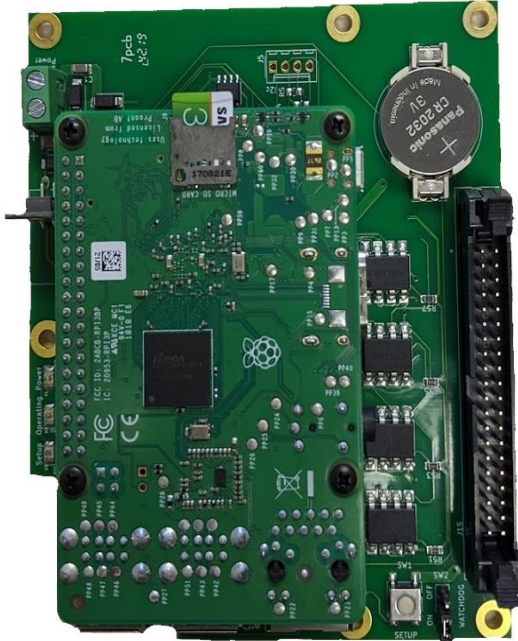


Figure 1

Telemetry T100i



- ◇ 24V incoming power
- ◇ Network cable ready
- ◇ WI-FI Enabled
- ◇ Monitors
 - ◇ UV alarm
 - ◇ Air pressure
 - ◇ High water alarm
 - ◇ Low water conditions
 - ◇ Peak float enabled

- ◇ Spare/Remote alarm input from secondary panel

Testing and Feild Data

	NSF/ANSI STD 40**			University of California Riverside ₂			Ventura Regional Sanitation District ₃			Cincinnati Demonstration ₄			Field Sample 2006-2012 ₅			Field Samples 2013-2019 ₆		
	BOD	TSS	TN ₁	BOD	TSS	TN	BOD	TSS	TN	BOD	TSS	TN	BOD	TSS	TN	BOD	TSS	TN
Effluent Mean₈	6	8	2	5.7	4	7	4.6	9.9	15.9	12	13	11.9	4	6	16	8	12	17
STD DEV	9	7	.4	3.1	4.1		3	4		10	12		10	11	11	12	12	15
% Reduction₇	95%	92%	95%	91%	90%	88%	91%	91%	59%	80%	81%	75%	78%	78%	78%	78%	78%	81%

₁ In 1999 MicroSepTec contracted with NovaTec to test the EnviroServer in support of its application for NSF certification. NovaTec conducts official NSF/ANSI Standard 40 testing under contract for manufacturers at its facility in British Columbia, Canada. MicroSepTec elected to sample for Nitrogen reduction during its NSF standard 40 testing although there was no nitrogen standard (e.g. Standard 245) at the time of the test. Dates: May 1999- September 1999*, Location: British Columbia,

Average Daily Flow: 600GPD, * Nitrogen testing was completed following NSF Standard 40 Testing. **Full report available upon request

₂In February of 1999 MicroSepTec authorized the Department of Chemical and Environmental Engineering at the University of California, Riverside (UCR) to conduct a full-scale treatment study to evaluate the capabilities of the Enviroserver, a proprietary residential wastewater treatment process manufactured and sold by MicroSepTec. The evaluation was conducted in three main parts: 1) initial acclimation period, 2) longterm removal efficiency, and 3) stress loading study. Unaltered, raw wastewater from a single-household residence located on the UCR campus was used as influent to an Enviroserver residential wastewater treatment unit provided by MicroSepTec. Dates: February 1999-August 1999*, Location: Riverside, CA, Average Daily Flow: 600GPD, * February and March consisted of grab sampling and March to August consisted of composite sampling ** Full report available upon request

₃ The Ventura Regional Sanitation District (VRSD) in Ventura County, California, field-tested and evaluated six different Advanced on-site Sanitary Systems (OSS) from four different manufacturers. The demonstration was partially funded by grant moneys from the United States Environmental Protection Agency (EPA) via the CA RWQCB. The purpose of this Septic Tank Nutrient Removal Project (STNR) was to demonstrate the typical wastewater treatment levels, and particularly the degree of nutrient removal by advanced OSS. Dates: August 2000, Location: Ventura California, Average Daily Flow: 600GPD, **Full report available upon request

₄ Demonstration/proving test for the city of Cincinnati, Ohio to demonstrate the effectiveness of the EnviroServer for use as an alternative for areas of the city that municipal sewer was cost prohibitive. Systems in this area were intended to be owned and operated by the city of Cincinnati. Dates: 2014-2015 (18 Months), Location: Cincinnati, Ohio, Average Daily Flow: 600GPD

₅ MicroSepTec receives third party field grab samples from authorized service providers throughout the year. This section is all third party grab samples supplied to MicroSepTec. Systems being sampled range in age from 6 months up to 15 years of activity Dates: February January 2006- December 2012, Location: Various (US Locations), Number of samples: 219, Average Daily Flow: Various single family homes to commercial applications ranging from 500GPD to 10,000 GPD

₆ MicroSepTec receives third party field grab samples from authorized service providers throughout the year. This section is all third party grab samples supplied to MicroSepTec. Systems being sampled range in age from 6 months up to 15 years of activity Dates: February January 2006- December 2012, Location: Various (US Locations), Number of samples: 219, Average Daily Flow: Various single family homes to commercial applications ranging from 500GPD to 10,000 GPD

₇ Percent reduction of TN based on 70 mg/L unless otherwise stated in full reports.

₈Influent based on NSF/ANSI STD 40 Influent

Limited Warranty

MicroSepTec EnviroServer ES Series

What is covered: MST Manufacturing, Inc. (“MST”) warrants the parts in each EnviroServer Advanced Treatment System to be free from defects in material and workmanship for a period of two years from the date of initial installation as evidenced by the installer’s Installation Sign-Off Form, or three years from date of sale, whichever occurs first. In order to activate warranty the Tank Installation Sign-Off Form and Startup Form must be submitted to MST.

What MST will do to correct problems: MST’s sole obligation under this warranty is to fulfill this warranty by repairing or exchanging, at the sole discretion of MST, any component part, F.O.B. factory, that, in MST’s judgment, shows evidence of defects – provided said component part has been paid for and is returned through an authorized dealer or distributor, delivery charges prepaid, along with proof of the date of original purchase, date of installation sign-off, and a written statement from the warranted specifying the nature of the defect.

What this warranty does not cover: This warranty covers only normal residential use within the United States. MST cannot warranty the treatment performance of the system since it cannot predict or control the nature of the influent and the effect of the influent on the biological process. MST is not responsible for warranty service should the MST label, the rating label, or serial number be removed or should the product fail to be properly maintained or fail to function properly as a result of misuse, abuse, improper installation, neglect, improper shipping, damage caused by disasters such as fire, flooding by external means, lightning, improper wiring or electrical current, interaction with non-MST products, service other than by a MST Authorized Service Provider, or the introduction of hazardous or harmful materials into the system.

This warranty applies only to the EnviroServer and does not include the chlorine tablets or UV lamp, if applicable, or any of the existing on-site wiring, plumbing, venting, drainage, or additional disposal system components. In addition to, and not in limitation of anything else contained in this warranty, MST is not responsible for any delay or damages caused by defective components or material, or for loss incurred because of interruption of service, or for any other special or consequential damages or incidental expenses arising from the manufacture, sale, or use of the EnviroServer.

The EnviroServer wastewater treatment system is based on a biological process using natural bacteria and oxygen to efficiently digest the waste in the water. The following items are examples of substances that should never be introduced into an on-site system because they can overtax or destroy the biological digestion or clog pumps and pipes and constitute misuse and/or abuse of the system: water softeners; excessive amounts of fat, grease or oil; coffee grounds; disposable diapers; feminine hygiene products; condoms; cigarette butts; gauze or adhesive bandages; cotton swabs; dental floss; cat litter; excessive amounts of disinfectants, detergents & cleaning supplies; chemicals, such as paints, varnishes, thinners, oils, photographic solutions, pesticides; construction debris; and prescription medicines.

MST reserves the right to revise, change, or modify the construction and design of the EnviroServer or any component part or parts thereof without incurring any obligation to make such changes or modifications in previously manufactured equipment. MST also reserves the right, in making replacements of component parts under this warranty, to furnish a component part which, in its judgment, is equivalent to the part being replaced. In addition to, and not in limitation of anything else contained in this warranty, under no circumstances will MST be responsible for any other direct or consequential damages, including (but not limited to) lost profits, lost income, labor charges, delays in production, and/or idle production, which result from defects in material and/or workmanship of the EnviroServer.

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